Alyxia Banks ex R.Br. in New Caledonia: a clarification of several species complexes, nomenclatural notes, and a description of three new species

Guillaume Lannuzel, Jérôme Munzinger, Hervé Vandrot, Gildas Gâteblé

Phytotaxa 649 (1): 001–043
https://www.mapress.com/pt/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.649.1.1

Alyxia Banks ex R.Br. in New Caledonia: a clarification of several species complexes, nomenclatural notes, and a description of three new species

GUILLAUME LANNUZEL[1, 3], JÉRÔME MUNZINGER[2], HERVÉ VANDROT[3] & GILDAS GÂTEBLÉ[4]
[1]*ecolinK, environmental consultancy, BP 1009, 98890 Païta, New Caledonia*
ecolink-nc@proton.me; https://orcid.org/0000-0002-9460-1178
[2]*AMAP, Univ. Montpellier, IRD, CIRAD, CNRS, INRAE, F-34398 Montpellier, France*
jerome.munzinger@ird.fr; https://orcid.org/0000-0001-5300-2702
[3]*Endemia, Plant Red List Authority, BP 4682, 98847 Nouméa, New Caledonia*
hervevandrot@gmail.com; https://orcid.org/0009-0008-4195-6996
[4]*INRAE, UEVT 1353, 90 Chemin Raymond, 06160 Antibes Juan-les-Pins, France*
gildas.gateble@inrae.fr; https://orcid.org/0000-0003-2831-6384

Abstract

The genus *Alyxia* Banks ex R.Br. is partially revised for New Caledonia, with 31 species recognised. The species complex *Alyxia tisserantii* Montrouz. is discussed and divided into seven species with existing names, and the synonymy is updated accordingly. *Alyxia loeseneriana* var. *macrocarpa* Boiteau is elevated to species status due to new flowering material with the name *A. paniensis* Lannuzel *nom. nov., stat. nov*. created to accommodate it, due to the preexisting *Alyxia macrocarpa* Koord. Detailed study of *Alyxia caletioides* (Baill.) Guillaumin ex Däniker revealed it was in fact made up of two distinct taxa; a new separate species, *Alyxia urceolata* Lannuzel, *sp.nov*. is therefore described. Two new species are also described following their recent collection: *Alyxia humboldtensis* Lannuzel & Gâteblé, *sp.nov*. is restricted to the summit of Mount Humboldt, and *Alyxia minimiflora* Lannuzel, *sp.nov.* is known from schistaceous cliffs around Nouméa. Finally, several nomenclatural issues are discussed, and an updated key to the genus in New Caledonia is provided.

Key words: *Alyxia*, New Caledonia, Apocynaceae, Alyxieae, Pacific

Introduction

During a research project to identify New Caledonian endemic species threatened by nickel mining activities (Lannuzel *et al.* 2022a, Lannuzel *et al.* 2022b), we found that an update of Middleton's (2002) last revision of the genus *Alyxia* Banks ex R.Br. in the Pacific islands and Australia was sorely needed for New Caledonia. The genus *Alyxia* belongs to the Apocynaceae family, in the Rauvolfioids grade, and to the tribe Alyxieae G.Don. It comprises about 106 species from northeast India, southeast Asia, Malesia, Australia and the Pacific Islands (Endress *et al.* 2018). Two relatively recent local and regional revisions of the genus were carried out by Boiteau (1981) and Middleton (2002), who respectively recognized 31 and 21 species respectively in New Caledonia. This difference in the number of species is essentially due to the fact that Middleton (2002) included several of Boiteau's species concepts within *Alyxia tisserantii* Montrouz. Middleton (2002) acknowledged, however, that more in-depth work was needed in order to clarify some species concepts. This situation led to great confusions by local field botanists because the current *Alyxia tisserantii* species concept makes it a highly variable taxon, regarding its morphology and ecology. A partial revision of the genus should therefore add more clarity for field botanists and conservation bodies. Among the New Caledonian species as circumscribed by Middleton (2002), only two are not endemic: *Alyxia podocarpa* Van Heurck & Müll.Arg., which is also native to Vanuatu, and *Alyxia stellata* (J.R.Forst. & G.Forst.) Roem. & Schult., a widely distributed species in Australia and the Pacific Islands. *Alyxia stellata* is another problematic species complex. Middleton (2002) made a thorough discussion of its typification but was unable to determine whether the type (*J.R. & G. Forster s.n.*) was from Society islands or Tonga. However, within the synonyms currently accepted, two originate from New Caledonia: *Gynopogon brevipes* Baill., which was collected on Lifou island (*Balansa 2427*), and *Alyxia brevipes* var. *macrocarpa* Däniker, which was collected on Maré island (*Däniker 3105*). This species is known to be of cultural importance in

Accepted by Yohan Pillon: 13 Apr. 2024; published: 16 May 2024

the Pacific islands. It is harvested for its bark, leaves and seeds, which are used for leis crafting and religious offerings (Jost *et al.* 2016, Kamelamela *et al.* 2023). The similarity of the names, such as 'maile' in Hawai'i (Kamelamela *et al.* 2023) or 'maire' in the Cook Islands and Tahiti (Whistler 1990) also suggests a shared knowledge of this plant between the various Pacific people. Such cultural uses could have led to past exchanges between islands, therefore obscuring its taxonomy and true wild distribution, unlike other *Alyxia* species.

We chose here not to deal with this species complex, as this taxon covers a wide geographic area, and therefore needs a dedicated wide-scale revision which is beyond the scope of this study. Consequently, Middleton's (2002) *Alyxia stellata* circumscription is not discussed here.

The first of the names currently included in New Caledonian *Alyxia* were first published in *Gynopogon* J.R.Forst & G.Forst (Forster & Forster 1776) and then in *Alyxia* Banks ex R.Br. (Brown 1810). Later, Guillaumin (1911), in the first reliable catalogue of New Caledonian flora, cited numerous species with both genus' names, without making a formal combination under *Alyxia*. He then made accurate combinations in the first revision of Apocynaceae in New Caledonia (Guillaumin 1941) because *Gynopogon* was rejected. Over 50 names were published in *Alyxia* and *Gynopogon* for New Caledonia. Most were published by van Heurck (1871), Baillon (1889), Schlechter (1906), Guillaumin (1941, 1957) and Boiteau & Allorge (1979). The remaining ones were published by Forster & Forster (1776), Montrouzier (1860), Moore (1921) and Däniker (1933).

Later, in his revision of the genus, Middleton (2002) performed tremendous nomenclatural work, thus limiting our contribution to several additions and precision. Our main focal point, for this first step towards a full revision of the genus in New Caledonia, therefore aims at re-circumscribing some species, especially within the *A. tisserantii* complex, and describing three species new to science. A new name is also created to raise a taxon to species level. Most species previously included in the *A. tisserantii* complex are illustrated in order to avoid further confusions.

Finally, this study can also be read with the advances of the IUCN Red List Authority of New Caledonia (RLA—Plants NC—held by Endemia NGO, Meyer *et al.* 2022) which evaluated the extinction risks of each taxon discussed here in a workshop held in 2022. Conservation statuses are not discussed here, but can be found on http://www.endemia.nc website and soon on IUCN red list website (https://www.iucnredlist.org/).

Materials and methods

This revision is based on morphological examination of *Alyxia* material from the NOU and P herbaria and images of specimens held at A, AWH, BM, K, L and Z (acronyms following Thiers 2020+). Morphological descriptions and terminology follow Harris and Harris (2001). In addition to dried specimens, most species of interest for the project were researched in the field to document more precisely their ecology and distribution and to make *in situ* photos as well as alcohol samples for later examination under a binocular Olympus SZ2-ILST equipped with a camera. Measurements were made using the RECOLNAT-ANNOTATE tool, version 1.9.5, accessible at https://www.recolnat.org/fr/annotate. Specimen locations were mapped with QGIS 3.16 (QGIS Development team 2021) to generate the distribution maps and to help in IUCN (2019) evaluation assessments.

Nomenclature

Lectotypification of most names in New Caledonian *Alyxia* and more broadly of the Apocynaceae species addressed in Boiteau (1981) could be qualified as unclear, implicit or inadvertent. Later, Middleton (2002) clarified the typification of all names and the nomenclatural status of most names can now be considered as clear. The remaining issues are treated here in accordance with Middleton (2002) and articles 7.11, 9.10 and 40.2 from Turland *et al.* (2018). We will thus follow Boiteau's typification as effective lectotypification (see Middleton 2002) even though better choices could have been made among the available syntypes and we will use second-step lectotypification when needed.

Species concept

Middleton (2000) has extensively discussed the validity of each of the morphological criteria for distinguishing species in the genus. Following his work, we mainly based our study on the characters he recognized as significant,

such as presence or absence of indumentum on the plant, phyllotaxy (leaves opposite, ternate, or in whorls of 4–5), inflorescence position, size and complexity and corolla size.

Middleton (2000) somehow rejected the bark color character, due to the absence of information on voucher labels. We have chosen to keep it, as it is sometimes valuable regarding the bark of young stems—present on vouchers—which can be grey, reddish, or display a grey and brown patchwork. Similarly, while recognizing that the size and shape of the fruit may be a good character in the genus (Middleton 2000), Middleton (2002) discarded it in the case of the large complex *Alyxia tisserantii*. After detailed study of the fruit variability in this complex, we have chosen to retain this character, while accepting a certain level of plasticity (due to variability and/or ripeness in vouchers). We therefore consider as characteristic: the length / width ratio of each fruit article (*i.e.* article rounded, ovoid, or very elongated), the mesocarp thickness (*i.e.* article obviously fleshy of not), the article number of each mericarp (*i.e.* 1–2 or 4–6), and finally three classes of article size (ca. 5 mm long, ca. 8 mm long, or longer in elongated articles).

As already noted by Middleton (2000), the habit character may be very confusing in *Alyxia*. While some species are clearly shrubs or vines, some others, such as *A. hurlimannii* Guillaumin, *A. pseudoserpentina* Boiteau or *A. tisserantii*, can present both habits, sometimes on the same plant, and often display leaf dimorphism between both shrubby and lianescent parts.

Finally, leaf shape and size is a complex issue, with some species having very stable leaves, while others are very unstable. This issue has certainly led to a great deal of confusion in the *A. tisserantii* complex. We accepted a certain level of plasticity in the leaf shape, along with shedding light on some species with very stable leaves.

All species cited in the key but not discussed in this paper follow Middleton (2002) concepts and synonymy.

Taxonomic treatment

Key to the New Caledonian species of *Alyxia* (updated from Middleton, 2002—criteria values are summarized for each species in the appendix)

1. Branchlets strongly angled; leaves in whorls of 4 or 5 2
- Branchlets terete to strongly angled; leaves opposite or in whorls of 3 3
2. Largest leaves 8.1–16.4 cm long, petiole 1–2 cm long; inflorescences branched several times with > 20 flowers ..... *Alyxia leucogyne* Van Heurck & Müll.Arg.
- Largest leaves 2.4–2.7 cm long, sessile, inflorescence a reduced and sessile to subsessile dichasial cyme ..... *Alyxia humboldtensis* Lannuzel & Gâteblé, *sp.nov.*
3. Leaves distinctly mucronate 4
- Leaves not distinctly mucronate 8
4. Branchlets sparsely to densely pubescent; leaves pubescent or glabrous beneath; sparsely pubescent around the outside of the corolla tube ..... *Alyxia mucronata* D.J.Middleton
- Branchlets and leaves glabrous; corolla tube glabrous outside 5
5. Inflorescences very lax, 4.8–14 cm long; pedicels 2.8–22 mm long; fruit articles somewhat sickle-shaped, 2.4–5.7 cm long ..... *Alyxia margaretiae* Boiteau
- Inflorescences variable, peduncle null to 3.8 cm long; pedicels 0.8–8.5 mm long; fruit articles ellipsoid or fusiform, 0.7–3.7 cm long 6
6. Leaf blade chartaceous to subcoriaceous; inflorescence 1–3-flowered; corolla tube 7.7–10.2 mm long, 5.4–8.5 times as long as sepals; fruit articles cylindrical ..... *Alyxia cylindrocarpa* Guillaumin
- Leaf blade subcoriaceous to coriaceous; inflorescence 3–11-flowered; corolla tube 3.2–9 mm long, 2.3–4.5 times as long as sepals; fruit articles ellipsoid 7
7. Inflorescence 7–11-flowered; peduncle not strongly flattened; corolla tube 3.2–4.2 mm long, 2.3–2.5 times as long as sepals ..... *Alyxia rubricaulis* (Baill.) Guillaumin
- Inflorescence 3-flowered; peduncle strongly flattened; corolla tube 5.8–7 mm long, 4.1–4.5 times as long as sepals ..... *Alyxia poyaensis* (Boiteau) D.J.Middleton
8. Sepals oblong, leafy, apex rounded to obtuse; inflorescences concentrated near branch ends; corolla tube densely puberulent outside; corolla lobes densely puberulent outside; fruit articles globular, black, very fleshy ..... *Alyxia sarasinii* Guillaumin
- Sepals ovate or lanceolate, leafy or not, if leafy then apex acute to acuminate; inflorescence position variable; corolla tube glabrous, puberulent around top of tube or only sparsely puberulent outside, corolla lobes glabrous outside; fruit articles of various shapes 9
9. Inflorescence 7–11-flowered; branchlets red ..... *Alyxia rubricaulis* (Baill.) Guillaumin
- Inflorescence 1–6(–7)-flowered, if 7-flowered then without red branchlets 10
10. Flowers mostly solitary, sometimes in small fascicules, leaves almost linear 11
-. Flowers in inflorescences of 2 or more, if solitary then not terminal; leaves variable in size and shape 12
11. Flowers subterminal or terminal and solitary, corolla tube ca. 8 mm long; leaves 0.5–2.2 by 0.15–0.45 cm ..... *Alyxia caletioides* (Baill.) Guillaumin ex Däniker

- Flowers mostly axillary, sometimes subterminal, solitary or in small fascicule, corolla tube ca. 3 mm long, leaves 0.9–1.3 by 0.15–0.25 cm ..... *Alyxia urceolata* Lannuzel, *sp.nov.*

12. Sepals 3.5–4.2mm long; bracts lanceolate or leafy, 4–11 mm long; leaves thickly coriaceous, margins mostly strongly inrolled..... ..... *Alyxia clusiophylla* (Baill.) Guillaumin ex Däniker
- Sepals 0.4–3 mm long; bracts mostly deltoid or ovate, rarely lanceolate or leafy, 0.5–2.5 mm long; leaves variable 13

13. Leaves dark green and dull above, venation obscure beneath, usually also obscure above; fruit with 2–8 articles, densely pubescent ..... *Alyxia podocarpa* Van Heurck & Müll.Arg.
- Leaves variable but generally shiny above, venation obscure to distinct beneath, not usually obscure on both surfaces; fruit with 1–6 articles, glabrous to only very sparsely pubescent 14

14. Leaf surfaces strongly discolorous, mostly with obscure venation beneath and often glaucous, corolla tube 5.5–9 mm long; fruit articles generally fusiform, 6.3–23.5 mm long..... *Alyxia baillonii* Guillaumin
- Leaf surfaces generally only slightly discolorous if at all, venation variable, only rarely glaucous but if so then corolla tube less than 5.5 mm long; fruit articles variable 15

15. Stamens inserted at 4.3–6.4 mm from corolla base 16
- Stamens inserted at 1–3.9 mm from corolla base..... 20

16. Petiole 0.1–0.2 cm long; leaves reaching 1.8–3.9 cm long; inflorescence delicate, peduncle at least 6 mm long, ca. 0.3 mm wide; corolla tube 4.3–7.8 mm long, fruit article elongated, longer than 7–7.5 mm ..... *Alyxia oppositifolia* Boiteau
- Petiole 0.3–1 cm long; leaves reaching 5.3–10 cm long; inflorescence robust, peduncle 2–7 mm long, 1.2–1.5 mm wide; corolla tube 6.5–8 mm..... 17

17. Leaf blade 3–5.3 by 0.9–2.4 cm; secondary veins on leaves only weakly visible beneath; inflorescence glabrous; sepals glabrous; corolla lobes ca. 4.3 mm long, corolla tube 1.6 times as long as lobes; ovary pubescent in tuft between carpels, fruit article rounded ca. 5 mm long ..... *Alyxia veillonii* D.J.Middleton
- Leaf blade 1.7–10 by 1–4.5 cm; secondary veins on leaves distinct beneath; fruit article ellipsoids 9–40 mm long 18

18. Inflorescence sparsely to densely puberulent all over; sepals densely puberulent; corolla lobes 2.3–3.5 mm long, tube 6.5–7.2 mm long ..... *Alyxia oubatchensis* (Schltr.) Guillaumin
- Inflorescence glabrous, sepals glabrous, corolla lobes ca. 4 mm long, tube ca. 8.5 mm long..... ..... *Alyxia paniensis* Lannuzel*, nom. nov., stat. nov.*

20. Branchlets sparsely to densely puberulent 21
- Branchlets glabrous 25

21. All inflorescences subterminal ..... *Alyxia kaalaensis* Boiteau
- Most inflorescences on a plant clearly axillary, occasionally also with a pseudoterminal inflorescence 22

22. Leaf blade densely pubescent on abaxial face..... *Alyxia nummularia* S.Moore
- Leaf blade glabrous, at least apparently 23

23. Leaf blade generally obovate, at least 6 mm wide, thickly coriaceous, often with obscure venation, often glaucous beneath; corolla tube 3.6–5.1 mm long; fruit articles 8–16 mm long..... *Alyxia glaucophylla* Van Heurck & Müll.Arg.
- Leaf blade linear to narrowly oblong, less than 10 mm wide, chartaceous, never glaucous beneath..... 24

24. Leaf linear, 10–30 × 1.4–2 mm, both surfaces looking lustrous but with sparse and very short hairs; inflorescence with a primary axis pubescent, null to 1.7 mm long; flowers less than 2 mm long..... *Alyxia minimiflora* Lannuzel*, sp.nov.*
- Leaf narrowly oblong, 30–40 x 6–7 mm, glabrous; inflorescence with a primary axis glabrous, 0.5–4 mm; flowers ca. 4 mm long ..... *Alyxia pseudoserpentina* Boiteau

25. Bracteoles present, corolla bud head ellipsoid ..... *Alyxia loeseneriana* Schltr.
- Bracteoles absent or only on terminal flowers' pedicel, corolla bud head globular or ovate 26

26. Fruit articles 14–20 by 7–9.5 mm, generally about 2 times as long as wide or more; ovary densely pubescent all over; inflorescence 4–6-flowered, lax..... *Alyxia hurlimannii* Guillaumin
- Fruit articles 3.5–14.5 by 3.4–9 mm, mostly less than 2 times as long as wide; ovary pubescence variable; inflorescence 1–5-flowered, variable 27

27. Leaves lanceolate to obovate, mostly > 10 mm wide..... 28
- Leaves linear to narrowly oblong, or spathulate, mostly < 10 mm wider..... 30

28. Fruit article globose, ca. 4 mm long, peduncle about half length of leaf blade ..... *Alyxia torquata* (Baill.) Guillaumin
- Fruit articles > 6 mm long, with fleshy pericarp; peduncle length less than ¼ of leaf blade..... 29

29. Corolla tube < 2.8 mm long.—New Caledonia..... *Alyxia celastrinea* (Baill.) Guillaumin
- Corolla tube > 2.8 mm long.—Loyalty Islands and sand islets around Grande Terre .... *Alyxia stellata* (J.R.Forst. & G.Forst.) Roem. & Schult.

30. Fruit article ellipsoid, 7–10 x 4.5–6.5 mm, corolla tube > 3 mm long, leaves linear 7–20 times longer than wide..... ..... *Alyxia dolioliflora* Guillaumin
- Fruit article globose, ca. 5 mm long, corolla tube < 2mm long 31

31. Leaves oblong to spathulate, always less than 20 mm long, black bark ..... *Alyxia spathulata* Guillaumin
- Leaves linear to oblong, > 20 mm long; bark reddish 32

32. Leaves linear, < 4 mm wide, 8–12 times longer than wide, primary inflorescence axis < 4 mm .... *Alyxia rosmarinifolia* (Baill.) Guillaumin
- Leaves oblong, > 7 mm wide, 2–4 times longer than wide, primary inflorescence axis 4–7 mm ..... *Alyxia tisserantii* Montrouz.

Taxonomic synopsis

***Alyxia* Banks ex R.Br.**, Prodr. Fl. Nov. Holland.: 469 (1810)
Type:—*Alyxia spicata* R.Br.

***Alyxia caletioides* (Baill.) Guillaumin** [1911: 193, combination not made] **ex Däniker**, (Däniker 1933: 380). *Gynopogon caletioides* Baillon (1889: 782). Lectotype (designated by Boiteau (1981: 106):—NEW CALEDONIA, sommet du Mont Poume [Poum], vers 400 m. d'altitude, May 1871, *Balansa 3287*: P [P00072131!]; isolectotypes: P [P00072132!; P00072133!], K [K000894134!] (Figs. 1, 2)

Species circumscription:—*Alyxia caletioides* was defined by Boiteau (1981) and Middleton (2002) with a corolla tube of 5–8 mm, and respectively with a solitary flower or with a subterminal or terminal inflorescence. Both authors however included a number of specimens having axillary flowers with corolla tube ca. 3 mm long, representing the southern half of the species' distribution. Further analysis (see under *A. urceolata sp. nov*. section) confirmed that specimens included in *Alyxia caletioides* by both authors actually represent two distinct species. *Alyxia caletioides* is here confirmed as a species following Boiteau's (1981) and Middleton's (2002) opinions, but with a narrower distribution and a more stable morphology.

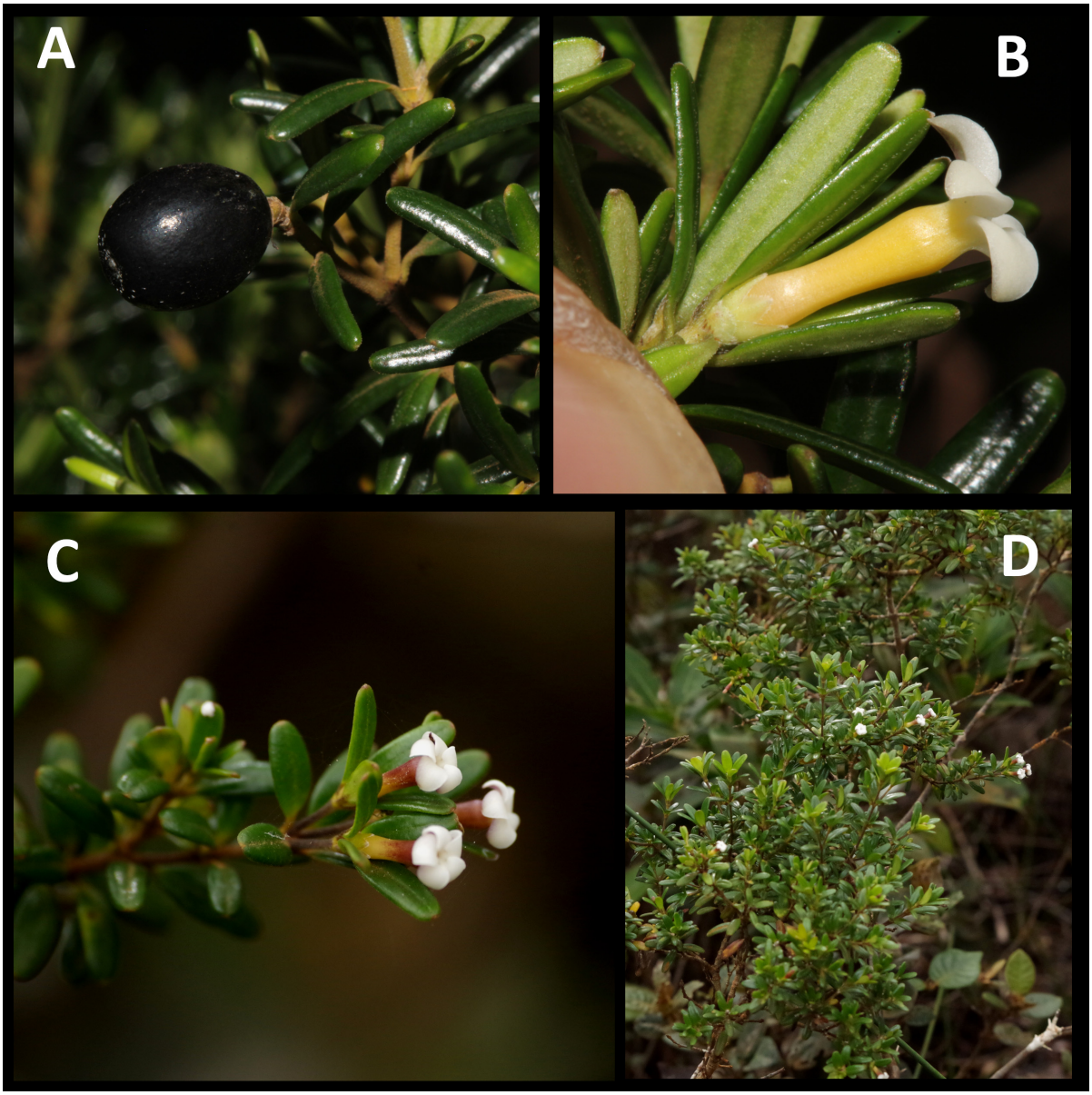

FIGURE 1. *Alyxia caletioides* fruit (A), flowers (B), flowering branch (C) and habit (D). Photographer: G. Lannuzel, A & B from Poum Mountain, C & D from Mount Kaala.

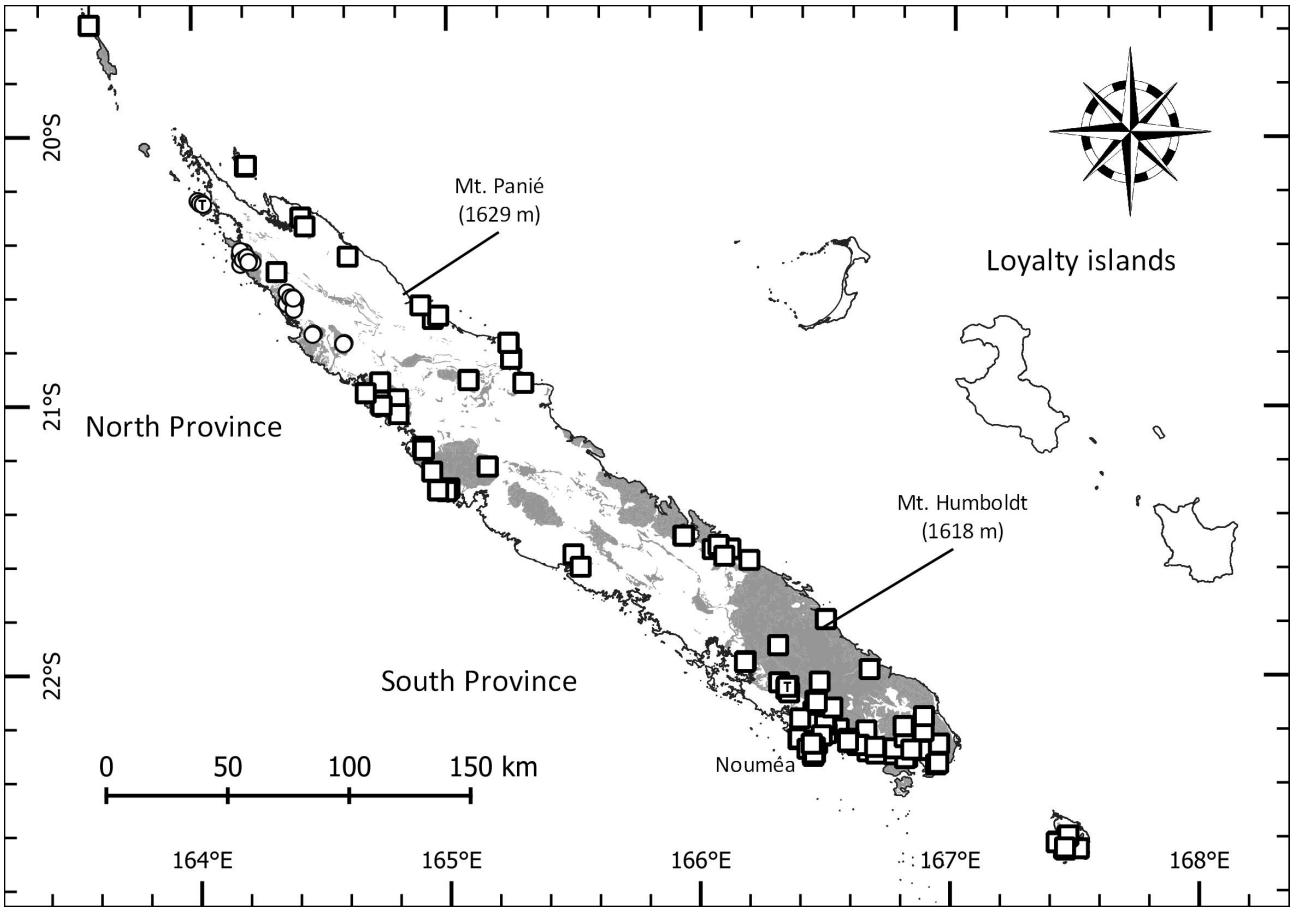

FIGURE 2. Known distribution of *Alyxia caletioides* (dots) and *Alyxia celastrinea* (square). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Distribution and habitat:—*Alyxia caletioides* occurs only in the northwestern part of Grande Terre, on ultramafic substrates. It grows in shrublands between 100 and 1000 m elev.

Phenology:—From herbarium specimens and pictures available, *A. caletioides* flowers and fructifies all year round.

Specimens examined:—**NEW CALEDONIA, North Province.** Sommet du Mont Poume, elev. 400 m, *Balansa 3287* (P00072131!, P00072132!, P00072133!, K000894134!); Dôme Tiébaghi, elev. 600 m, 17 August 1965, *Bernardi 10275* (P05391666!, L.2710203!); Monte Poum, elev. 412 m, 10 April 1968, *Bernardi 12661* (L.2710205!, P05391667!, US2749435!); Dôme de Tiébaghi, 1 February 1965, *Blanchon 1464* (NOU022046!, P05391668!); Tiebaghi, elev. 430 m, 20°28'32"S, 164°13'50"E, 24 November 2019, *Bruy, Fleurot, Munzinger& McPherson 1505* (MPU312930!); Massif du Kaala, Pente Du Pandop, elev. 700 m, 14 November 2005, *Dagostini, Rigault & Barrière 1079* (NOU009110!); Auf dem Plateau des Tiebaghi massif, 16 March 1925, *Däniker 1465* (L.2710206!, P05391669!); Pente Sud-Ouest du Dôme de Tiébaghi, 9 May 1966, *MacKee 14915* (L.2710212!); Mt Kaala, 21 April 1967, *MacKee 16656* (L.2710207!); Dôme de Tiébaghi, elev. 500 m, 25 April 1976, *MacKee 31155* (L.2710208!); Mont Kaala, elev. 800 m, 17 April 1977, *MacKee 33051* (L.2710209!); Tiébaghi, elev. 300 m, 15 October 1975, *Jaffré 1385* (L.2710213!, NOU021993!, P05391604!); Tiébaghi, 6 May 1978, *Jaffré 2474* (NOU021994!, P05391665!); Mt Kaala, elev. 850 m, 20°36'28" S, 164°22'44"E, 21 June 2017, *Lannuzel 45* (NOU088512!); Montagne de Poum, elev. 400 m, 1 February 1966, *MacKee 14334* (L.2710214!, P05391639!); Pente Sud Ouest du Dôme Tiébaghi, elev. 300 m, 9 May 1966, *MacKee 14915* (P05391611!); Pente Ouest du Mt Ouazangou, elev. 100 m, 19 June 1967, *MacKee 16931* (L.2710211!, L.4284620!, NOU022043!, NOU084324!, P05391610!); Montagne de Poum, elev. 350 m, 10 September 1969, *MacKee 20763* (L.2710215!, NOU022044!, P05391609!); Dôme de Tiébaghi (Plateau), elev. 500 m, 25 April 1976, *MacKee 31155* (P05391664!); Mont Kaala (Pente Nord), elev. 800 m, 17 April 1977, *MacKee 33051* (P05391663!); Mont Taom: Crête Est, elev. 1000 m, 13 July 1979, *MacKee 37155* (L.2710210!, NOU021998!, P04551287!, P05391662!); Montagne de Poum, elev. 100 m, 20 May 1956, *MacKee 4572* (E00098755!, L.2710204!, P05391640!); Paagoumène, elev. 5 m, 23 May 1980, *McPherson 2709* (MO1113657!); Tiébaghi, elev. 500 m, 8 November 1980, *McPherson 3316* (MO1113728,

NOU022040!, P05391607!); Dôme de Tiébaghi, 26 January 1999, *Munzinger 347* (P00246820!); *s.l.*, *legit.Pancher* (P05391606!); Dôme Tiébaghi, elev. 600 m, 25 November 1967, *Sévenet 36 S* (P04551313!); Tiébaghi, 12 June 1974, *Sévenet 674* (NOU021995!, NOU084325!, P05391645!); *s.l.*, *sin.col.* (P05391608!); Montagne de Poum, 9 June 1982, *Suprin 1953* (P05391644!); Tiébaghi Massif, 21 October 1959, *Thorne 28099* (P05391643!); Dôme de Tiébaghi, elev. 500 m, 17 August 1965, *Veillon 363* (NOU022041!); Tiébaghi Pente Sud, elev. 500 m, 11 May 1981, *Veillon 4443* (NOU021999!, P05391642!); S slopes of Mt Kaala, elev. 400 m, 11 August 1968, *Webster 14714* (P05391602!)

***Alyxia celastrinea* (Baill.) Guillaumin** (1941 :365). *Gynopogon celastrineus* Baillon (1889 : 782). Lectotype (first step by Boiteau (1981:140), second step by Middleton (2002: 66)):—NEW CALEDONIA, Cours supérieur de la Tamoa, April 1870, *Balansa 2825*: P [P00072125!]; isolectotype : P [P00072126!] (Fig. 2)

= *Alyxia myrtoides* Schlechter (1906: 237). Lectotype (designated by Middleton (2002: 66)):—NEW CALEDONIA, auf den Hügeln am Ngoye, elev. 50 m, 29 November 1902, *Schlechter 15133*: P [P00156843!]; isolectotype : BM [BM000508518!], BR[BR0000006956400!], G [G00169232!], K [K000894166!], HBG [HBG514665]

= *Alyxia doratophylla* Guillaumin (1957: 78). Lectotype (designated by Middleton (2002 : 67)):—NEW CALEDONIA, Flanc Est des Monts Kouvelée, elev. 580 m, 30 March 1951, *Hürlimann 1129*: P [P00072128!]; isolectotype : Z [Z-000000951!].

Notes:—Boiteau (1981) put *Alyxia celastrinea* (including the names *A. doratophylla* and *A. myrtoides* as its synonyms) along with *Alyxia stellata* in the series Reinwardtiae, which was characterised by 7–10 × > 10 mm fleshy fruit articles, and peduncles 5–7 mm long. Within this series, both species were differentiated by flower length and calyx lobe shape. Later, Middleton (2002) considered *Alyxia celastrinea*, as a synonym of *A. tisserantii* (from Grande Terre and surrounding islands like Isle of Pines, and Belep islands), while *A. stellata* was restricted, in New Caledonia, to the Loyalty Islands. He also extensively discussed variations in shape and habit among *Alyxia stellata* in the Pacific and recognized that his conclusion of accepting a broadspecies concept was unsatisfactory and should be clarified by further studies. He noted that leaf shape and size were unreliable as a character, nor was flower size, considering an evolution from the western part of the Pacific ocean, with corolla tubes about 2 mm in length, to the eastern part with corolla tubes about 1 cm in length.

In our work to re-circumscribe *A. tisserantii* presented below, we narrowed its definition to specimens with small, rounded fruit articles (ca. 4 mm in diameter), and consequently excluded those corresponding to Boiteau's (1981) Reinwardtiae series (fruit articles more than 7 mm in diameter). We then followed Boiteau's (1981) hypothesis and compared these specimens both with *A. tisserantii* as newly circumscribed, and *A. stellata* sensu Middleton (2002). To test this, we made measurements on several specimens divided into four groups: *A. stellata* sensu Middleton (*i.e.* Loyalty islands), *A. celastrinea* sensu Boiteau on ultramafic soils and on non-ultramafic soils, and *A. tisserantii* as here defined. The results (Table 1) conclusively show that *A. tisserantii* is different from the three other groups. However, there were no clear differences between these three groups based on the characters considered discriminant by previous authors. We thus concluded that *A. celastrinea* along with its synonyms (Boiteau 1981), considered by Middleton (2002) as a synonym of *A. tisserantii*, should more accurately be considered as close, if not synonym, to *A. stellata*, as Boiteau (1981) first hypothetised.

TABLE 1. Comparison of characters between *A. stellata* sensu Middleton (i.e. Loyalty islands), *A. celastrinea* sensu Boiteau on ultramafic soils (UM), *A. celastrinea* on non-ultramafic soils (NUM) and *A. tisserantii* as circumscribed here, based on 159 measurements (minimum value-first quartile–third quartile–maximum value). All measurements in millimeters. Measured specimens are presented in Appendix 1.

	Alyxia stellata	***Alyxia celastrinea* NUM**	***Alyxia celastrinea* UM**	***Alyxiatisserantii***
Article length	(8.01) 8.05–8.84 (9.21)	(6.68) 7.34–8.38 (10)	(6.95) 8–9.09 (9.36)	(3.7) 4.2–4.9 (6.7)
Article width	(6.74) 7.29–8.03 (8.04)	(5.91) 6.26–6.94 (6.98)	(6.23) 6.95–7.53 (7.87)	(3.7) 4.1–4.5 (6.3)
Corolla tube length	(2.8) 2.89–3.11 (3.17)	(2.11) 2.34–2.79 (3.01)	(2.42) 2.46–2.54 (2.58)	(1.8) 1.9–2.1 (2.2)
Calyx lobe length	(0.71) 0.92–1 (1.16)	(0.7) 0.83–1.09 (1.22)	(0.88) 0.90–0.93 (0.95)	(0.7) 0.8–1.1 (1.3)
Peduncle length	(4.3) 4.41–6.74 (6.78)	(2.43) 4.33–6.08 (8.09)	(4.67) 4.78–5.01 (5.12)	(4.3) 4.5–6.4 (6.8)
Leaf length	(13.2) 27.8–37.6 (45.2)	(22.9) 26.1–34.2 (55.6)	(27.3) 30.1–50.2 (55.3)	(17.8) 23.2–30.6 (39.0)
Leaf width	(6.4) 10.7–18.2 (22.6)	(10.1) 12.8–17.3 (22.6)	(10.1) 11.7–18.2 (19.5)	(5.5) 7.7–10.0 (11.9)

However, a deep study on *A. stellata* in all the Pacific islands is badly needed, in order to clarify every putative taxon contained in it, and is beyond the scope of the present one. Consequently, in the absence of such a study, and without the help of further genetic studies, we prefer not to attempt to make divisions in this group, nor to add further names as synonyms. We thus chose a conservative conclusion, and consider both *A. stellata* and *A. celastrinea* as valid species, the former being restricted to Loyalty Islands and coral islets on calcareous substrates, and the latter present on mainland Grande Terre, the Isle of Pines and some of the northern islands, on both ultramafic and non ultramafic substrates.

Specimens examined:—NEW CALEDONIA; North Province; Povila, 29 January 2000, *Achille 641* (L.3718457!); Hienghène, June 1871, *Balansa 3288* (P04225805!); Nakety, October 1869, *Balansa 2436* (P04260847!); Inter Ouegoa et Col d'Amos, elev. 150 m, 18 August 1965, *Bernardi 10336* (L.2702421!, P04259038!); *s.l.*, *Deplanche 287* (P04226215!, P04226218!); Yadek, Lindéralique, Hienghène, elev. 22 m, 20°40'45"S, 164°57'46"E, 21 February 2018, *Fleurot 426* (NOU088621!, NOU105051!, P00932025!); *s.l.*, 1874, *Germain s.n.* (P04236840!); Koniambo, 21 December 1950, *Guillaumin & Baumann-Bodenheim 9503* (L.3735049!, P04236861!); Koniambo, 21 December 1950, *Guillaumin & Baumann-Bodenheim 9529* (L.3718460!, P00072197!); Rivière Voh, 12 April 1951, *Guillaumin & Baumann-Bodenheim 12142* (L.3729968!, P00156844!); Plaine des Gaiacs, 26 March 1978, *Jaffré 2406* (NOU058186, P04226244!); Route Tiwaka—Koné Bopope, 1 April 1988, *Jaffré 2969* (NOU058300!, P04225719!); *s.l.*, *Le Rat 507* (P04225712!); *s.l.*, *Le Rat 712* (P04260862!); *s.l.*, *Le Rat 1108/2* (P04225713!); Nakéty: Saint Pol, elev. 20 m, 4 December 1965, *MacKee 13967* (L.2702432!, L.2702474!, P04226190!, P04551236!); Pente SE du Mt Koniambo, elev. 350 m, 23 August 1966, *MacKee 15500* (L.2699508!, NOU058161!, P04226200!); Plateau de Tiéa, elev. 100 m, 16 September 1968, *MacKee 19532* (L.2702469!, L.2702470!, NOU058214!, P04226192!, P05236764!); Balabio, elev. 10 m, 17 September 1974, *MacKee 29327* (L.2699559!, NOU058298!, P04225584!); Touho : Pouiou, elev. 150 m, 13 September 1978, *MacKee 35685* (L.2702451!, NOU057973!, P04236856!, P04551203!); NW of Canala, elev. 250 m, 4 February 1983, *McPherson 5489* (NOU058173!, MO421148, P04236853!); route Tiwaka-Koné : Bopope, 9 February 1977, *Morat 5316* (L.2699510!, P04225574!); *s.l.*, *Pancher 958* (BM000508400!); *s.l.*, *Pancher s.n.* (P04225720!); *s.l.*, *Pancher s.n.* (P04220362!); *s.l.*, *Pancher 273* (P04225768!); Ignambi, 1911, *Sarasin 208* (P04236806!); *s.l.*, 1 November 1955, *Schmid s.n.* (P04259014!); Près de Vieux-Touho, 7 November 1975, *Sévenet & Boiteau 1134* (NOU058301!, P04236864!, P04236865!, P04236866!); Route de Bondé—Ouégoa, 26 November 1967, *Sévenet 45S* (P04551184!); Boulinda-Gebiet, 10 March 1964, *Stauffer, Blanchon & Boulet s.n.* (L.2699511!, WAG.1475247!, WAG.1475197!); sin loc., 1847, *Védel s.n.* (P04225778!); Ile Pott : plateau Sud, 27 August 1978, *Veillon 3736* (L.2702433!, NOU058333!, NOU058334!, P04260791!, P05236803!); Népoui, presqu'île de Pindaï, elev. 100 m, 18 November 1987, *Veillon 6575* (P04220401!); Népoui, presqu'île de Pindaï, 29 April 1993, *Veillon 7627* (P04220395!); Ouegoa : piste Arama-Ouegoa, 24 April 1997, *Veillon 7963* (NOU058154!); Poya: presqu'île de Muéo, elev. 30 m, 29 October 1997, *Veillon 8057* (L.2699536!, NOU058290!, NOU058291!, P04220393!); Gatope, 1861, *Vieillard 2958* (P04236828!, P04236837!); *s.l.*, 1855, *Vieillard 949* (P04236818!, P04236820!, P04236821!, P04236822!, P04236823!, P04236825!); Wagap, 1861, *Vieillard 954* (P04236848!, P04236849!); *s.l.*, *Vieillard & Pancher 958* (P04220363!); Gatope, 1861, *Vieillard 958* (K000894168!, P04225724!); *s.l.*, 1855, *Vieillard 958a* (P04220360!)**; South Province;** La Conception, elev. 700 m, 24 January 1869, *Balansa 1401* (P04226219!, P04226222!); Au-dessus de la Ferme-Modèle, 1 October 1868, *Balansa 213* (P04225810!, P04226234!); Baie du Prony, September 1868, *Balansa 218* (P04260849!); Au-dessus de la Ferme-Modèle, September 1868, *Balansa 219* (P04226233!); Environs de Nouméa, September 1868, *Balansa 219a* (P04226236!); Au-dessus de la Ferme-Modèle, October 1868, *Balansa 220* (P00072130!, P04236788!, P04236789!); Mont d'Or, 17 May 1869, *Balansa 2433* (P04226221!, P04226224!); Cours supérieur de la Tamoa, April 1870, *Balansa 2825* (P00072125!, P00072126!); Environs de Nouméa, 1871, *Balansa 3015* (P04226225!); Nouméa, 1868, *Balansa1400* (P04226220!); *s.l.*, 1868, *Balansa s.n.* (P04226223!); Mont Mou, elev. 300 m, 10 September 1950, *Baumann-Bodenheim 5872* (L.3729958!, P04225786!, US2316461!); Mont Mou, 2 February 1951, *Baumann-Bodenheim 10094* (P04225791!); Ile des Pins : Pic Nga, 29 May 1951, *Baumann-Bodenheim 13676* (P04226238!); Pic Nga (Ile des Pins), 30 May 1951, *Baumann-Bodenheim 13818* (P04226239!, US2316671!); Ermitage, 4 July 1951, *Baumann-Bodenheim 14496* (L.3735035!, P04260800!, US2316709!); Route du Carénage, elev. 164 m, 10 November 1964, *Blanchon 1077* (NOU058311!, P04225776!); Ouen-Toro, vallée au Sud-Ouest, elev. 50 m, 1960, *Blanchon 1123* (P04225779!); Nouméa : Ouen Toro, elev. 78 m, 22°18'25"S, 166°27'21"E, 11 August 2015,*Chambrey 135* (NOU081168!); Prony, *Cribs 1385* (P04260855!); Prony, *Cribs 1602* (P04225765!, P04260851!, P04226227!); Mont Dore, 26 March 1974, *Debray 2203* (P04226214!); Port Boisé, *Deplanche 285* (P04226217!); Prony, 20 November 1914, *Franc 1857* (P04260856!); Nouméa, *Franc 1968* (US1597539!); Nouméa, 1 August 1928, *Franc 1988* (P04226208!); Rivière des Lacs, 8 October 1950, *Guillaumin 1152* (P04225733!); Mont Mou, 15 October 1950, *Guillaumin & Baumann-Bodenheim 6885* (L.3729967!, NY345464!,

P00156845!, US2316483!); Mont Mou, *Guillaumin & Baumann-Bodenheim 6943* (L.3735065!, US2316487!, P04226191!); Plaine des Lacs, *Guillaumin, Baumann-Bodenheim & Hürlimann 10739* (L.3729959!); Nouméa : Ouen Toro, 29 January 1979, *Hoff 23* (NOU058349!, NOU058155); Mt Natégou, elev. 250 m, 29 January 1951, *Hürlimann 778* (P04225722!); secteur du Mont Dore, 4 January 1978, *Jaffré 1208* (P04236767!); Ile des Pins, 3 August 1975, *Jaffré 1377* (NOU058190!, P04226172!); Ouen-Toro, 5 July 1977, *Jaffré 1872* (NOU058356!, P04226170!); Ile des Pins : Pic Nga, 25 November 1977, *Jaffré 2075* (NOU058160!); Plaine des Lacs, 20 January 1978, *Jaffré 2226* (L.2702450!, NOU058327!, P04226168!); Pic du Pin, elev. 500 m, 1 February 1978, *Jaffré 2303* (NOU058326!, P04226246!, P05236772!); Prony, zone maritime, *Le Rat 128* (P04225769!, P04226186!); Prony, 1 September 1908, *Le Rat 202* (P04226187!, P04260865!); Pointe de l'artillerie, Nouméa, 1 September 1902, *Le Rat 257* (P04225710!); Au pied Ouen Toro, elev. 50 m, 26 February 1955, *MacKee 2161* (L.2702435!, P04226197!, US2187245!); Nouméa : rivière Yahoué, elev. 200 m, 27 February 1955, *MacKee 2172* (L.2699531!, P04225704!, US2192547!); Pente Ouen Toro, elev. 50 m, 30 September 1955, *MacKee 3140* (L.2702447!, P04226198!, US2210092!); Plage de Plum, 14 January 1956, *MacKee 3775* (P04236846!); Vallée Dumbéa, elev. 200 m, 24 March 1956, *MacKee 4148* (L.2699526, P04226195!); Nouméa : Parc forestier Montravel, elev. 50 m, 23 April 1965, *MacKee 12473* (L.2699516!, NOU058344!, P04226199!); Nouméa : Parc forestier Montravel, elev. 50 m, 23 April 1965, *MacKee 12474* (P04226196!); Ile des Pins : Pente Ouest du Pic Nga, elev. 100 m, 18 December 1965, *MacKee 14070* (P04226194!); Nouméa : Base SW Ouen Toro, elev. 50 m, 29 December 1971, *MacKee 24770* (L.2702475!, NOU053368!, P04260840!, P05236776!); Nouméa : Base SW Ouen Toro, elev. 50 m, 29 December 1971, *MacKee 24771* (L.2699532!, L.3735064!, P04260842!, P04260843!, P05236774!); Nouméa : Base SW Ouen Toro, elev. 50 m, 29 December 1971, *MacKee 24772* (P04260845!, P05236763!); Nouméa : Baie Tina, elev. 10 m, 1 November 1972, *MacKee 25720* (NOU058248!, P04226232!, P04551206!); Nouméa : Baie Tina, elev. 10 m, 24 July 1973, *MacKee 26963* (L.2702457!, NOU058250!, P04226230!, P05236771!); Crête au Sud de la Baie de Ouinné, elev. 400 m, 10 November 1973, *MacKee 27752* (P04225591!); Nouméa : Ouen Toro, elev. 50 m, 15 February 1975, *MacKee 29753* (CANB 722300.1, L.2699518!, NOU058357!, P04225582!, P05236778!); Prony, Rivière Bleue, elev. 200 m, 23 March 1976, *MacKee 30893* (NOU058329!, P04226235!, P04226237!); Baie de la Conception, 5 August 1977, *MacKee 33554* (L.2702453!, NOU058260!, P04226226!); Ile des Pins : Ouro, 8 September 1977, *MacKee 33832* (L.2699550!, NOU058194!, P04260859!); Ile Nou : Mt. Téréka, elev. 100 m, 26 January 1983, *MacKee 41197* (BISH745441, L.2702456!, NOU058277!, P04260792!, P04551237!); Koutio : Pic aux Chèvres, elev. 200 m, 25 April 1991, *MacKee 45475* (L.2699523!, P04226228!, P05236777!); Along road from Dumbéa to Mt. Dzumac, 17 June 1981, *McPherson 3835* (NOU058185!, P04236812!); Pic N'Ga, 23 November 1977, *Morat 5744* (NOU058193!, P04236852!); Col de Mo, 22 August 2004, *Munzinger & Létocart 2332* (P04551210!); Ilôt Nouré, elev. 5 m, 8 April 2005, *Munzinger 2762* (NOU006252!); Réserve du Pic Du Grand Kaori, 22°17'36"S, 166°53'45"E, 30 August 2007, *Munzinger, Barrabé, Rigault & Kurpisz 4484* (NOU029169!); Ile des Pins, *Pancher 576* (P04236813!, P04236824!); Ile des Pins, 1862, *Pancher s.n.* (P04226188!, P04236814!); Bois de Saint-Louis, 1880, *Pompéry s.n.* (P04236826!); Bourail, 1881, *Pompéry s.n.* (P04220390!); Auf den Hügeln am Ngoye, elev. 50 m, 29 November 1902, *Schlechter 15133* (BM000508518!, K000894166!, P00156843!); Ngoye, elev. 50 m, *Schlechter s.n.*(G-G-153313/1!, HBG514665!); Mont Dzumac, elev. 600 m, 12 July 1966, *Schmid 1335* (NOU058259!); Haute Tontouta, elev. 600 m, 17 December 1970, *Schmid 3669* (P04236839!, P04551234!); Ouen Toro pente Est, 1 April 1975, *Schmid 5287* (NOU058353!, P04236816!); Ouen Toro, 29 November 1984, *Schmid 5442* (NOU058352!); Ouroué (Nakéty), 30 August 1975, *Sévenet 1036* (NOU058168!); Ouen-Toro, 20 May 1976, *Sévenet 1168* (NOU058348!, P04236809!); Ouen-Toro, 28 July 1976, *Sévenet 1207* (P04236811!); Plaine des lacs, 10 May 1977, *Sévenet & Pusset 1249* (NOU057997!, P05236804!); Port-Boisé, 16 June 1977, *Sévenet & Pusset 1264* (NOU058022!, NOU058166!, NOU058167!, P04551333!); Col de Plum, 10 April 1968, *Sévenet 181S* (P04551183!); Rivière des Pirogues, 4 November 1974, *Sévenet 760* (P04236854!); Ouen Toro, elev. 100 m, 27 February 1964, *Stauffer 5719* (BISH130274, L.2702445!, L.2702446!, NOU058358!, P04236815!, P04236817!, WAG.1475194, WAG.1475195); Secteur de N'Go, 17 July 1980, *Suprin 584* (NOU058165!); Bourail, Nessadiou, elev. 424 m, 21°36'53"S, 165°31'22"E, 3 September 2016, *Vandrot 1164* (NOU084989!); Haute Vallée du Creek Pernod, Forêt Cachée, elev. 200 m, 9 March 1967, *Veillon 1101* (NOU058331!, P04226231!); Ouen-Toro, elev. 100 m, 24 March 1967, *Veillon 1122* (NOU058351!); Ouen-Toro, elev. 100 m, 24 March 1967, *Veillon 1123* (NOU058355!, P04220402!); Baie de Tina (Nouméa), 1 November 1987, *Veillon 6641* (NOU058332!, P04220398!); Nouméa: Ouen Toro 100 m, elev. 100 m, 9 May 1988, *Veillon 6797* (NOU058354!, P04220399!); Dumbea: Nakutakoin, elev. 200 m, 5 April 1992, *Veillon 7480* (NOU058164!); Mont Dore, 1855, *Vieillard 2* (P04236819!); Port de France, 1855, *Vieillard 958* (P04260863!, P04260864!, P04220365!); Port de France, 1855, *Vieillard 960*(P04236834!, P04236836!, P04236838!); Pic N'Ga (Ile des Pins), elev. 50 m, 1 March 1943, *Virot 1066* (P04236842!); Ouen Toro, 23 July 1943, *Virot 1132* (L.2699515!, P04220373!); Port Despointes (Nouméa), elev. 40 m, 25 July 1943, *Virot 1177* (P04220372!, P04220374!,

P04220375!); Sentier du Dzumac, elev. 400 m, 8 August 1943, *Virot 1206* (P04220370!, P04220371!); Port Despointes, 28 August 1944, *Virot 1418* (L.2702460!, P04236841!, P04236844!, P05236773!); Ouen Toro, 1 November 1941, *Virot 548* (P04220380!); Ouen Toro, elev. 50 m, 1 August 1968, *Webster & Hildreth 14459* (P04226243!); circa Yaté, elev. 300 m, 2 August 1968, *Webster & Hildreth 14475* (P04226189!); Nouméa, 1 October 1923, *White 2139* (P04226241!); Nouméa, 1 October 1923, *White 2141* (P04226242!); Nouméa, 19 October 1923, *White 2150* (P04226240!)

Alyxia dolioliflora **Guillaumin** (1958: 398). Holotype:—NEW CALEDONIA, Two miles south of Pouembout, elev. 200 m, 16 July 1952, *MacMillan 5108*: P [P00072136!]; isotypes: A [A02180217!], BISH [BISH500605], E [E00086582], K [K000894167!], L [L0004670!] (Figs 3, 5)

Species circumscription:—*Alyxia dolioliflora* was considered as a distinct species by Boiteau (1981), and then included in *A. tisserantii* by Middleton (2002). We follow Boiteau (1981) and keep it as a distinct species characterized by linear leaves, red bark, and fruit articles longer than they are wide. Some specimens (*e.g. MacKee 16935*, *Munzinger 7856*) of *A. tisserantii* s.l. (as circumscribed here) can be confused with *A. dolioliflora.* However *A. dolioliflora* differs from *A. tisserantii* by a longer corolla tube (2.5–4.1mm vs 1.1–2.1 mm), and longer fruit articles (8–9.5 mm vs ca. 4.2–5.1 mm). *Alyxia dolioliflora* is most similar to *A. minimiflora* and *A. rosmarinifolia*, but differs from both by a longer corolla tube (2.5–4.1 mm vs 0.8–1.6 mm), and from the former by being entirely glabrous. As circumscribed here, the species grows only on serpentinites, at the low altitude foot of ultramafic mountains in the central part of the western coast of Grande Terre. In this region, it is easily recognizable as it forms typical shrubs with erect linear leaves. One must however be careful, as it can be confused with some forms of *A. tisserantii*, at the margins of its distribution. A closer look at the fertile parts then becomes conclusive.

Distribution and habitat:—*A. dolioliflora* is distributed from Poya to Kaala-Gomen, at low altitude (0–300 m elev.) on ultramafic substrates. It grows mainly in shrublands.

Phenology:—From herbarium specimens and pictures available, *A. dolioliflora* is flowering and fruiting from October to July, and seems to be sterile in August and September.

Specimens examined:—NEW CALEDONIA; North province: Presqu'île de Gatope, 20°58'47"S, 164°39'50"E, 23 October 2012, *Butin 266 bis* (NOU081790!); Pouembout, Tiaoué, elev. 50 m, 26 February 2004, *Dagostini, Rigault & Fambart-Tinel 835* (NOU003016!, P04551201!); *s.l.*, 1874, *Germain s.n.* (P04225736!); Mt Koniambo, 21 December 1950*, Guillaumin 9512b* (P04225738!); Kaféaté, 27 December 1950, *Guillaumin 9630* (L.3729894!, P04225726!); Oundjo, 15 January 1974, *Jaffré 1214* (L.2702461!, NOU058240!, P04225717!, P05236784!); Tinip, elev. 50 m, 20 May 1956, *MacKee 4627* (E00098761, L.2711052!, P04237019!); Voh : Mt. Katépahié, elev. 400 m, 20 January 1963, *MacKee 10071* (CANB 146007.1!, L.2702420!, NOU058232!, P04225709!); Oundjo, elev. 50 m, 8 May 1966, *MacKee 14905* (L.2699544!, NOU058233!, P04225749!); Voh: base du Mt. Katépahié, elev. 30 m, 12 October 1965, *MacKee 13607* (L.2702434!, P04225754!); Tinip, 5 July 1966, *MacKee 15191* (L.2711050!, MO1114518, NOU058037!, P04237018!); Pouembout : Base W Plateau Tiéa, elev. 30 m, 22 May 1967, *MacKee 16813* (L.2702419!, MO1114516!, NOU058302!, NOU058303!, P04225816!); Mt Kopéto (Pente Nord), elev. 400–800 m, 6 July 1967, *MacKee 17097* (L.2699557!); Oundjo, 26 January 1970, *MacKee (Leg. Déméné) 21482* (NOU058031!, P04225597!, P04237011!); Kone: Pinjen, elev. 50 m, 25 April, 1971*, MacKee 23568* (L.2711049!); Pouembout, elev. 30 m, 16 February 1972, *MacKee 25018* (L.2699514!, NOU058304!, P04225595!); Pouembout, elev. 30 m, 16 February 1972, *MacKee 25019* (NOU058305!, P04225594!); Oundjo, elev. 0–50 m, 17 February 1972, *MacKee 25040* (L.2699543!, P04225596!); Mt Koniambo, elev. 100m, 24 April 1974, *MacKee 28530* (L.2699538!, P04225587!, P05236797!); Tiéa (Pente Ouest), elev. 50 m, 27 December 1974, *MacKee 29554* (L.2702431!, MO1114514, P04225583!); Pouembout : Base W Tiéa, elev. 50 m, 11 April 1975, *MacKee 30028* (L.2702418!, NOU058306!, P04225550!); Voh: Katepahie, elev. 50 m, 1 January 1976, *MacKee 30566* (L.2699519!, L.2699520!, MO1114578, P04260832!), Poya: Avangui, elev. 300 m, 2 January 1976, *MacKee 30617* (L.2699563!, NOU058171!, P04225546!); Voh: Tieta, elev. 50 m, 20 May 1977*, MacKee 33175* (L.2711048!, NOU058028!, P04237010!); Tinip, elev. 150 m, 22 January 1979, *MacKee 36482* (BISH745438!, L.2702462!, NOU058307!, P04225534!, P04225538!, P04551288!); Voh: Tahafé, elev. 200 m, 12 April 1979, *MacKee 36765* (BISH745436, L.2702441!, NOU058308!, P04551240!, P04225535!, P04551241!); Cap Deverd, South of Kaala-Gomen, elev. 30 m, 22 December 1983, *McPherson 6208* (MO420962!, NOU058181!, P04236830!); Base du Koniambo, 16 December 1973, *Jaffré 1267* (NOU058239!, P04236776 !); Vavouto, elev. 45 m, 18 December 2002, *Jaffré & Roumagnac 3583* (NOU058226!, P04551199!); Tiéa, S of Pouembout, elev. 90 m, 18 November 2015, *Lowry 7411* (MO100880167, MPU312388! , NOU082432!); 2 miles south of Pouembout, elev. 200 m, 1952, *McMillan 5108* (BISH500605, E00086582!, K000894167!, L 0004670!, P00072136!); Mt, Koniambo,

elev. 150 m, 7 January 1983, *McPherson 5323* (MO421093, NOU058313!); Oundjo, 15 September 1966, *Schmid 1442* (NOU058238!, NOU058295!, P04225564!, P04225565!, P05236779!); Oundjo, 15 September 1966, *Schmid 1442 bis* (NOU058294!); Koniambo Ouest, elev. 50 m, 19 December 1972, *Schmid 4341* (NOU058296!), Koné, cimetière Oundjos, 25 November 1967, *Sévenet 345* (P04551311!); Koniambo, elev. 100 m, 12 February 1974, *Sévenet 589* (NOU058297!); Ouaco-Tinip, 4 November 1975, *Sévenet & Boiteau 1100* (NOU058231!, P04226203!); Near Oundjo, 10 November 1959, *Thorne 28017* (P04225559!); 7 km S of Pouembout, 20 October 1959, *Thorne 28025* (P04225560!); Pouembout Goyeta, 26 May 1982, *Toutain 3486* (NOU058310!); Gatope, 1861, *Vieillard 2766* (P04220361!, P04225811!); Gatope, 1861, *Vieillard 2970* (P04220355!); Pum, Tanlé, *Vieillard 951* (K000894170!, L 0064516!, L 0004669!, NY345468!, NY345469!, P00156869!, P00156870!, P00156871!, P00156872!, P00156873!, P00156874!, P00156875!); Gatope, *Vieillard 952* (BM000508454!, K000894169!, P00156867!, P00156868!).

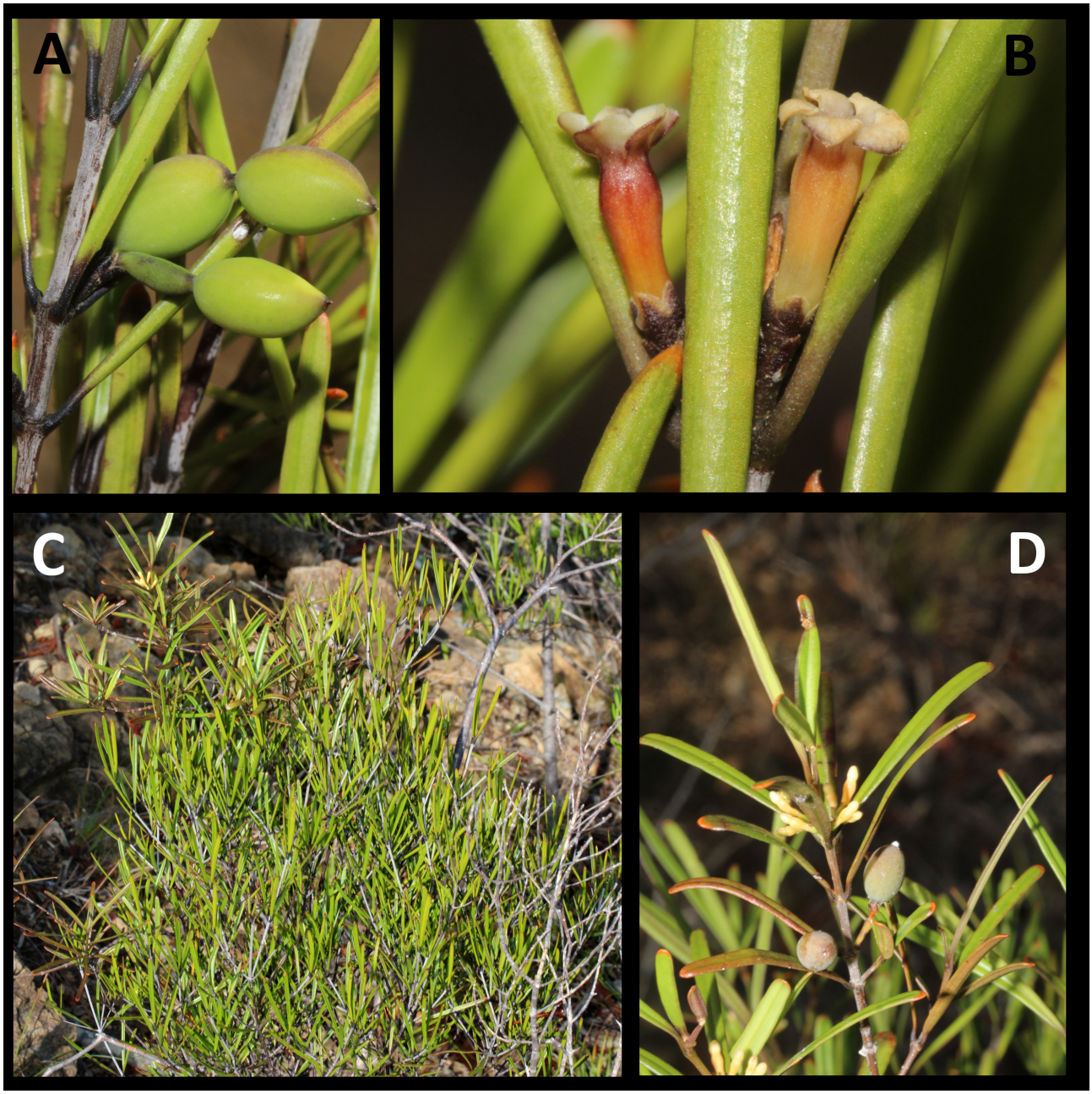

FIGURE 3. *Alyxia dolioliflora* with detail of immature fruits (A), flowers (B), habit (C) and a fertile branch (D). Photographer: G. Lannuzel, from *Lannuzel 530.*

Alyxia humboldtensis **Lannuzel & Gâteblé, *sp.nov.*** (Figs. 4, 5), (urn:lsid:ipni.org:names:77336418-1)

Diagnosis:—*Alyxia humboldtensis* is a small procumbent vine characterized by its leaves, generally in whorls of 4–5. It is similar to *A. leucogyne* in being the only species with more than 3 leaves per whorl, but differs from it by the adult

plant's size, sessile leaves, short and reduced inflorescences and apparently glabrous fruits. Flowers are twice as long (ca. 8 mm vs 4 mm in *A. leucogyne*), with yellowish corolla (white in *A. leucogyne*).

Type :—NEW CALEDONIA, South Province, Mont Humboldt, elev. 1500 m, 21°52'58"S, 166°25'19"E, 2 February 2022, *Lannuzel & Pouget 568*, holotype: NOU [NOU108492!]; isotype: P [P01139694!]

Procumbent liana, up to 50 cm, stems covered by ca. 0.1 mm hairs; latex white. Leaves verticillate in whorls of 3–5, coriaceous, green adaxially, light green abaxially, strongly revolutate, sessile, lamina oboval to spatulate, 24–27× 13–18 mm ; base attenuate to rounded, apex retuse, mucronate, both surfaces minutely pubescent, covered with 0.1 mm hairs, leaf venation not visible apart from the midrib. Flowers axillary, grouped in reduced dichasial cymes, axes green, sparsely pubescent, ca. 1.3 mm, pedicels null to ca. 0.5 mm. Narrowly triangular bracts, ca. 2.5 × 1 mm, green, margin ciliate.

Flower 5-merous, 7.8 × 1.8 mm. Calyx lobes slightly spreading from corolla, narrowly triangular, acute at apex, ca. 3.5 × 1 mm, green, glabrous, with margin ciliate toward apex. Corolla pale yellow, tube ca. 4.5 ×1.5 mm, glabrous outside, with only 1 ring of hairs inside, below anthers and stigma, composed of 0.1 mm long appressed hairs, lobes sinistrorse, lanceolate, glabrous, erected at anthesis.

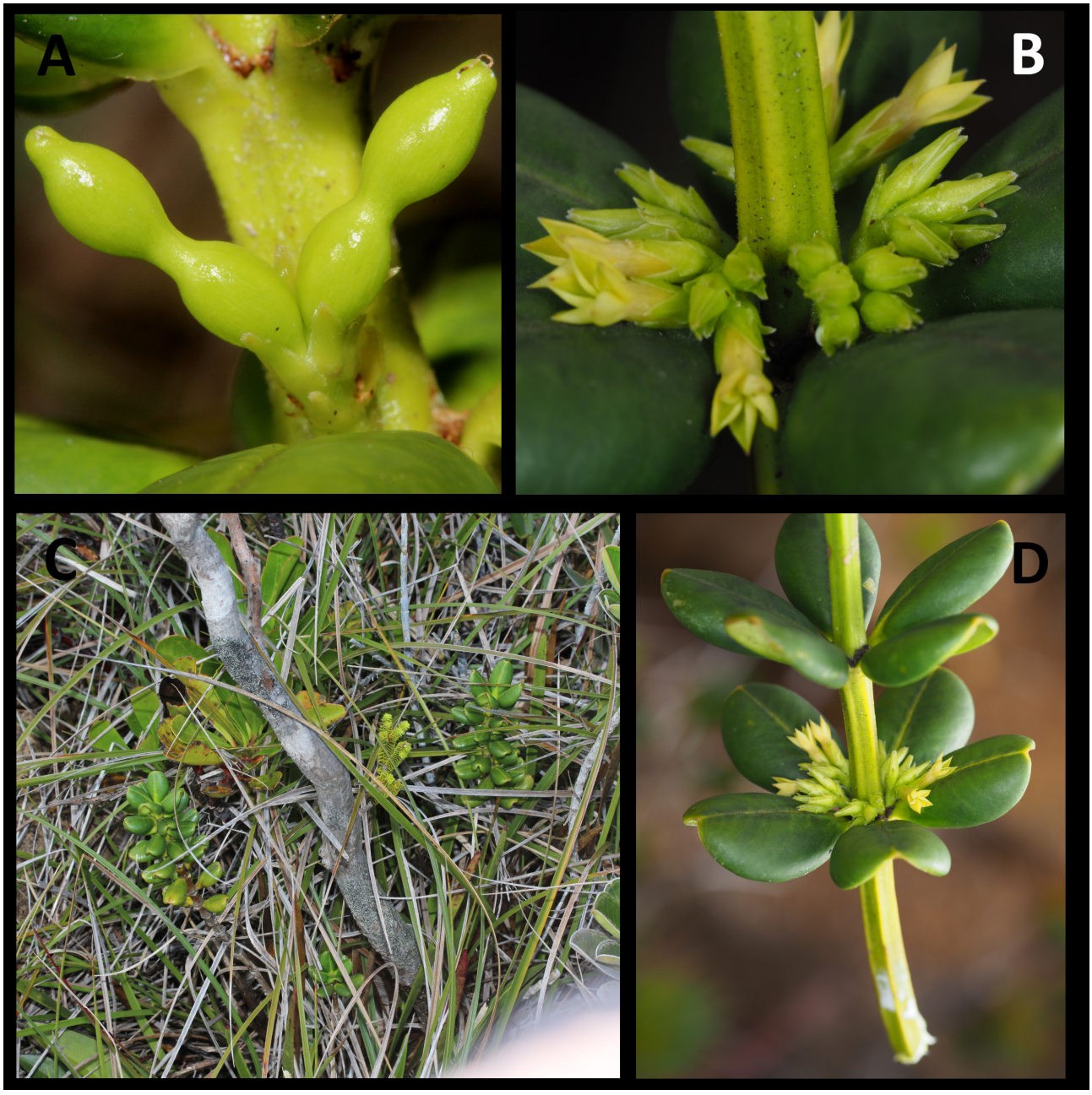

FIGURE 4. *Alyxia humboldtensis*, with detail of immature fruits (A), flowers (B), habit (C), and a flowering branch (D). Photographers: G. Lannuzel (A & C from *Lannuzel & Pouget 568*), C. Laudereau (B & D).

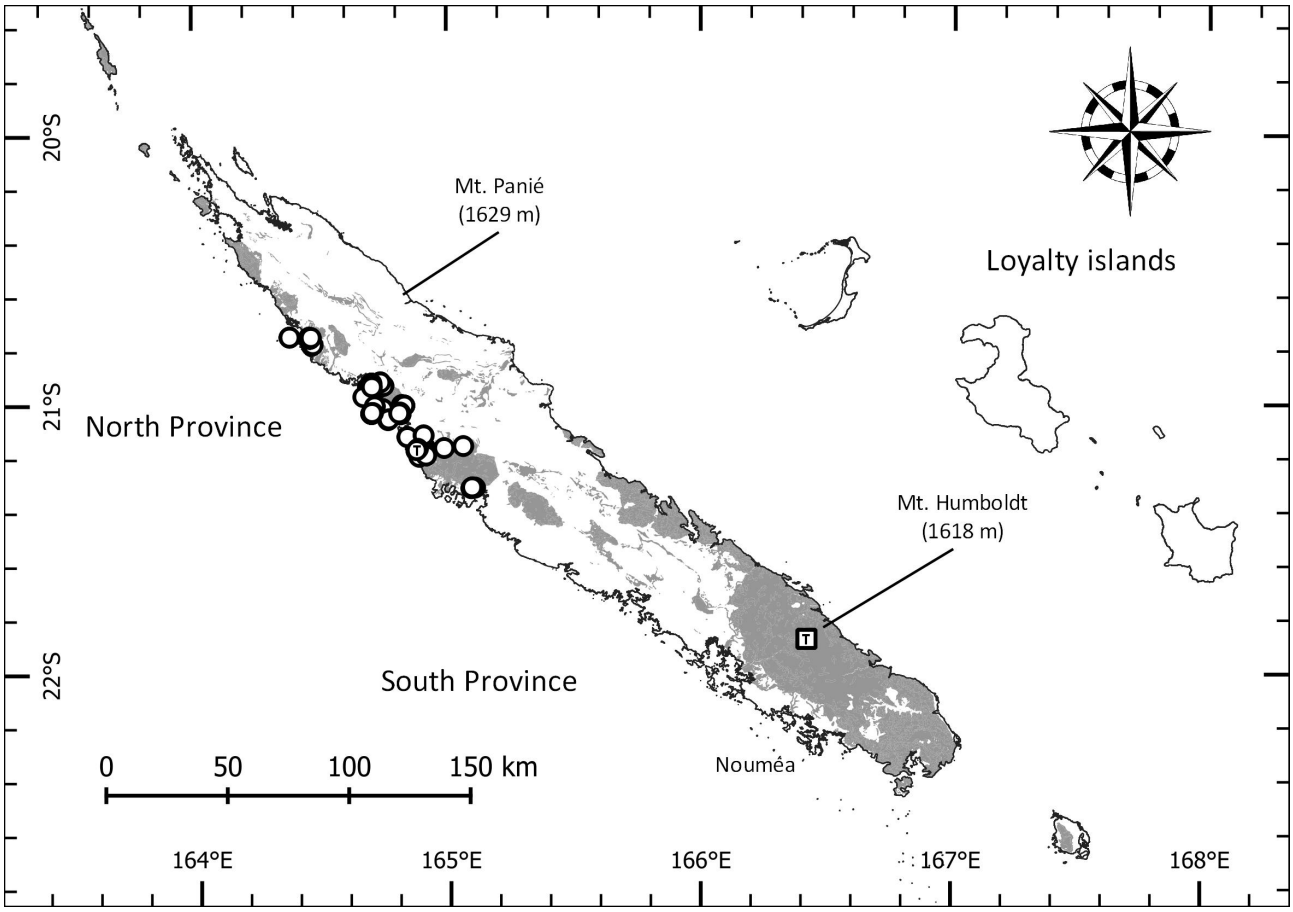

FIGURE 5. Known distribution of *Alyxia dolioliflora* (dots) and *Alyxia humboldtensis* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Anther cone 1 mm long, not exserted; filaments 0.2 mm long, inserted at 2/3 of tube length. Ovary ca. 0.6 × 0.5 mm, very hairy around base with 0.2–0.3 mm long hairs, style 1.5 mm long, glabrous, stigma ovoid, acute, hairy at top. Mature fruit unknown. From young fruits, mericarps seem to present 1–2 ovoid articles.

Distribution and habitat:—*Alyxia humboldtensis* is known from only one population, located near the Mont Humboldt summit, at 1500 m elev. It grows as a procumbent liana in the cyperaceous vegetation between peridotite rocks.

Phenology:—From herbarium specimens and pictures available, the species seems to flower in December and January. Immature fruits were seen in February.

Etymology:—The species is named after the mountain where the only population is known, Mont Humboldt.

Specimen examined:—NEW CALEDONIA: South province; Mont Humboldt, elev. 1500 m, 21°52'58"S, 166°25'19"E, 13 December 2013, *Gâteblé. 410* (NOU092221!).

Alyxia kaalaensis Boiteau (1979: 446). Holotype:—NEW CALEDONIA, pente sud du Mt Kaala, elev. 400m., 10 October 1965, *MacKee 13599*: P [P00072140 !]; isotype : P [P00143138 !] (Figs 6, 7)

Species circumscription—*Alyxia kaalaensis* has received several recircumscriptions over time, leading to wide or narrow distributions. We accept the species as plants bearing dense pubescence on young parts, oblong to orbicular leaves, and rounded fruit articles. It is most similar to *A. nummularia*, probably leading to different concepts, but differs from it by subterminal inflorescences, and a corolla tube > 3 mm long. The known species distribution is around Mont Kaala, north of Grande Terre. At first sight, specimens from the top of the mountain and from low altitude were considered as different species, the former with orbicular leaves, and the latter with oblong ones. However, detailed investigation, along with flower dissections, showed no significant differences between both morphotypes' fertile parts. We thus kept one species ranging from low to high altitude in the region of Mount Kaala. The specimens referred to as "*A. sp.* cfr. *caletioides*" in Guillaumin (1957) and assigned to *A. kaalaensis* by Middleton (2002) correspond better to *A. oppositifolia*.

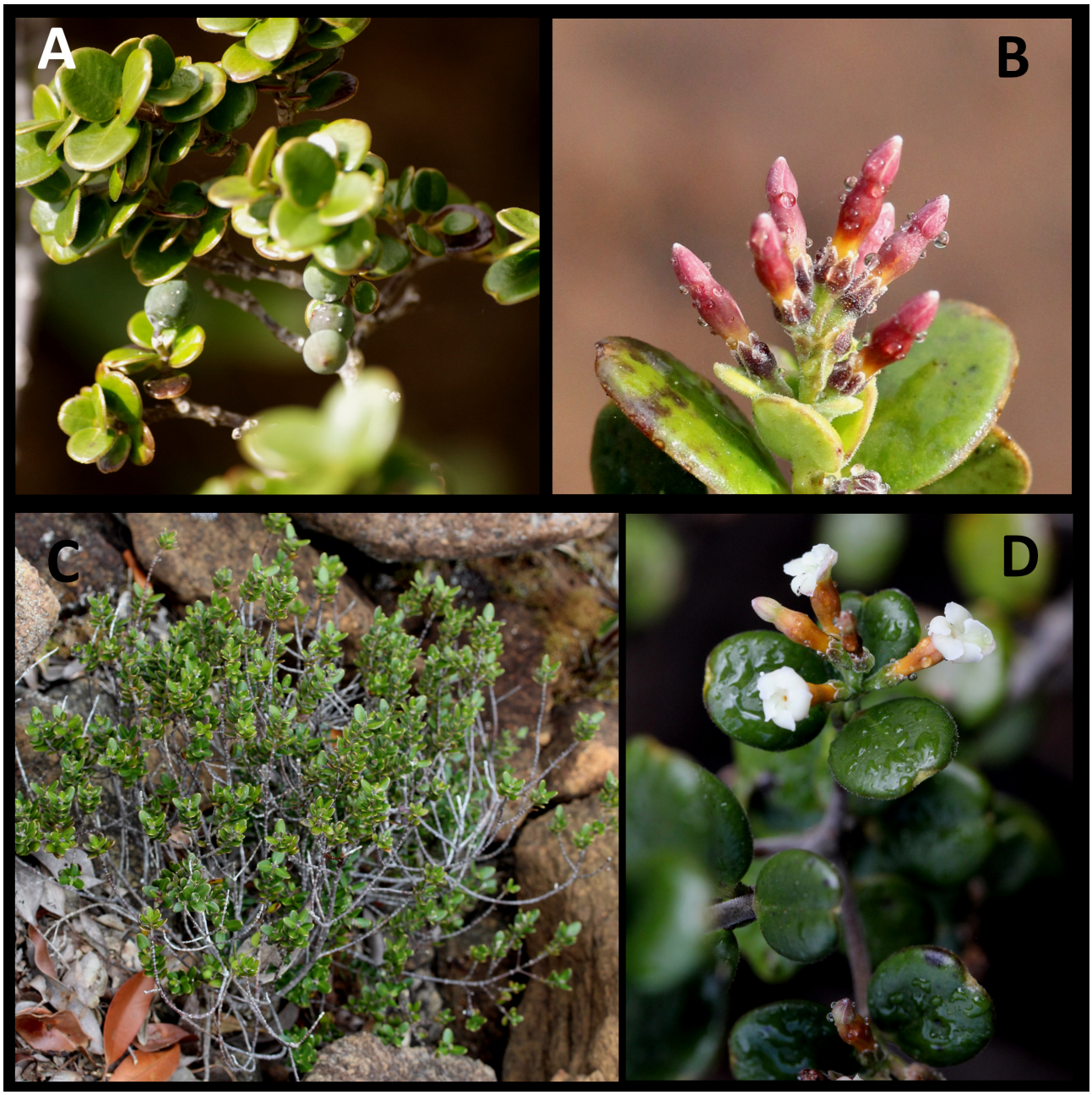

FIGURE 6. *Alyxia kaalaensis* with detail of a fruiting branch (A), buds (B), habit (C) and a flowering branch (D). Photographer: G. Lannuzel from *Lannuzel 184*.

Distribution and habitat:—The species is known only from Kaala-Gomen and Koumac, on the hills of Siounda, Mont Kaala and Mont Ouazangou (from pictures only for the latter locality). It grows in shrublands from 20 to 950 m elev.

Phenology:—From herbarium specimens and pictures available, *A. kaalaensis* is flowering from March to October, and fruiting from February to October.

Specimen examined:—NEW CALEDONIA: North province; Koumac, Kokondo, 25 February 2004, *Dagostini 814* (NOU002995!); Massif du Kaala, elev. 740 m, 8 November 2005, *Dagostini, Rigault & Barrière 1064* (NOU010215!); Mt Kaala, elev. 850 m, 20°36'28"S, 164°22'44"E, 21 June 2017, *Lannuzel 46* (NOU088511!); Mt Kaala, Au-Dessus du Captage, elev. 180 m, 20°39'3"S, 164°23'31"E, 11 January 2018, *Lannuzel 145* (NOU089023!); Mt Kaala, elev. 800 m, 20°36'28"S, 164°22'44"E, 04 July 2018, *Lannuzel 184* (NOU089182!); Base W Mt Kaala, elev. 50 m, 20 May 1956, *MacKee 4618* (P04237016!); Pente W Mt. Kaala, elev. 100 m, 8 September 1958, *MacKee 6490* (P04236963!); Pente W Mt Kaala, elev. 100 m, 8 September 1958, *MacKee 6506* (P04237013!); Western slope of Mt Kaala, elev. 100 m, 8 September 1958, *MacKee 6507* (P04237014!); Pente Sud du Mt. Kaala, elev. 400 m, 10 October

1965, *MacKee 13568* (P04236962!, P04551337!); Pente S Mt Kaala, elev. 400 m, 10 October 1965, *MacKee 13599* (P00072140!, P00143138!); Sommet Nord du Mt Kaala, *MacKee 16127* (L.2702413!); Pente du Mt Kaala au dessus de Gomen, elev. 500 m, 21 April 1967, *MacKee 16656* (NOU021996!, P05236808!, P05391603!); Koumac: Siounda, 22 April 1967, *MacKee 16663* (L.2711051!, NOU058035!, P04237015!), Koumac: Siounda, elev. 200 m, 13 May 1978, *MacKee 35149* (CANB 721982.1, L.2699329!, NOU058036!, P04236967!, P05236819!); Koumac: Kokondo, elev. 20 m, 13 May 1983, *MacKee 41470* (L.2699330!, NOU058127!, P04259046!, P04551336!); Base Kaala Versant Ouaco, 4 November 1975, *Sévenet-Pusset 1102* (NOU058038!, P04237012!).

Alyxia loeseneriana **Schlechter** (1906: 237). Lectotype, designated by Middleton (2002:32):—NEW CALEDONIA, Auf den Bergen bei Ou-Hinna, elev. 800 m., 7 January 1903, *Schlechter 15689*: P [P00072143!] (Fig. 7)

= *Alyxia johnsoniae* Moore (1921: 358). Holotype:—NEW CALEDONIA, Mont Mou, 13 March 1914, *Compton 543*: BM [BM000508534!]

= *Alyxia vieillardii* Boiteau (1979:452). Lectotype (designated here):—NEW CALEDONIA, Balade, *Vieillard 961*: P [P00072144 !]; isolectotypes : P [P00143131!; P00143132!], L [L0544776!]

Notes:—In the protologue of *Alyxia vieillardii*, Boiteau (1979) wrote that the type specimen was "*Vieillard 961*, bord de rivière à Balade (riverside at Balade), (holo-, P)". There are at least six specimens of *Vieillard 961* at P and one at L. Two of them (P00228423! and P04223453!) belong to the genus *Ochrosia* Juss. and one (P00143133!) is not labelled "bord de rivière à Balade" so they can be excluded from the type material. A lectotype and three isolectotypes are then designated in accordance with Middleton's 1997–1999 notes on the specimens.

Species circumscription:—Boiteau (1981) and Middleton (2002) had a concept of *Alyxia loeseneriana* which included *Alyxia loeseneriana* var. *macrocarpa* Boiteau, the latter only known from specimens bearing fruits. Flowering specimens collected after Boiteau's description of the variety or not seen by him (not held at P) shows this variety deserves to be elevated to the species level (see under *A. paniensis nom. nov., stat. nov.*) because of different flower morphology. The concept of *A. loeseneriana* is thus narrowed to specimens with corolla tubes 3–5 mm long, and fruit articles ca. 1.5 cm long, with rounded apices.

Distribution and habitat:—This species is quite common on Grande Terre, mostly on non-ultramafic substrates and sometimes on ultramafic ones, from 50 to 1000 m elev. It grows almost exclusively in dense humid forest, but can be seen at forest edges.

Phenology:—From herbarium specimens, *A. loeseneriana* is flowering from October to February. Fruits were collected all year round so they probably mature slowly.

Specimens examined :—NEW CALEDONIA: North province; Sud de Canala, 1 November 1869, *Balansa 2436* (P04237304!, P04237305!); Col Amieu, 11 February 2005, *Barrabé 277* (NOU004587!); Pouébo, 15 September 1949, *Cheeseman 3153* (P04237261!); Haute vallée de la Tchamba, elev. 100 m, 15 January 1966, *MacKee 14251* (L.2711018!, NOU058079!, P04237282!); Massif Ton-Non, elev. 800 m, 21 March 1968, *MacKee 18518* (P04237263!); Massif Ton-Non, elev. 900 m, 13 July 1968, *MacKee 19176* (P04237262!); Table Unio, elev. 900 m, 14 November 1970, *MacKee 22882* (L.2711013!, NOU058098!); Col D'Arama, elev. 60 m, *MacKee 25969* (L.2711014!, P04237251!); Tiwaka: Entre Bopope et Pombei, elev. 250 m, 30 October 1973, *MacKee 27666* (L.2711019!, NOU058080!, P04237250!); Haute Tchamba, elev. 500 m, 8 March 1977, *MacKee 32890* (NOU058083!, P04237283!); Haute Tipindjé, elev. 900 m, 27 December 1990, *MacKee 45273* (NOU058101!); Mt. Colnett, elev. 1000 m, 29 October 2003, *McPherson 19061* (P04551208!); Mt. Colnett, elev. 950 m, 1 November 2003, *McPherson 19122* (P04551209!); Tiébaghi Massif, elev. 550 m, 20 December 1983, *McPherson 6167* (MO421107, NOU058071!, NSW 238708, P04237259!); Roches de la Ouaième, elev. 619 m, 20°38'26"S, 164°52'15"E, 1 November 2010, *Munzinger 6094* (NOU063272!); *s.l.*, *Pancher s.n.* (P04237273!); Gatope, *s.c. 2960* (P04237281!); Auf den Bergen bei Ou-Hinna, elev. 800 m, 7 January 1903, *Schlechter 15689* (P00072143!); Route de Gomen à Konio, 21 December 1966, *Schmid 1900* (NOU058077!); Mont Ignambi, elev. 1000 m, 19 August 1965, *Veillon 431* (P04237266!); Mont Panié, elev. 900 m, 7 July 1978, *Veillon 3609* (P04237265!); Bord de rivière à Balade, *Vieillard 961* (L 0544776!, P00072144!, P00143131!, P00143132!); Balade, *Vieillard 961* (P00143133!); Gatope, 1861, *Vieillard 2960* (P04237277!); Gatope, 1861, *Vieillard 2961* (P04237280!), Kanala, 1861, *Vieillard 2962* (P04237274!); Gatope, 1861, *Vieillard 2963* (P04237269!); Gatope, 1861, *Vieillard 2965* (P04237255!); **South province;** Forêts situées au dessus de la Ferme-Modèle (Nouméa), 1 October 1868, *Balansa 212* (P04237306!); Mont Mi, 20 February 1869, *Balansa 1399* (P04237307!, P04237252!, S-PL-20399!); Forêts situées au NE de la Conception, elev. 700 m, 24 January 1869, *Balansa 1404a* (P04237301!, P04237303!); Monts Koghis, elev. 500 m, 1965, *Blanchon 8* (P04237268!); Tendo, 21 August 1974, *Bourret 12* (NOU058082!); Mt Mou,

13 March 1914, *Compton 543* (BM000508534!); Me Ammeri, 30 November 1950, *Guillaumin, Baumann-Bodenheim & Hürlimann 9075* (L.3729966!); Mt. Mou, 2 February 1951, *Guillaumin, Baumann-Bodenheim 10141* (L.3718458!, P04237267!); Mt. Bouo, 20 April 1950, *Guillaumin, Baumann-Bodenheim & Hürlimann 12609* (L.3729994!); Mt. Bouo, 20 April 1950, *Guillaumin, Baumann-Bodenheim & Hürlimann 12611* (L.3729993! L.3729995!); Mt. Bouo, 20 April 1950, *Guillaumin, Baumann-Bodenheim & Hürlimann 12650* (L.3735012!); Mt Bouo, 20 April 1951, *Guillaumin, Baumann-Bodenheim 12651* (P04237257!); Tonghoue, 24 January 1971, *MacKee 23281* (L.2711009!); *s.l.*, *Hürlimann 125*, (P04237270!); Route de la Ouenghi, elev. 100 m, 16 December 1970, *Jaffré 430* (NOU058067!); Près de La Foa 1910, *Le Rat s.n.* (P04237271!); *s.l.*, *Le Rat s.n.* (P04237272!); Mt. Koghi: Vallée Thy, elev. 200 m, 24 December 1955, *MacKee 3632* (E00075715!, L.2711011!, P04237300!, P04237302!); Mt. Koghi, *MacKee 4005* (L.2711017!); Koh, 1 October 1967, *MacKee 17764* (P05391652!); Canala : Sentier Ciu-Koindé, elev. 300 m, 5 December 1967, *MacKee 18079* (L.2711020!, NOU058078!, P04237285!); Tonghoué, elev. 100 m, 24 January 1971, *MacKee 23281* (MO1114225, NOU058076!, P04237284!); Thio: Vallée De Koua, elev. 200 m, 23 June 1977, *MacKee 33333* (L.2711010!, MO1114562, NOU058081!, P04237253!, WAG.1475204); Mt Koghis, elev. 850 m, 27 October 1979, *McPherson 1984* (MO1574039, NOU021989!); Monts Koghis, elev. 500 m, 14 January 1965, *Schmid 8* (NOU057968!); Mt Koghis, elev. 950 m, 7 December 1967, *Veillon 1543* (P04237254!); Paita, au nord du pic Nondoué, elev. 50 m, 4 April 1991, *Veillon 7356* (NOU058180!); Port de France, 1855, *Vieillard 959* (P04237275!, P04237276!, P04237278!)

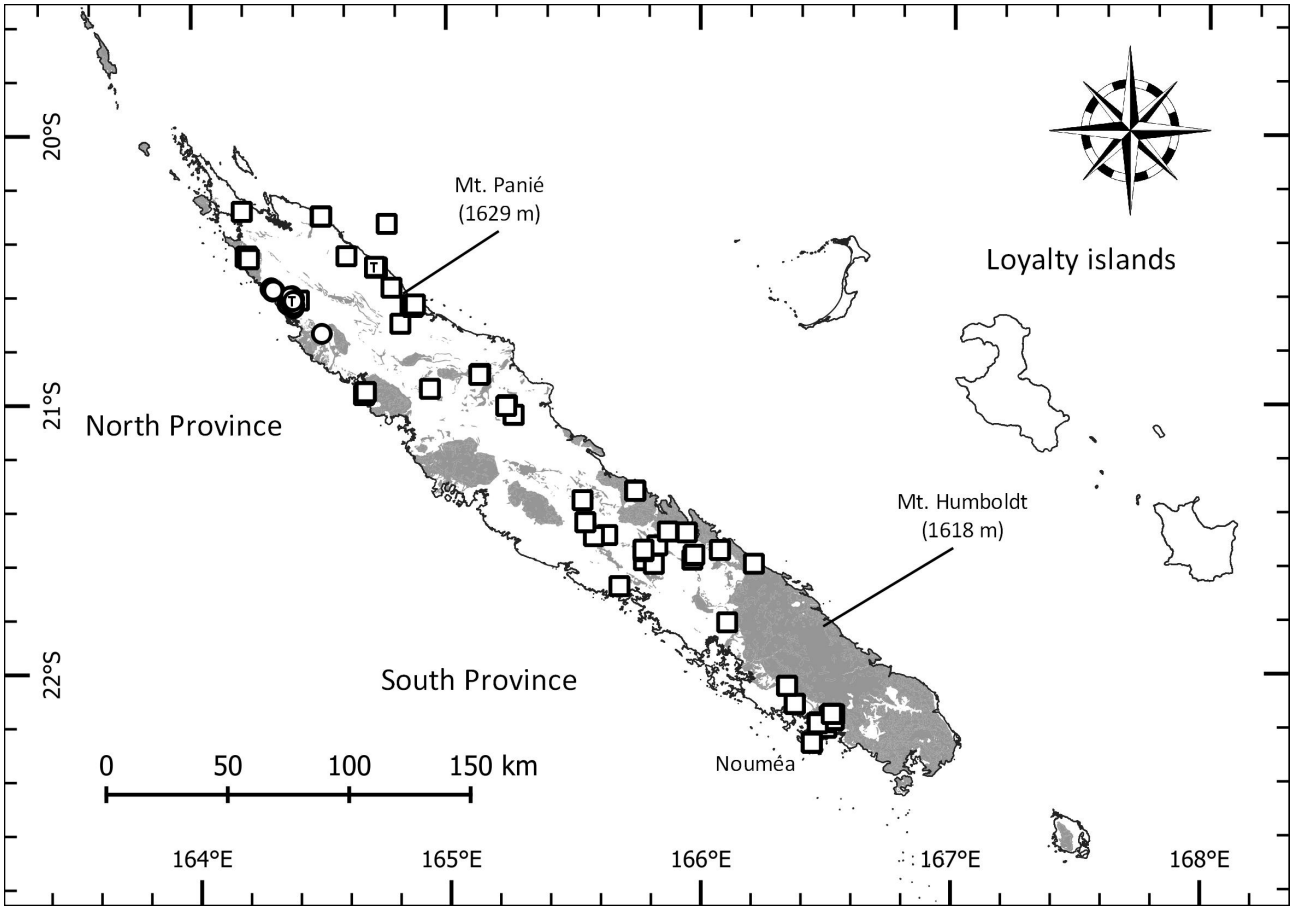

FIGURE 7. Known distribution *Alyxia kaalaensis* (dots) and *Alyxia loesneriana* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Alyxia minimiflora **Lannuzel, *sp.nov.*** (Figs 8, 10), (urn:lsid:ipni.org:names:77336419-1)

Diagnosis :—*Alyxia minimiflora* is a small dense shrub characterised by its small linear leaves, and small flowers. It is similar to *A. rosmarinifolia* (Baill.) Guillaumin by its linear leaves and small flowers, but differs from it by shorter flowers (1.5 mm vs 2 mm in *A. rosmarinifolia*), a primary inflorescence axis of 1 mm (vs ca 3 mm in *A. rosmarinifolia*) and densely pubescent young shoots.

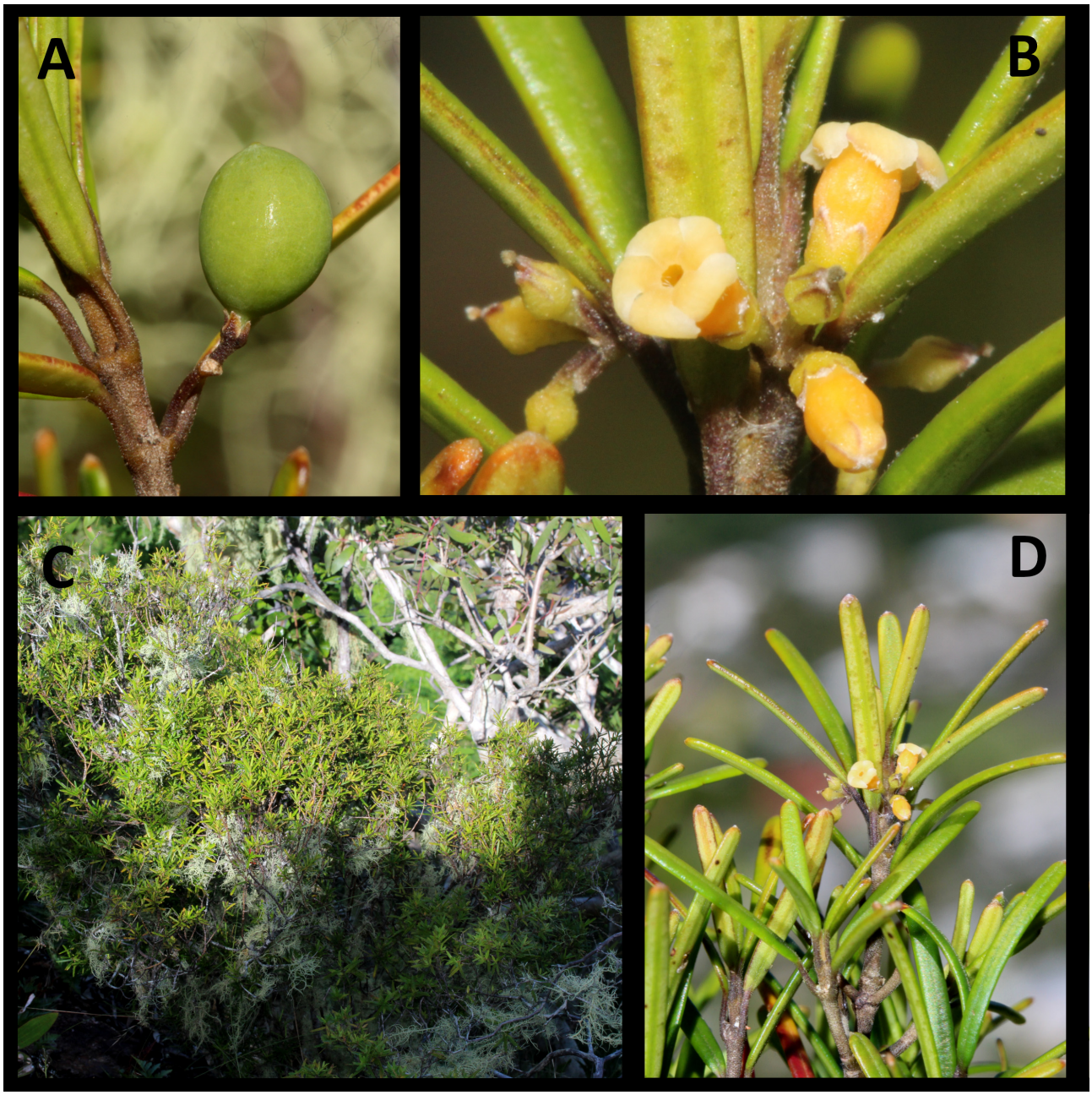

FIGURE 8. *Alyxia minimiflora* fruit (A), flowers (B), habit (C), and a flowering branch (D). Photographer: G. Lannuzel, from Lannuzel 634.

Type :—NEW CALEDONIA, South Province, Pic aux chèvres, elev. 270 m, 22°11'38"S, 166°27'37"E, 5 May 2022, *Lannuzel, Foord & Pouget 634*, holotype: NOU [NOU108945!]; isotype : P [P01139656!]

Small shrub, up to 50 cm, young stems densely pubescent; latex white. Leaves ternate, subcoriaceous, green adaxially, light green abaxially when young, flat, petiole 1.5–2.8 mm long, pubescent, lamina linear, 10–30 × 1.4–2 mm; base cuneate, apex rounded, mucronate, both surfaces looking lustrous but with sparse and very short hairs (ca. 0.01 mm long) on main veins abaxially, leaf venation not visible apart from the midrib. Flowers axillary, grouped in trichasial cymes, axes green, pubescent, null to 1.7 mm, pedicels 0.2 × 0.8 mm covered by 1 caduceous bract, ca. 1 × 1 mm, reddish, pubescent.

Flower 5-merous,1.6–1.9 × 0.5–1 mm. Calyx lobes appressed to corolla, widely triangular, acute to obtuse at apex, ca. 0.5 × 0.5 mm, green, glabrous, but with ciliate margin. Corolla tube pale orange, lobes creamy to yellowish, tube ca. 1.6 × 0.8 mm, glabrous outside, with only 1 ring of hairs inside, below anthers and stigma, composed of 0.2 mm long appressed hairs, lobes sinistrorse, rounded, glabrous with slightly ciliate apex, recurved at anthesis.

Anther cone 0.5 mm long, not exserted; filaments 0.1 mm long, inserted at 2/3 of tube length. Ovary ca. 0.5 × 0.3 mm, hairy at base with 0.1 mm long hairs, style 0.4 mm long, glabrous, stigma ovoid, obtuse, hairy at top. Fruit green then black when ripe, fleshy, 1 article, 6–7 x 4–5 mm, ovoid.

Distribution and habitat:—*Alyxia minimiflora* is known from only one population, located on Pic aux chèvres peak, Dumbéa, near Nouméa. It is a rupicolous plant growing only on top of schistaceous cliffs, ca. 250 m elev. where another narrow-range species, *Austrocallerya australis* (Endl.) J.Compton & Schrire is also known.

Phenology:—From the few specimens available, *A. minimiflora* is known to flower between March and May. Fruits are only known from the type specimen, in May.

Etymology:—The species is the *Alyxia* with the shortest flowers in New Caledonia, thus justifying the epithet *minimiflora*.

Notes:—*MacKee & Suprin 45389* and *Veillon 7334* were included in *A. tisserantii* by Middleton (2002) and not yet gathered when Boiteau (1981) published the flora. They however show perfect matching with the type specimen and were collected in the same locality. As circumscribed here, *A. tisserantii* has much longer flowers (ca. 3 mm vs 1.5 mm in *A. minimiflora*), a longer inflorescence axis (ca. 5 mm vs 0–1.7 mm in *A. minimiflora*), and wider leaves (variable 5.5–12 mm vs remarkably stable 1.4–2 mm in *A. minimiflora*). Finally, the whole *A. tisserantii* plant is glabrous while *A. minimiflora* is densely pubescent, at least on young shoots.

Specimens examined:—NEW CALEDONIA: South province: Pic aux chèvres, elev. 250 m, 22°11'38"S, 166°27'37"E, 5 May 2022, *Lannuzel, Foord & Pouget. 632* (NOU108942!); Pic aux chèvres, elev. 250 m, 22°11'38"S, 166°27'37"E, 5 May 2022, *Lannuzel, Foord & Pouget 633* (NOU108943!; P01139656!); Koutio: Pic aux Chèvres, elev. 250 m, 11 March 1991, *MacKee & Suprin 45389* (P04225605!!, L.2702438!); Dumbéa: sommet Pic aux chèvres, elev. 289 m, 11 March 1991, *Veillon 7334* (NOU058309!, P04220397!).

***Alyxia nummularia* Moore** (1921: 358). Holotype:—NEW CALEDONIA, Mt Dore, elev. 1500 ft, 1 May 1914, *Compton 841*: BM [BM000508535!] (Figs 9, 10)

Species circumscription:—*Alyxia nummularia* was considered as a distinct species by Boiteau (1981) and then merged into *A. tisserantii* by Middleton (2002). We follow Boiteau (1981) and consider it as a distinct species, mostly characterized by orbicular leaves, and densely pubescent young stems and leaves. It differs from our conception of *A. tisserantii* mostly by the young stems and densely pubescent leaves, slightly longer corolla tubes (ca. 2.1–3.1 mm vs 1.1–2.2 mm), and grayish bark. It is most similar to higher-altitude forms of *A. kaalaensis* by the orbicular leaves, but differs from it by the always axillary inflorescences and shorter corolla tube (ca. 2.1–3.1 mm vs 3–4.5 mm in *A. kaalaensis*). Flower dissections also showed that *A. nummularia*'s ovary only presents a ring with sparse hairs (ca. 0.1 mm) at the base, while *A. kaalaensis* has a densely pubescent ovary, with longer hairs (0.15–0.2 mm).

Distribution and habitat:—*Alyxia nummularia* occurs in the southern half of Grande Terre, between 50 and 1100 m elev. It grows mainly on rocky areas, in shrubland vegetations on ultramafic substrates. Vieillard's specimens are not presented on the map (Fig. 12), because they are considered doubtful, with mixes of different plants under the same collection number, plus old and unreliable locality names.

Phenology:—From herbarium specimens and pictures available, *A. nummularia* can present flowers and fruits all year round.

Specimens examined:—NEW CALEDONIA: North province; Kopéto, elev. 300 m, 25 March 2000, *Achille 906* (P04257736!); Rade de Canala, 1 November 1869, *Balansa 1440a* (P04260808!), Kopéto, Pouembout, elev. 184 m, 21°11'52"S, 165°1'58"E, 23 February 2019, *Fleurot 548* (NOU105625!, NOU090229!); Col de Nékoro, 11 October 1972, *Jaffré 2206* (NOU058198!, P04260780!); Massif du Boulinda, elev. 400 m, 23 February 1978, *Jaffré 2370* (L.2702481!, NOU058204!, P05236790!, P04260801!); Poya: Avangui, elev. 100 m, 11 April 1969, *MacKee 20510* (NOU058360!); Kopéto: Crête E Mt. Vert, elev. 800 m, 8 July 1970, *MacKee 22214* (NOU058209!, P04260796!); Wagap, 1861, *Vieillard 2964* (P04220358!); Gatope, *Vieillard 2965* (P04220359!); Kanala, 1855, *Vieillard 957* (P04220364!, P04220366!, P04220367!); **South Province;** Montagne des Sources, 11 February 2000, *Achille 671* (P05391660!); Rocher Bouremere, à l'embouchure de l'Io, 27 December 1869, *Balansa 2440* (P04260784!, P04260809!, P04260803!); Col de Plum, 22 August 1950, *Baumann-Bodenheim 5593* (P04225785!); Col de Vulcain, 11 November 1950, *Baumann-Bodenheim 8076* (P04260804!, US2316500!); Col de Vulcain, 1 November 1950, *Baumann-Bodenheim 8150* (L.3729964!, P04260810!, US2316501!, U.1088679!); Ouroué/ Dothio, 29 July 1951, *Baumann-Bodenheim 14391* (P04225781!, US2316701!); Mont Dore, elev. 500 m, *Compton 841* (BM000508535!); Peak near Col de Mouirange, elev. 300 m, 6 October 1963, *Green 1253* (MEL 0568836A, P04225732!); Col de Plum, elev. 50 m, *Guillaumin, Baumann-Bodenheim & Hürlimann 7927* (L.3729962!, P04225735!), Mt Dore, *Guillaumin, Baumann-Bodenheim& Hürlimann 11399*, (L.3729963!, P04260785!); Mt. Dore, 21 March 1951, *Guillaumin, Baumann-Bodenheim*

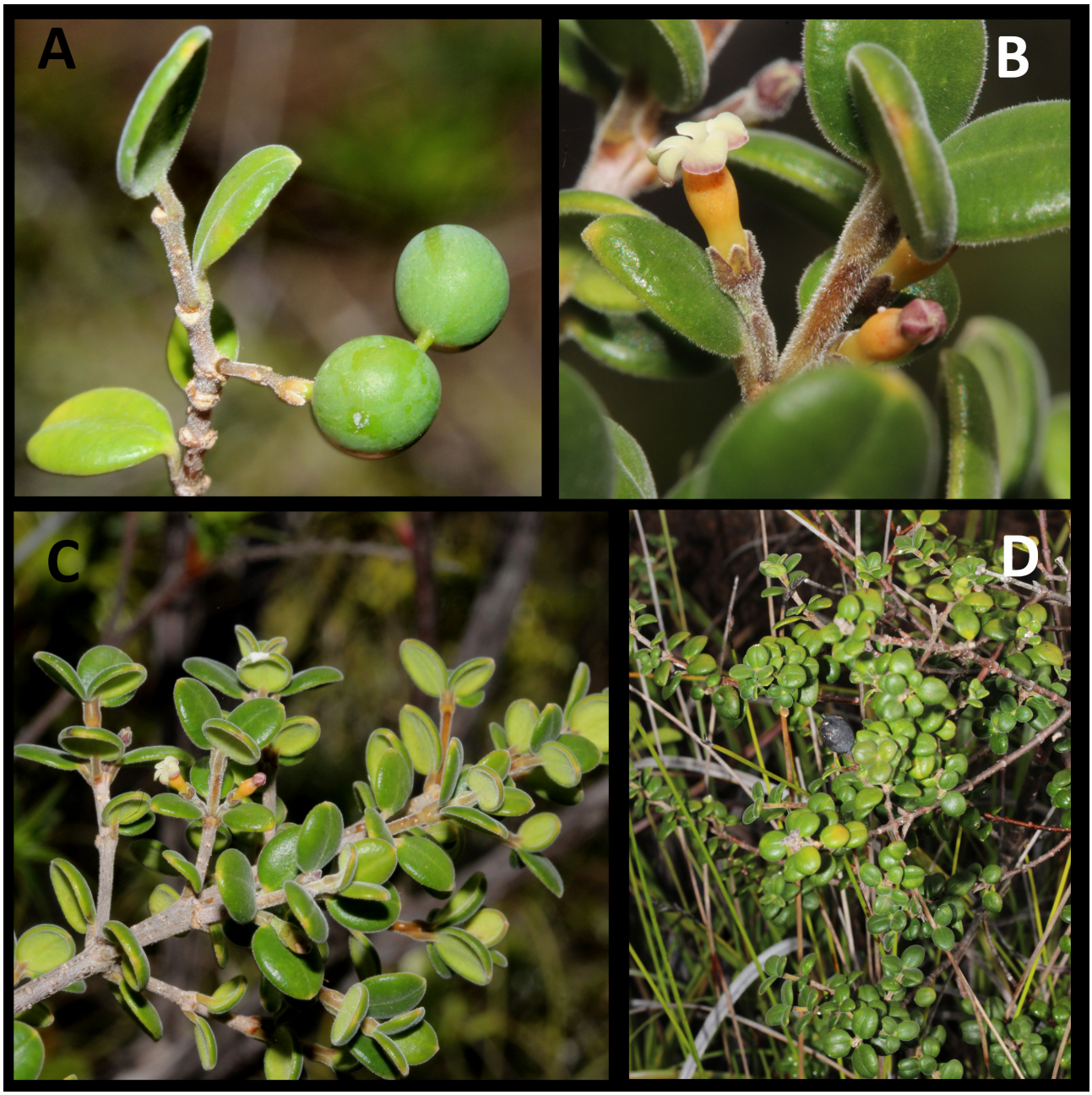

FIGURE 9. *Alyxia nummularia* with detail of an immature fruit (A), flower (B), fertile branch (C) and general habit (D). Photographer: G. Lannuzel from *Lannuzel 566*.

& Hürlimann 11431 (L.3729961!, P04260782!, US2316594!); Ouroué, *Guillaumin, Baumann-Bodenheim& Hürlimann 14342* (L.3729960!, US2316693!); au dessus du sentier de la Dumbéa au Dzumac, elev. 800 m, 29 March 1951, *Hürlimann 1122* (P04260802!); Mt. Dzumac, elev. 800 m, 15 April 1978, *Jaffré 2410* (L.2702428!, L.2702429!, L.2702480!, P04225714!, NOU058278!); Tontouta Valley Near Junction of Kalouéhola, elev. 50 m, 25 December 1955, *MacKee 3658*, (L.2699547!, P04260786!); Piste Dzumac, elev. 400 m, 14 April 1956, *MacKee 4343* (E00098780!, P04260788!); Confluent Tontouta-Kalouéhola, elev. 50 m, 15 July 1956, *MacKee 4910* (E00098782!, P04260787!); Confluent des Rivières entre Tontouta et Kalouéhola, elev. 50 m, 25 December 1960, *MacKee 7736* (L.2702471!, P04260783!); Ouroué, elev. 50 m, 30 April 1967, *MacKee 16707* (P04260798!, P04551185!); Mt. Dore, elev. 750 m, 29 December 1982, *MacKee 41103* (P04225602!); Peak Near Col de Mouirange, elev. 300 m, 6 October 1963, *McPherson 1253* (NOU058199!); 17 Km South-West of Thio, elev. 50 m, 17 August 1982, *McPherson 4898* (MO421590, NOU058299!); Lower reaches of Dumbéa valley, 27 November 1982, *McPherson 5216* (MO420718, NOU058263!); Col de Mo, 22 August 2004, *Munzinger & Létocart 2328* (NOU006832!, P04551229!); Mont Dore, face Est, 6 May 1966, *Nothis 133* (NOU058253!, P04225577!, P04225576!); Côteaux boisés, *Pancher 308* (P04225578!,

P00156842!); Rivière Bleue De Prony, 2 October 1969, *Schmid 2991* (NOU058328!, P04225566!); Jardin Botanique de Montravel, 19 November 1967, *Sévenet 23 S* (P04551367!); Mont Dore, elev. 700 m, 29 December 1982, *Suprin 2196* (NOU058276!, P04225555!); Col du Vulcain, elev. 1100 m, 26 April 1973, *Veillon 2869* (NOU058275!, P05236780!, P04260795!); Mont Dzumac, *Veillon 3623* (L.2702430!, NOU058283!, P04220400!); Rive Droite de la Tontouta, 7 October 1986, *Veillon 6006* (NOU058201!); Presqu'île Montagnès, 31 January 1991, *Veillon 7325* (NOU058202!); Mont-Dore—pente Sud, 28 June 1939, *Virot 213* (P04220379!, P04220381!).

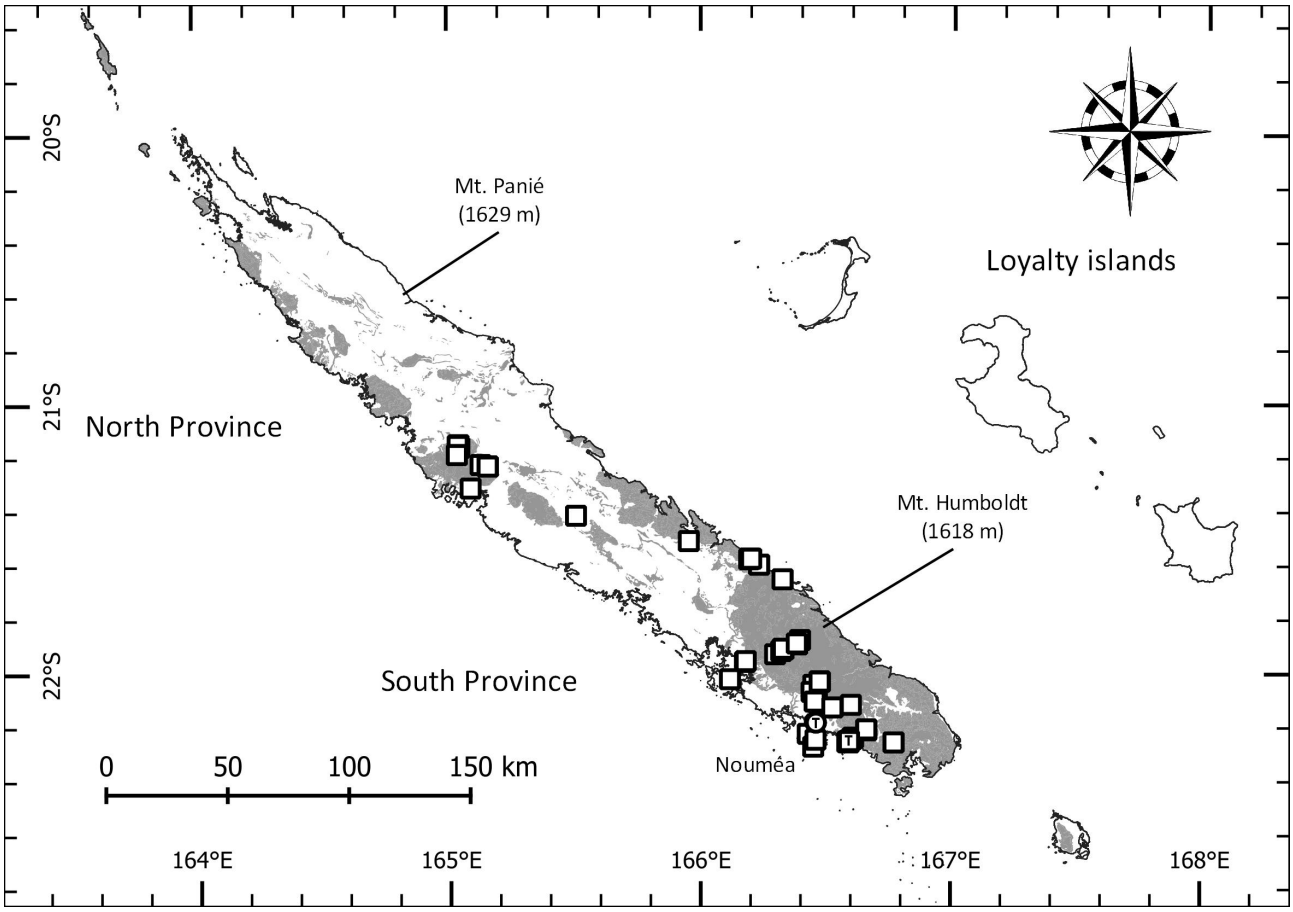

FIGURE 10. Known distribution *Alyxia minimiflora*(dots) and *Alyxia nummularia* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

***Alyxia oppositifolia* Boiteau** (1979: 452). Holotype:—NEW CALEDONIA, Vallée de la Koumac, elev. 30 m, 19 April 1967, *MacKee 16599*: P [P00072115!]; isolectotype: P [P00625018!], L [L 0544770!], K [K000894177!], NOU [NOU005731!] (Figs 11, 12)

Species circumscription:—*A. oppositifolia* was described by Boiteau (1979) and then maintained by Boiteau (1981) and Middleton (2002). This species' concept however varied between the two authors, resulting in varying distribution and ecology. We accept a broad concept of *A. oppositifolia*, characterized by usually opposite leaves, sometimes ternate, flowers usually solitary, sometimes in simple inflorescences of three flowers, with a corolla tube 4.3–7.8 mm long, borne by a peduncle of at least 6 mm, and a fruit article longer than 7–7.5 mm. Lamina shape varies from flat and lanceolate chartaceous leaves, to linear revolutate and coriaceous ones. Pubescence is also variable with glabrous plants and plants pubescent on young stems, leaves, and peduncles. This variation appears to be correlated with substrates, with glabrous plants on calcareous substrates and pubescent ones on serpentine outcrops. These differences could cover two species, but further studies are needed to reach a conclusion on this point.

Distribution and habitat:—*A. oppositifolia* occurs only in the northwestern part of Grande Terre, at low altitude (0–300 m) shrublands and sclerophyllous forests, on various substrates.

Phenology:—From herbarium specimens and pictures available, flowers can be seen from September to May. Fruits were collected almost all year round.

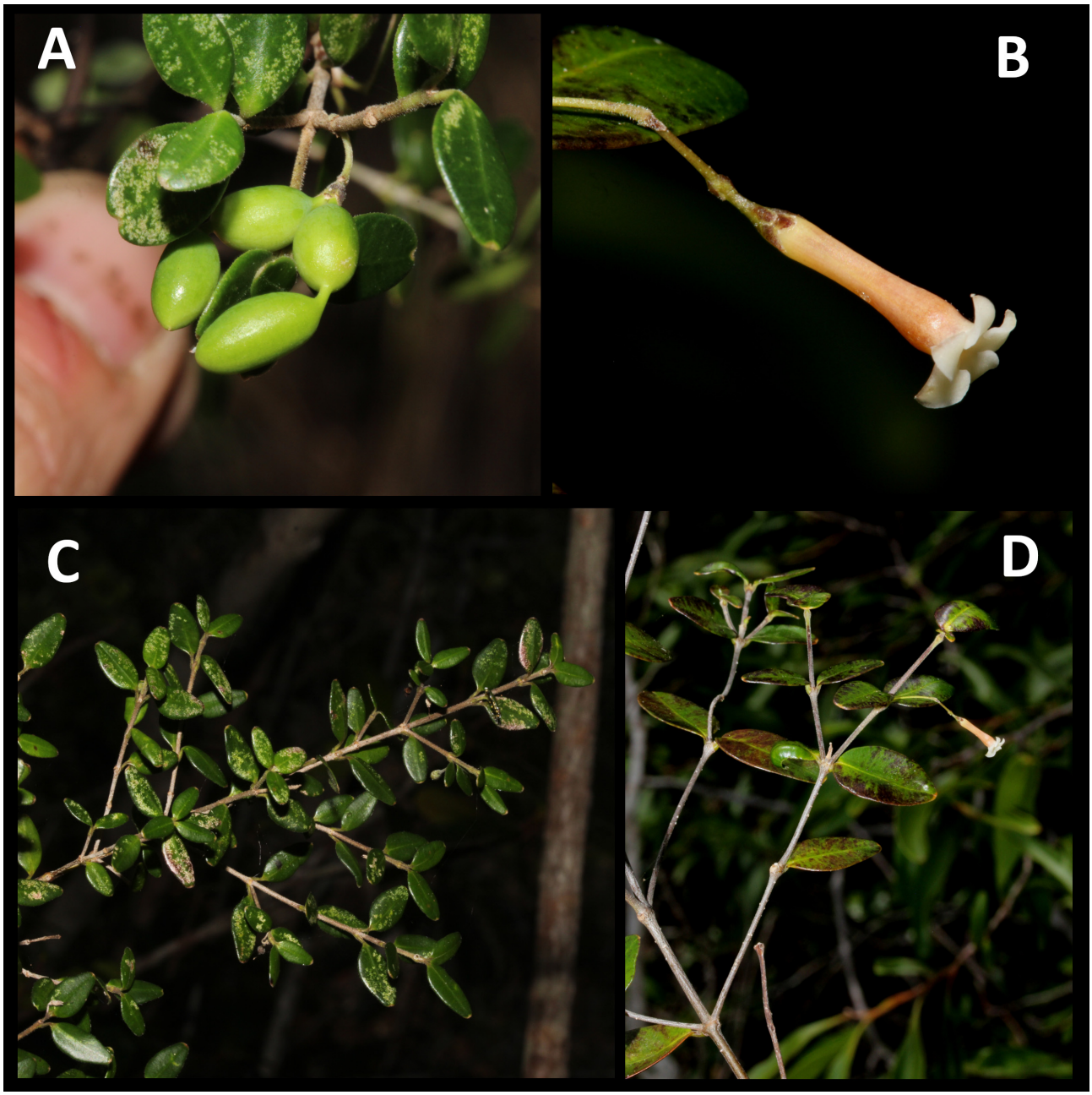

FIGURE 11. *Alyxia oppositifolia* with detail of an immature fruit (A), flower (B), sterile branch (C) and fertile branch (D). Photographer: G. Lannuzel, A & C from Moindah valley, B & D from Tiéa.

Specimens examined:—NEW CALEDONIA: North province; Dôme de Tiébaghi, 22 January 1965, *Blanchon 1453* (NOU058274!); Pouembout: conservatoire botanique de Tiéa, 03 October 2000, *Dagostini 243* (NOU058270!, P05391656!); Abhang des Pic de Koné, 08 February 1925, *Däniker 1153* (P04257739!); Koumac, elev. 50 m, 20°35'7"S, 164°18'50"E, 18 November 2018, *Fleurot 503* (NOU090187!, NOU105606!); Oua Tilou Mt., 13 April 1951, *Guillaumin & Baumann-Bodenheim 12223* (L.3735039!, P04236964!, US2316613!); Oua Tilou., 13 April 1952, *Guillaumin & Baumann-Bodenheim 12248* (L.3735066!, P00072196!, US2316614!); Oua-Tilou, 13 April 1951, *Guillaumin & Baumann-Bodenheim 12264* (L.3735067!, P04236966!); OuaTilou, 13 April 1951, *Guillaumin & Baumann-Bodenheim 12274* (L.3735068!, P04236965!, US2316617!); Mt Koniambo, 21 December 1950, *Guillaumin & Baumann-Bodenheim 9512a* (L.3718456!, P00072195!); Pindaï, Baie des Sapins, 5 March 2007, *Hequet 3597* (NOU016947!); Massif du Boulinda, 10 July 1973, *Jaffré 1158* (NOU058279!, P04225718!); Massif du Boulinda, Col de Nékoro, 09 November 1972, *Jaffré 2172* (NOU058280!, P04225715!); Gatope, elev. 141 m, 16 November 2004, *Labat 3498* (NOU011192!, P00454760!); Vallée de Koumac, elev. 30 m, 19 April 1967, *Mackee 16599* (K000894177!, L 0544770!, NOU005731!, P00072115!, P00625018!); Poya: Avangui, elev. 100 m, 11 April 1969, *MacKee 20524*

(NOU058179!, P04260812!, P05236799!); Vallée de Poya, Ndokoa, elev. 100 m, 07 May 1971, *MacKee 23714* (NOU058092!, P04257740!, P04257741!); Koumac: Ruisseau Grande Forêt, elev. 250 m, 01 December 1972, *MacKee 25996* (P04257738!); Néhoué: Babouillat, elev. 30 m, 28 December 1972, *MacKee 26110* (L.2699540!, P04260799!); Koumac: Grande Forêt, elev. 250 m, 25 March 1973, *MacKee 26481* (NOU058096!, P04257745!, P04257746!); Base Sw du Mt Koniambo, elev. 150 m, 10 April 1975, *MacKee (leg.Veillon) 30007* (NOU058287!, P04260797!, P04551368!); Gomen, crête rocheuse calcaire, 16 July 1977, *MacKee 33500* (NOU058095!, L.2711324!, P04257743!, P04257744!); Koumac: Siounda, elev. 30 m, 13 May 1978, *MacKee 35137* (NOU058094!, P04257737!); Paagoumène, elev. 100 m, 7 July 1978, *MacKee 35402* (L.3735063!, P04260794!, P05236768!); Massif de Tiébaghi, elev. 5 m, 23 May 1980, *McPherson 2709* (NOU058093!, P04456360!); Presqu'île de Pindai, elev. 5 m, 11 December 2003, *Mouly 216* (NOU050749!); Ouéholle, 17 August 1967, *Nothis 439* (NOU058097!, P04257742!); Paagoumène, 21 August 1967, *Nothis 544* (NOU058189!, P04260814!); Rochers calcaires au-dessus de la Koumac, 20 December 1966, *Schmid 1872* (P05391647!, P05391648!); Homedeboa, elev. 314 m, 20°44'5"S, 164°32'34"E, 12 September 2018, *Vandrot 1450* (NOU106034!, P00936759!).

***Alyxia paniensis* Lannuzel, *nom. nov.*, *stat. nov.*,** (urn:lsid:ipni.org:names:77336450-1). *Alyxia loeseneriana* var. *macrocarpa* Boiteau (1979: 450). Holotype:—NEW CALEDONIA, Slopes of Mt Panié, elev. 1000–1200 m, 1 September 1958, *MacKee 6414*: P [P00143130!] (Fig. 12)

Species circumscription:—This species was originally described as *A. loeseneriana* var. *macrocarpa*, based only on specimens with fruits. However, *McPherson 17791* (NOU058367), with flowers, justifies raising this taxon to specific rank, with a new name due to the earlier name *Alyxia macrocarpa* Koord. *Alyxia paniensis* differs from *A. loeseneriana* by the ca. 8.5 mm long corolla tube vs 3–5 mm in *A. loeseneriana*, overall flowers ca. 13.5 mm long, and fruit articles 3.5–4 cm long, vs 1.5 cm long in *A. loeseneriana*.

Distribution and habitat:—This poorly known species occurs in the Mont Panié mountain range, in the Northeastern part of Grande Terre. It is known only from medium to high altitude (400–1200 m elev.) dense humid forests.

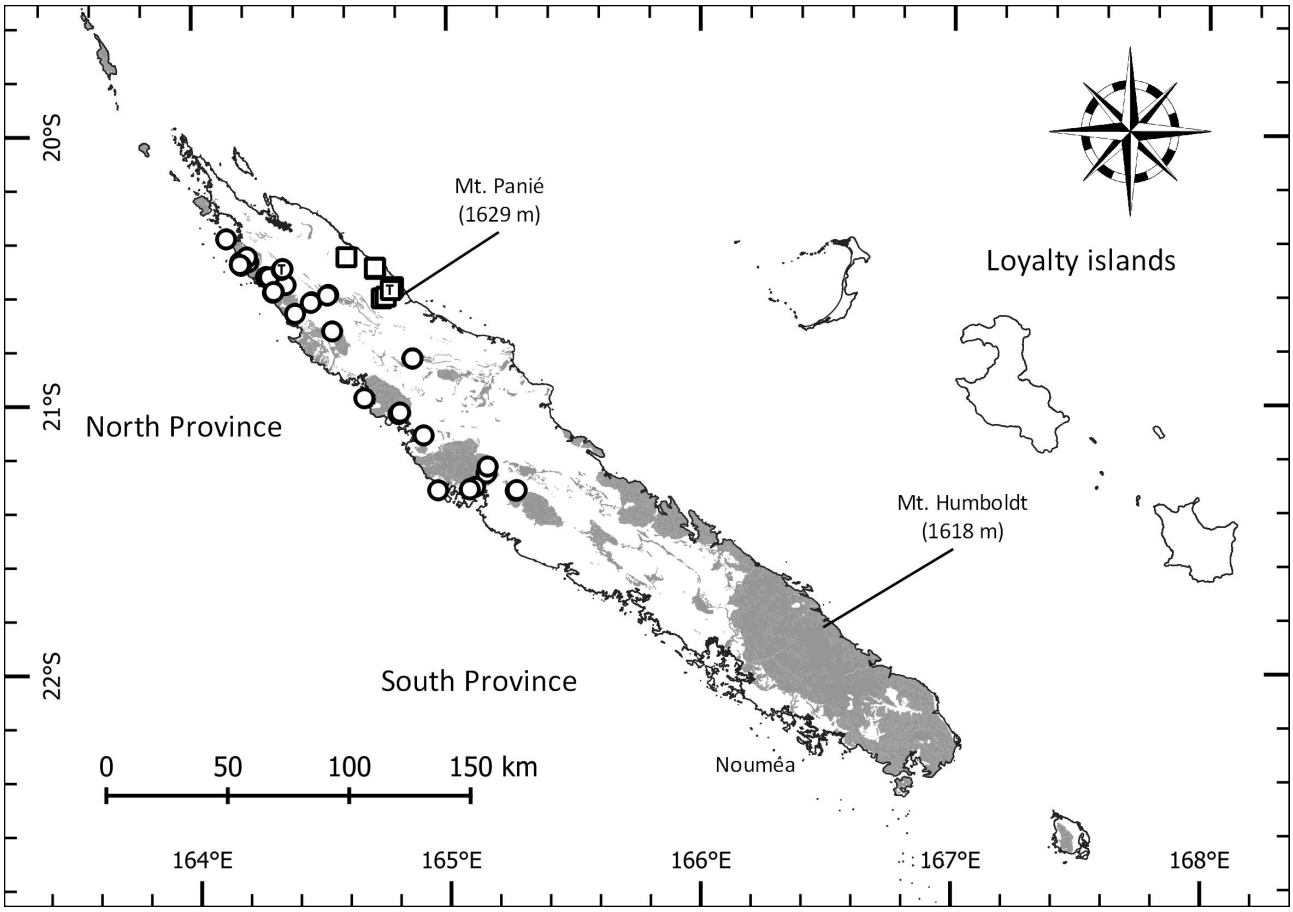

FIGURE 12. Known distribution *Alyxia oppositifolia*(dots) and *Alyxia paniensis* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Phenology:—The only flowering specimen was collected in October. Fruiting specimens were collected in July, August, September, November and February.

Specimens examined:—NEW CALEDONIA: North province; Mt. Panié, elev. 400 m, 1 September 1958, *MacKee 6414* (P00143130!); Mt. Panié, above Haut Coulna, elev. 895 m, 28 October 1999, *McPherson & van der Werff 17791* (MO1382522!, NOU058367!, NOU058367!); Mont Colnett, elev. 1000 m, 29 October 2003, *McPherson, Swenson & Mouly 19061* (L.3735011!, MO1939443!, MO1939443!, NOU004372!); Mt. Colnett, elev. 990 m, 1 November 2003, *McPherson, Swenson & Mouly 19122* (MO1939875!, NOU004379!, NOU004379!); Mont Panié, elev. 900 m, 15 February 2006, *Munzinger 3322* (NOU012199!); Mont Panié, elev. 1200 m, 6 July 1978, *Sévenet-Pusset 1500* (NOU058072!); Mont Panié, elev. 1000 m, 7 September 1978, *Sévenet-Pusset 1545* (NOU058073!, NOU058074!, NOU058074!); Mont Panié, elev. 800 m, 17 September 1981, *Suprin 1412* (NOU058075!); Mont Panié, elev. 900 m, 7 July 1978, *Veillon 3609* (L.2711016!, NOU058068!, NOU058068!, NOU058069!); Ignambi, sentier vers Gomen, elev. 1000 m, 19 August 1965, *Veillon 431* (NOU058070!)

***Alyxia pseudoserpentina* Boiteau** (1979: 448). Holotype:—NEW CALEDONIA, Bosquets des environs de Nouméa, September 1868, *Balansa 221*: P [P00072157!]; isotype: A [A00054878!]; P [P00072158!]; Z [Z-000030175!] (Figs. 13, 15)

= *Alyxia microcarpa* Pancher ex Boiteau (1979: 449). Lectotype (designated here):—NEW CALEDONIA, dans les massifs, sur les coteaux argilo-schisteux, *Pancher 308*, P [P00072141!—left hand parts], ***syn. nov.***

Species circumscription:—*Alyxia pseudoserpentina* was considered as a distinct species by Boiteau (1979, 1981), and then included in *A. tisserantii* by Middleton (2002). According to Boiteau's (1981) key, the species was characterized, within the Globuliferae series, by subsessile axillary inflorescences, and small membraneous leaves. We confirm Boiteau's conclusion, and circumscribed the species based on the short inflorescence peduncle (0.5–4 mm), and a corolla tube 2.6–3.6 mm long. It is similar to some forms of *A. tisserantii* as circumscribed here, but differs from it by the shorter inflorescence primary axis (0.5–4 mm vs 4.2–12 mm), and longer corolla tube (2.6–3.6 mm vs 1.1–2.2 mm). Sterile material is also distinguishable by the very prominent nodes on stems and chartaceous leaves, instead of coriaceous ones in *A. tisserantii*. Finally, this species is restricted to coastal dry forests on non-ultramafic substrates, while *A. tisserantii* grows in ultramafic shrublands.

Distribution and habitat:—*A. pseudoserpentina* is found at low altitude (elev. 0–250 m) on the west coast of Grande Terre. It grows in sclerophyllous vegetations on non-ultramafic substrates.

Phenology:—From herbarium specimens, flowering and fruiting seems to be distributed all year round, but irregularly. Flowers were collected in February, March, April, July, August and December. Fruits were collected from September to April, and in July.

Notes:—Boiteau (1979) described the new species as *Alyxia microcarpa* based on Pancher's manuscript note on a specimen's label at P herbarium. At that time, Boiteau (1979) wrote "*Pancher 308*, coteaux argilo-siliceux, environs de Nouméa, (holo-, P)". Later, Boiteau (1981) added an isotype in Z as "TYPE: *Pancher 308* (holo-, P!; iso-, Z)" being unclear if he had seen the Zurich specimen (without "!"). Middleton (2002) added several other isotypes respectively in A, K, MEL and P. Of the four sheets of *Pancher 308* at P, two (P00156842! and P04225578!) do not bear the original *Alyxia microcarpa* name and can be discarded from original type material. On the two other sheets bearing Pancher's manuscript name *Alyxia microcarpa*, P00156841! has several numbers (*Musée Néocal. 117*, *Pancher 308* and *V.[ieillard] 2969*) and localities (Tanlé and Côteaux boisés) with a morphology not matching the protologue (e.g. *lamina lineari*) such that this sheet could be excluded from the type material. The last sheet P00072141! is the one most closely matching Boiteau's protologue though it is not a perfect match because of several incongruences (e.g. *côteaux argilo-siliceux* versus *côteaux argilo-schisteux*, *Environs de Nouméa* versus *Calédonie*, *Frutex scandens vel sarmentosus* versus *Petit arbre de 3 mètres ou arbre de 4 mètres, Corolla glabris versus Tube intérieurement velu sous le point d'insertion des étamines, fruit on the sheet versus no fruit description*). Because Boiteau (1979) asserted that the species had been studied with living specimens in "Parc de Montravel (Nouméa)" and because he has speculated that this locality was most probably the one where Pancher collected the specimen, we can conclude that Boiteau's protologue is based on both this Pancher sheet and *in situ* observations in Parc de Montravel. It could also be inferred that Boiteau overinterpreted Pancher's label in correcting "côteaux argilo-schisteux" to "côteaux argilo-siliceux" and "Calédonie" to "Environs de Nouméa". In addition P00072141 has three branches and two labels on it so it could be easily concluded that they represent at least two different gatherings based on label information, state of drying and morphology. Based on the morphology described in the protologue and based on Fig. 23.10 in Boiteau (1981: 119)

who referred this drawing to *Pancher 308*, we can confidently select the two branches on the left of the sheet as the lectotype along with the upper label. The single fallen linear leaf in the pocket might also be considered as part of the lectotype. The fruit is not described in the protologue though the epithet name proposed by Pancher refers to a small fruit. The fruit articles in the pocket are related to the bottom label ("fruits noirs") and most probably to the right branch. This label, fruits in the pocket and right branch thus represents a second gathering (a common practice at that time by Pancher, Deplanche and Vieillard- see Morat 2010, Lannuzel *et al.* 2022c) and so do not belong to the lectotype.

Pancher 308 specimens from A (A00054880), MEL (MEL727291), and Z (Z-000000963) seem to belong to one gathering, regarding the leaf shape and drying, but are different from P00072141, with shorter leaves. They are however very similar to P00156841 and probably represent the same collection. The specimen cited by Middleton (2002) at K could not be retrieved during this study. The specimen P00072141, narrower as defined here, is thus considered as the lectotype without any isolectotypes.

Specimen examined:—NEW CALEDONIA: North Province; Pouembout, conservatoire botanique de Tiéa, 3 August 2000, *Dagostini 180* (NOU058340!, P05391646!); *s.l.*, *Deplanche 287* (P04260828!); Gatope, *Godefroy 4581* (L.2699561!); Corne de Koumac, elev. 250 m, 10 July 1972, *MacKee 25666* (P04260846!, P05236766!); Baaba, elev. 40 m, 28 July 2004, *Munzinger 2383* (NOU006843!, P04551211!); *s.l.*, Pancher 308 (A00054880!, MEL727291!,Z-000000963!); Presqu'île de Pindaï, 1 July 1987, *Veillon 6409* (NOU058336!); Pouembout: forêt Berton, elev. 20 m, 11 October 1988, *Veillon 7022* (NOU058339!); Poum, Pointe Olan, elev. 10 m, 22 July 1997, *Veillon 8001* (L.3729956!, NOU058224!, P04220392!); Gatope, 1861, *Vieillard 2967* (P04220356!); Balade, 1855, *Vieillard 953* (P04220383!); **South Province;** Bosquets des environs de Nouméa, *Balansa 221* (A00054878!, L.3729893!, P00072157!, P00072158!); Nouméa, dans les bois, 1 December 1868, *Balansa 1405* (P04225807!, P04225808!, P04225809!); Ouen Toro, 27 July 1950, *Baumann-Bodenheim 5024* (P04225788!, US2316448!); Ile Moro, 5 March 1951, *Baumann-Bodenheim 11103* (L.3718461!, P04260819!); Ouen Toro, 17 May 1951, *Baumann-Bodenheim 13340* (L.2702472!, L.3729891!, L.3729892!, P04260818!, US2316654!); *s.l.*, elev. 100 m, 1 March 1901, *Cribs 1208* (P04226183!); Gouaro Deva, 13 October 2005, *Dagostini 976* (NOU009447!); Caricaté St Vincent, 13 December 1924, *Däniker 766* (L.2699525!, P04260830!); Pointe Noire Boulouparis, elev. 50 m, 21°56'26"S, 166°1'48"E, 1 August 2015, *Fleurot 77* (NOU082018!); Presqu'ile Ducos, 28 February 1951, *Guillaumin 11059* (L.2699560!, L.3729896!, P04260827!, WAG.1475203!, US2316580!); Ile Moro, 6 March 1951, *Guillaumin, Baumann-Bodenheim & Hürlimann 11145* (L.3735041!, P04260820!, US2316584!); Porokoué, 19 February 2007, *Hequet 3579* (NOU016928!, P04551216!); Gouaro Deva, Pic Deva, 21°33'38"S, 165°18'50"E, 14 November 2009, *Hequet 3810* (NOU052814!); Ilot montagnès, 5 September 1988, *Jaffré 2982* (NOU058227!, P04260826!); Ste Marie, près Nouméa, 1903, *Le Rat 325* (P04225711!); Anse Vata, 23 January 1955, *MacKee 1975* (BISH130275!, L.2699530!, P04260831!, US2187151!); Nouméa: Parc forestier Montravel, elev. 30 m, 2 March 1965, *MacKee 12177* (L.2702487!, MO1114215!, NOU058345!, P04225753!); Nouméa: Montravel (Parc forestier), elev. 50 m, 12 March 1966, *MacKee 14527* (L.2699524!, P04225748!); Nouméa: Presqu'Ile Ducos Koumourou, elev. 50 m, 14 April 1970, *MacKee 21784* (NOU058228!, P04260829!); Nouméa: Parc forestier Montravel, elev. 50 m, 9 August 1971, *MacKee 24049* (L.2699545!, MO1114208!, P04225592!, WAG.1475211!); Nouméa: Baie Tina, elev. 10 m, 24 July 1973, *MacKee 26983* (L.2699509!, NOU058237!, P04225589!); Nouméa: Baie Tina, elev. 10 m, 24 March 1974, *MacKee 28361* (L.2699507!, MO1114217!, P04225586!); Nouméa: Ouen Toro, elev. 50 m, 15 February 1975, *MacKee 29764* (MO1114216!, L.2702488!, P04225585!); Bouloupari: Ile Leprédour, elev. 200 m, 28 April 1978, *MacKee 35059* (L.2702467!, P04225544!, P04551327!); Païta: Ngoué, elev. 50 m, 9 March 1980, *MacKee 37888* (L.2702440!, NOU058229!, P04260822!, P04551289!); Bourail: Les Montagnes Blanches, elev. 250 m, 11 February 1981, *MacKee 38739* (P04225540!); Bourail: Les Montagnes Blanches, 11 February 1981, *MacKee 38743* (NOU058285!); Ile Nou: Mt. Téréka, elev. 100 m, 26 January 1983, *MacKee 41194* (P04225603!); La Foa: Ile Isié, elev. 10 m, 20 September 1985, *MacKee 42831*(L.2702426!, NOU058222!, P04260821!, P05236822!); La Foa: Ile Isié, elev. 10 m, 20 September 1985, *MacKee 42833* (L.2702476!, NOU058342!, P04226229!); Tontouta: Uitoé, elev. 60 m, 19 November 1986, *MacKee 43353* (NOU058225!, P04225604!); Côteaux boisés, *Pancher 308* (P00072141!, P00156841!); Nouméa, *Pancher 577* (P04225571!, P04236771!); Côteaux boisés, *Pancher s.n.* (P00072142!, P04225568!, P04225569!, P04225570!); Montravel, 14 February 1965, *Schmid 86* (NOU058343!); Lepredour, 23 May 2002, *Suprin 2651* (NOU001580!); Ile Lepredour, 21 December 1977, *Veillon 3431* (L.2702473!, NOU058347!, P04236831!, P04260852!, P04551326!, P05236767!); Ile Leprédour, 28 July 1988, *Veillon 6855* (NOU058346!); Bourail: embouchure de la deva, elev. 130 m, 11 December 1990, *Veillon 7286* (NOU058230!, P04220396!); Moindou, elev. 30 m, 29 November 1995, *Veillon 7882* (NOU058284!); Port de France, 1855, *Vieillard 956* (P04226177!, P04226178!, P04226179!); Nouméa, Port Despointes, elev. 40 m, 14 November 1942, *Virot 808* (P04220377!); Port-Despointes, elev. 50 m, 21 November 1942, *Virot 845* (P04220378!); Bois de Port-Despointes, elev. 30 m, 13 December 1942, *Virot 915* (P04220376!).

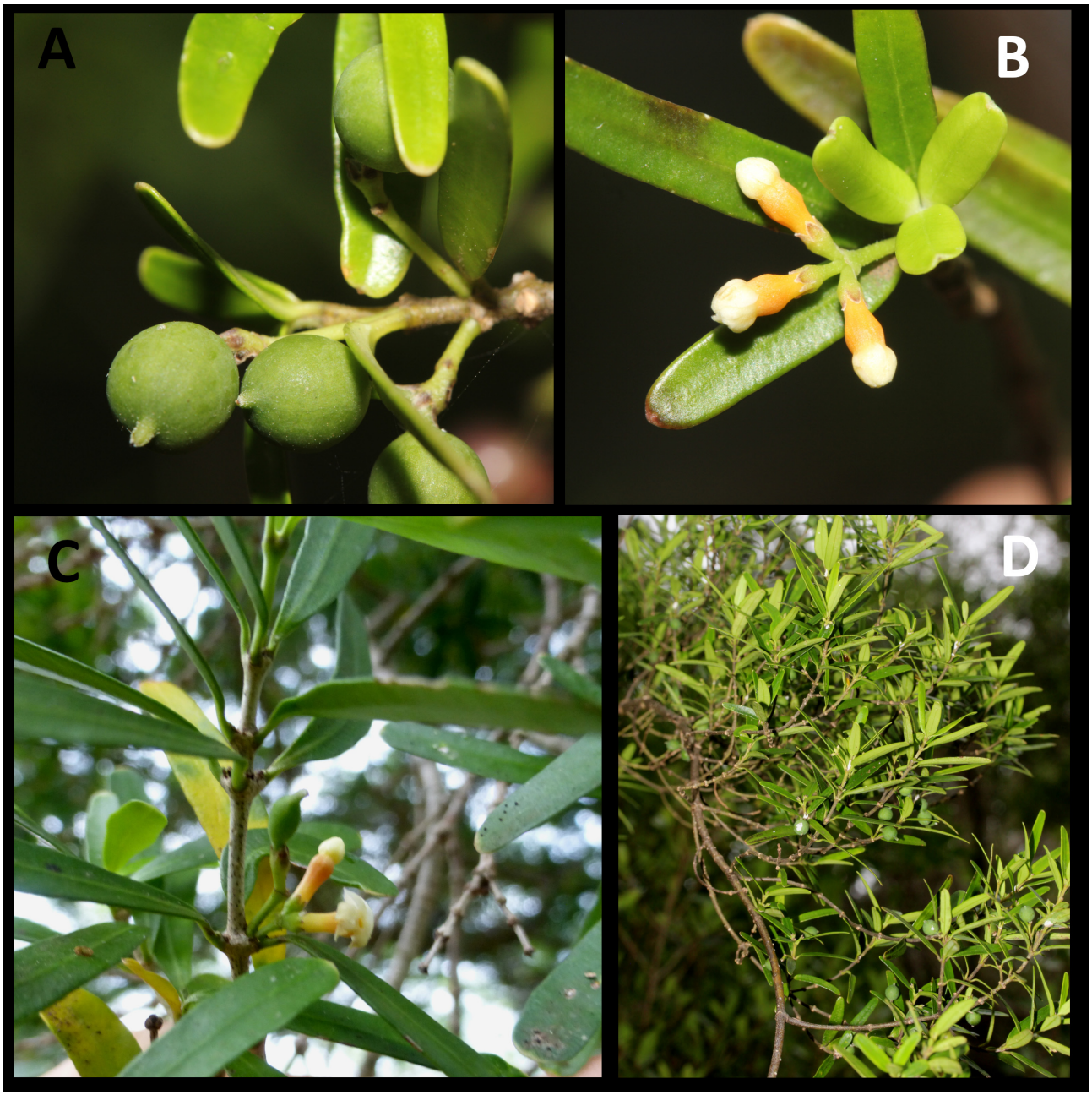

FIGURE 13. *Alyxia pseudoserpentina* with details of immature fruits (A), buds (B), fertile branch (C) and habit (D). Photographer: G. Lannuzel. All pictures taken in Nouméa dry forests.

***Alyxia rosmarinifolia* (Baill.) Guillaumin** (1941: 366). *Gynopogon rosmarinifolius ("rosmarinifolium")* Baillon (1889: 782). Lectotype (designated by Middleton (2002: 66):—NEW CALEDONIA, Baie de Canala, sur les collines éruptives, 29 June 1869, *Balansa 2428*: P [P00156839!]; isolectotype: P [P00156840!], K [K00894172!] (Figs. 14, 15)

Species circumscription:—*Alyxia rosmarinifolia* was considered a synonym of *Alyxia tisserantii* by both Boiteau (1981) and Middleton (2002). We propose to recognise this name as a valid species. *Alyxia rosmarinifolia* is close to *A. dolioliflora* on the basis of sterile material because of its leaf shape. However, *A. rosmarinifolia* has flowers with a corolla tube 0.9–2 mm long, vs 2.5–4.1 mm long for *A. dolioliflora*. Its fruit articles are also of spherical shape, while *A. dolioliflora* has ovoid fruit articles. Finally, *A. rosmarinifolia* is found between 800 and 1000 m elev. in its only present day known location (Mont Do, south of Grande Terre), while *A. dolioliflora* grows in low altitude maquis in the Northwestern ultramafic maquis of Grande Terre. The species is also very similar to *Alyxia minimiflora* described here, but differs from it by being entirely glabrous, and having flower borne on inflorescences with a primary axis

ca. 3.7 mm (vs 1 mm in *A. minimiflora*), and longer pedicels (up to 2 mm). Since Balansa's original collection (only fruiting material), no further specimen of this species has been collected in the type locality (Baie de Canala, sur les collines éruptives). We have some doubts because of locality disjunction between Baie de Canala and Mont Do about identifying the specimens from the latter locality under *A. rosmarinifolia.* But, at this stage, this seems the best option instead of resurrecting a possibly extinct species and describing a new narrow range one from Mont Do.

Distribution and habitat:—The only known population of *A. rosmarinifolia* occurs on top of Mont Do, in the southern part of Grande Terre. It grows in open herbaceous maquis, on peridotite rocks, between 800 and 1000 m elev.

Phenology:—From herbarium specimens and available pictures, the species is flowering in October and November. Fruits were observed in November, March, April, and June.

Notes:—The isolectotype held in K (K00894172) has "Nouméa" written on the label, as the locality. It carries the same Balansa collection number, however, and regarding shape and drying, is the same plant as the ones at P. Although the original label is Balansa's one, hand-written entries (name, locality and number) are not from Balansa. In fact, the handwritten number is the same as the P isolectotype and not the same as the P lectotype, the latter being written by Balansa himself. In addition to the name, the locality and number were most likely written by Guillaumin when he published the invalid combination for the first time (Guillaumin 1911: 194) and before the specimen was sent to K.

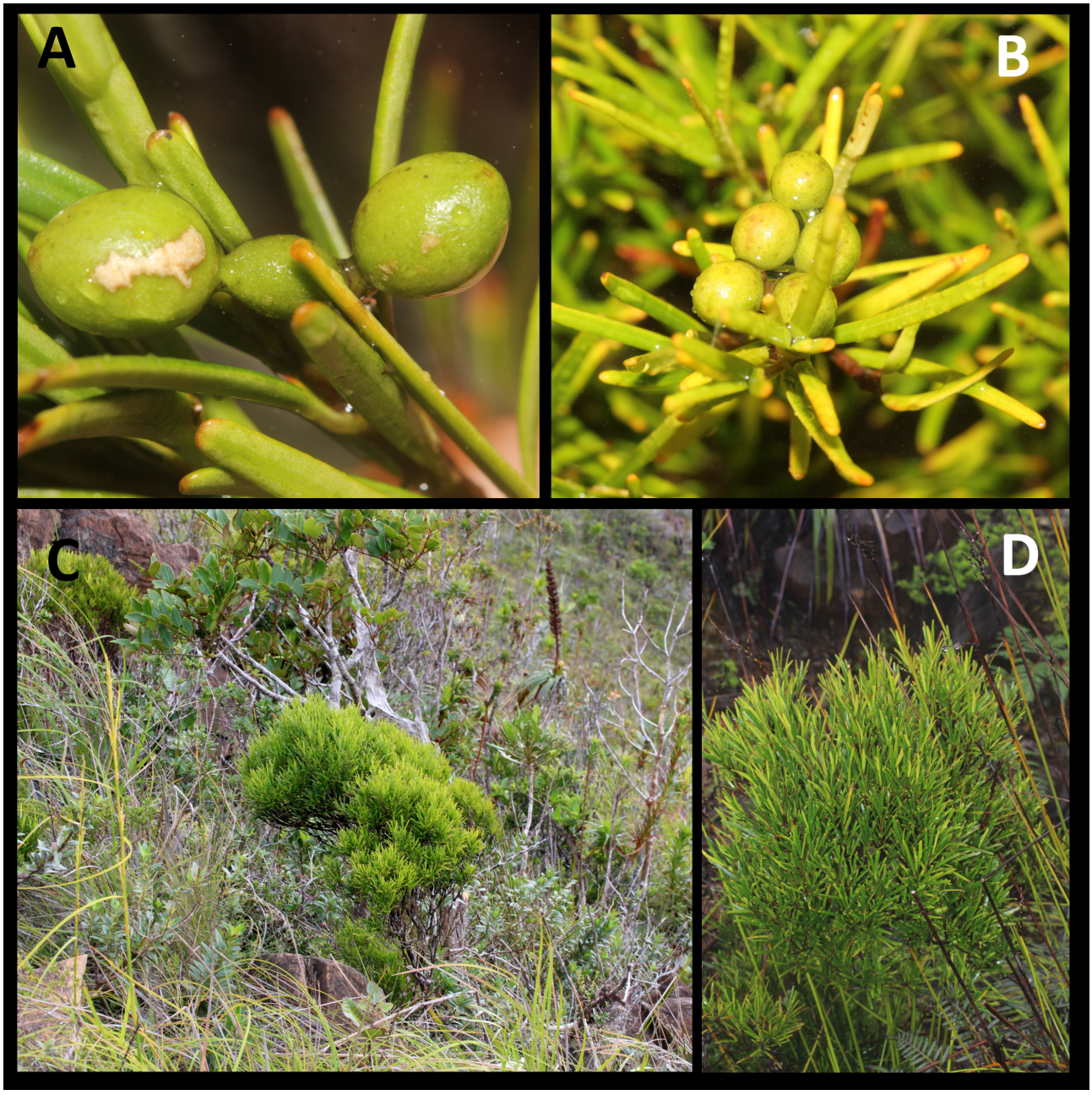

FIGURE 14. *Alyxia rosmarinifolia* with detail of an immature fruit (A), fertile branch (B), vegetation (C), and habit (D). Photographer: G. Lannuzel from *Lannuzel 431*.

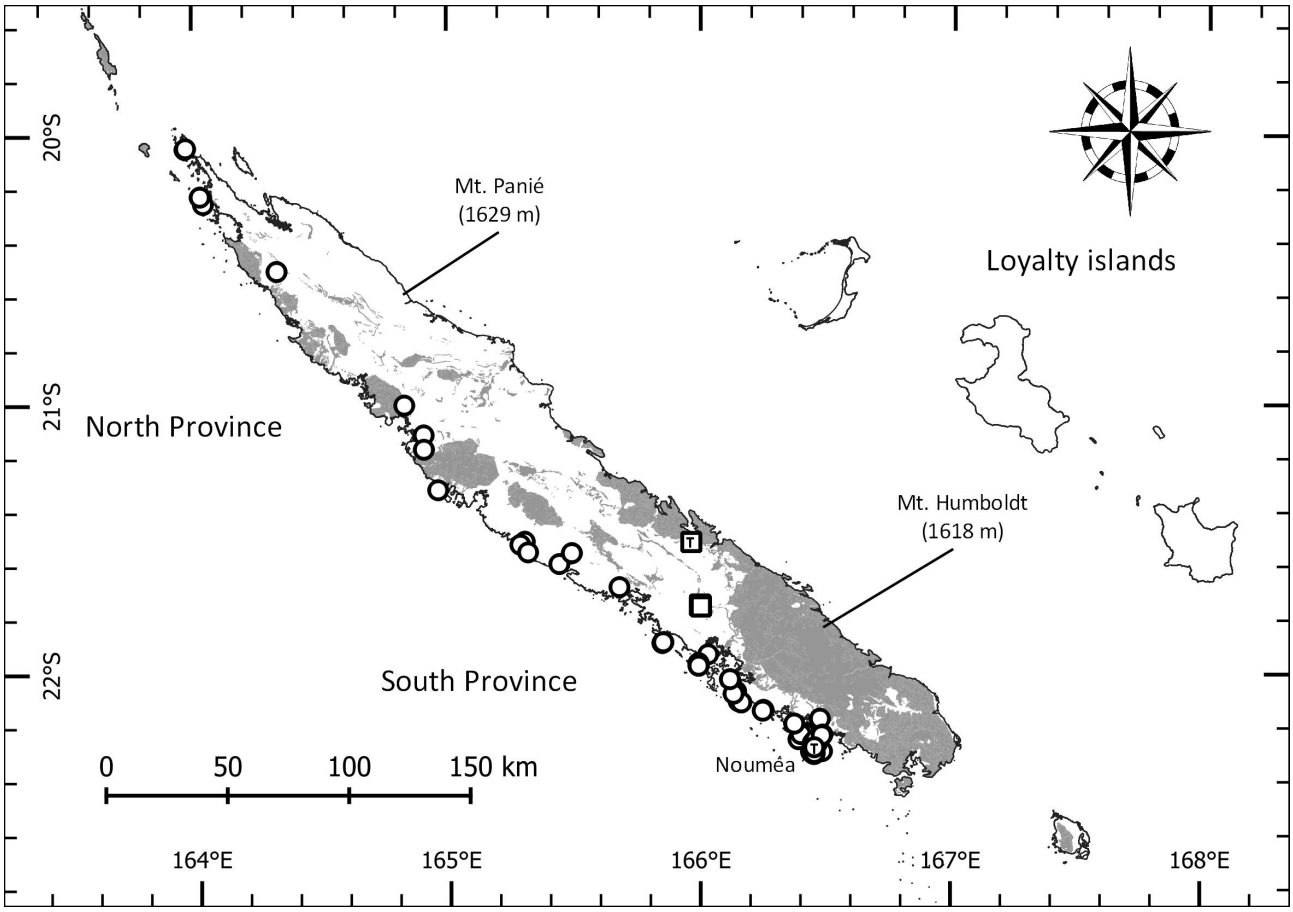

FIGURE 15. Known distribution *Alyxia pseudoserpentina* (dots) and *Alyxia rosmarinifolia* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Specimens examined:—NEW CALEDONIA; South Province; Mont Do, elev. 950 m, 21°45'28"S, 166°0'06"E, 20 April 2021, *Lannuzel 431* (NOU108249!); Crête sommet Mt. Do, elev. 900 m, 28 November 1966, *MacKee 15975* (L.2699553!, MO1114544!, NOU058322!, P04225751!); Mt. Do, elev. 900 m, 23 March 1977, *MacKee 32938* (NOU058325!, P04225542!); Mont Do, elev. 800 m, 21 October 1975, *Sévenet 1075* (NOU058320!, NOU058321!, P04225557!, P04225558!); Mont Do, elev. 800–1000 m, 28 November 1966, *Veillon 941* (L.3729837!, NOU058324!, P04220405!).

Alyxia spathulata **Guillaumin** (1957: 80). Lectotype (designated by Boiteau (1981:121):—NEW CALEDONIA, Ile des Pins, *Germain s.n. :* P [P00072149!]; isolectotype P [P00625016!] (Figs. 16, 18)

Species circumscription:—*Alyxia spathulata* was considered as a distinct species by Boiteau (1981) and then as a synonym of *A. tisserantii* by Middleton (2002). While narrowing the concept of *A. tisserantii*, we choose to follow Boiteau and consider *A. spathulata* as a species readily distinguishable by its smaller oblong to spathulate leaves (1.3–2.1 cm), short corolla tube (0.7–1.6 mm), and blackish bark. Further, all specimens come from the Pic N'Ga hill, on the Isle of Pines, where no *A. tisserantii* specimen is found, and where all specimens are very stable in leaf and fruit shapes.

Distribution and habitat:—*A. spathulata* is only known from Pic N'Ga, on the Isle of Pines. It grows at low altitude (50–150 m elev.) in shrublands on ultramafic substrates.

Phenology:—From herbarium specimens and pictures, flowers of *A. spathulata* can be seen in January and June. Fruits are known from May to November.

Specimens examined:—NEW CALEDONIA; South Province; Ile des Pins: Pic N'Ga, 26 May 1951, *Baumann-Bodenheim 13487* (L.3735043!, P04236779!, US2316656!); Pic N'Ga, Ile des Pins, 26 May 1951, *Baumann-Bodenheim 13499* (L.3735052!, P04236780!, US2316658!); Pic N'ga (Ile des Pins), 26 May 1951, *Baumann-Bodenheim 13503* (L.3735042!, P04236781!, US2316659!); Ile des Pins: Pic Nga, 29 May 1951, *Baumann-Bodenheim 13677* (P04236783!); Pic N'Ga, Ile des Pins, 29 May 1951, *Baumann-Bodenheim 13681* (L.3735036!, P04236782!,

US2316667!); Pic Nga, 29 May 1951, *Baumann-Bodenheim 13689* (P00156846!, US2316668!image); Ile des Pins, Pic N'Ga, 29 May 1951, *Baumann-Bodenheim 13731* (P04236777!); Ile des Pins (Kunié), Pic Nga, elev. 150 m, 18 July 1965, *Bernardi 10051* (L.2702448!, P04236796!); Ile des Pins, *Germain s.n.* (P00072149!, P00625016!); Ile des Pins: sommet du Pic N'Ga, 27 July 1980, *Hoff 2467* (NOU058264!); Ile des Pins: Pic Nga, 25 November 1977, *Jaffré 2082* (NOU058266!, P04236769!, P05236823!); Ile des Pins: Pic Nga, 25 November 1977, *Jaffré 2084* (NOU058267!, P04236803!); Ile des Pins: Mt. Nga, elev. 100 m, 5 August 1956, *MacKee 5027* (P04236778!); Ile des Pins: Mt. Nga, elev. 100 m, 05 August 1956, *MacKee 5028* (P04226193!, L.2702444!); Ile des Pins: Pic Nga, elev. 150 m, 18 July 1965, *MacKee 13101* (P04236795!, P04236799!); Ile des Pins: Plateau Méréque, elev. 50 m, 7 June 1966, *MacKee 15060* (L.3729842!, P04236801!); Ile des Pins: Pic Nga, elev. 50 m, 14 October 1966, *MacKee 15823* (P04236800!); Pic N'Ga, 23 November 1977, *Morat 5731* (NOU058195!, P04226212!); Pic N'Ga, 23 November 1977, *Morat 5743* (NOU058196!, P04226211!, P04551308!); Ile des Pins: Pic Nga, 9 June 1967, *Schmid 2058* (NOU058316!, P04236798!); Ile des Pins: Pic Nga, 9 June 1967, *Schmid 2059* (NOU058317!, P04226206!); Ile des Pins: Pic Nga, 9 June 1967, *Schmid 2060* (NOU058318!, P04236797!); Ile des Pins: Pic Nga, 9 June 1967, *Schmid 2061* (NOU058265!); Ile des Pins: plateau, 9 September 1975, *Sévenet 1050* (NOU058315!); versants du Pic N'ga (île des Pins), elev. 50 m, 1 March 1943, *Virot 1077* (P04236775!).

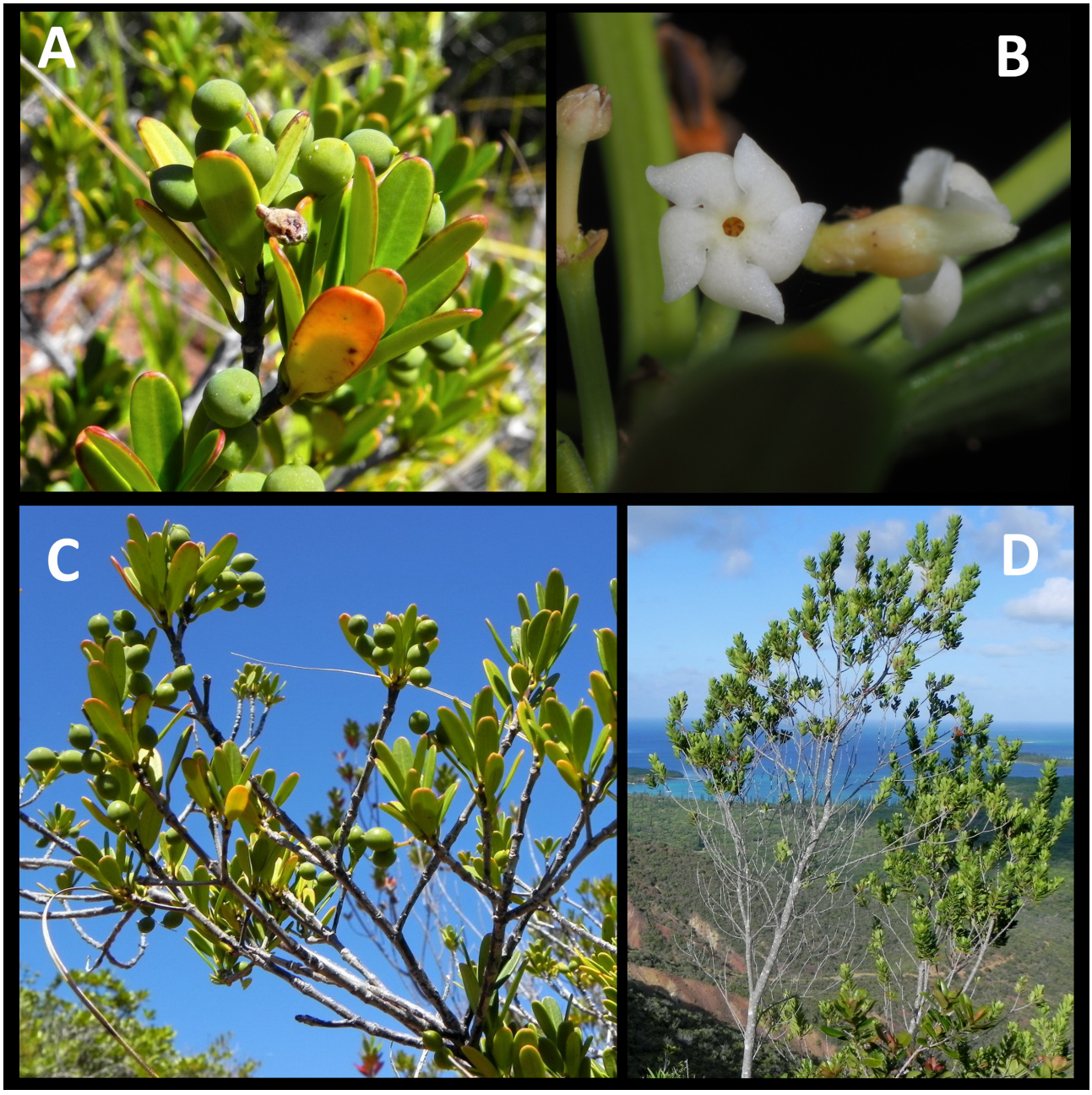

FIGURE 16. *Alyxia spathulata* with detail of an immature fruit (A), flowers (B), a fertile branch (C), and habit (D). Photographers: A, C & D: B. Henry, B: C. Laudereau.

***Alyxia tisserantii* Montrouzier** (1860: 233). Neotype (designated by Middleton (2002: 66):—NEW CALEDONIA, Ile Art: Plateau Nord, elev. 200 m, 10 December 1975, *MacKee 30500*: L [L 26699537!]; isoneotype: K, NOU [NOU058172!]; P [P04260837!] (Figs. 17, 18)

= *Alyxia affinis* Van Heurck & Müller Argoviensis (1871: 193). Holotype:—NEW CALEDONIA, Gatope, *Vieillard 958*: AWH [AWH12555284!]; isotype: P [P00143134; P00143135]. *Pulassarium affine* (Van Heurck & Müll.Arg.) Kuntze (1891: 417).

= *Alyxia breviflora* Van Heurck & MüllerArgoviensis (1871: 195). Holotype:—NEW CALEDONIA, Gatope, *Vieillard 952*: AWH [AWH12555291!]; isotypes: BM [BM000508454!], K [K000894169!], P [P00156867!; P00156868!]. *Pulassarium breviflorum* (Van Heurck & Müll.Arg.) Kuntze (1891: 417).

= *Alyxia discolor* Boiteau (1979: 449). Holotype:—NEW CALEDONIA, embouchure du Dothio, December 1871, *Balansa 3473:* P [P00072134!]; isotypes: A [A00054887!]; P [P00072135!]; Z [Z-000000950!]

= *Alyxia disphaerocarpa* Van Heurck & Müll. in Müller Argoviensis (1870: 169). Lectotype (designated here):—NEW CALEDONIA, Pum [Poum] Tanlé, Deplanche [*Vieillard 951]*: AWH [AWH12555253!—lower left hand plant]; isolectotypes (see notes): G [G00169235!, G00169234!—left hand plant], L [L004696!, L0064516!—upper plant], NY [NY345469!—right hand specimen], K [K000894170!—lower right hand plant], P [P00156872!—left hand plant, P00156874!—left hand upper and lower plants], W [W 1889-0036663—left hand plant], Z [Z-000000949!]. *Pulassarium disphaerocarpum* (Van Heurck & Müll.Arg.) Kuntze (1891: 417).

= *Alyxia microbuxus* (Baill.) Guillaumin (1941: 366)).*Gynopogon microbuxus* Baillon (1889: 776). Lectotype (designated by Boiteau (1981: 124):—NEW CALEDONIA, 1862, *Pancher s.n.*: P [P00072142!]

Species circumscription:—*Alyxia tisserantii* is most similar to *Alyxia dolioliflora* by its reddish bark and sometimes almost linear leaves, but differs by fruits composed of several (2 to 4–6) spherical articles, 3.7–5 × 3.7–4.4 mm vs fruits composed of 1–2 ovoid articles 8–9.5 × 4.7–6.5 mm. It is also close to *A. pseudoserpentina* by the general morphology and habit, as well as leaf shape. However, it differs by longer peduncles (4.2–12 mm vs 0.5–4.1 mm in *A. pseudoserpentina*) and a shorter corolla tube of 1.1–2.2 mm, almost equal to the corolla lobes, while *A. pseudoserpentina* has the corolla tube almost twicethe length of the lobes. *A. pseudoserpentina* is also different by its grayish bark and prominent nodes.

Distribution and habitat:—The species is widely distributed on ultramafic substrates on Grande Terre, from Belep islands to the South of Grande Terre. It grows mainly in shrublands from low to high altitude (10–1000 m elev.).

Phenology:—From herbarium specimens and picture available, the species flowers and fructifies all year round.

Notes:—**Typification of *Alyxia affinis*.** The specimen P04220365 is not considered as belonging to the type material because it is said to be collected in Nouméa. P04220363 labeled as *Vieillard 958* is most probably a Pancher specimen numbered by Pancher according to "Vieillard's species n° 958". The specimen BM000508400 is a flowering one (the other original type materials are fruiting ones), most probably collected by Pancher and without locality, so it can be discarded from type material. The K (K000894168) specimen should also be rejected from the type material because it was treated at Caen herbarium (CN) by Lenormand, who is known to have mixed specimens and labels. This specimen actually belongs to *A. celastrinea*.

Typification of *Alyxia breviflora.* There are several specimens labeled as *Vieillard 952* in numerous herbaria. At P, three (P04220382, P04220384, P04220385) were collected in Balade during the period 1855–1860 (as against "Gatope 1861–1867" for the AWH specimen) so they are not types. P04260777 was originally labeled *Vieillard 952* from Gatope and a second label most probably added by Lenormand in Caen says it is from Balade so this specimen could be considered as an isolectotype. P00156868's label (probably not Vieillard's handwriting) does not say it is a Vieillard specimen collected in 1861–1867 but is congruent (phenology, shape of the leaves, state of drying) with the lectotype and is most probably an isolectotype. P00156867, K000894169 and the BM specimen also match the protologue and can be considered as isolectotypes.

Typification of *A. disphaerocarpa*. In the initial protologue van Heurck and Müller Argoviensis (1870) described *A. disphaerocarpa* from *Vieillard 951* in New Caledonia but they (van Heurck and Müller Argoviensis 1871) later refined the locality as "Pum et Tanlé" in their own herbarium. Middleton (2002: 70) recognized AWH12555253 was a mixed specimen with several plants on it and chose the holotype as probably being only the lower left-hand branch. We agree with Middleton but because it is a mixed specimen it should be lectotypified. The lower left-hand branch is preferred because it is the only one with fruits so it most closely matches epithet's name. Here, it is important to note that this branch bears a Deplanche 1861–67 label numbered "*951 Vieill. (205 Depl.?*)" from "Pum, Tanlé" while the other label is a Vieillard one from Gatope numbered *2968*. And to the best of our knowledge, only Deplanche has visited

Tanlé islet. In our opinion, the lectotype is therefore a Deplanche specimen he numbered according to "Vieillard n°951 species". Middleton (2002) also found numerous isotypes in many herbaria (A, BR, G, K, L, NY, P, W, Z). Among the ones to which we had access, L0004669, the top sterile branch of L0064516, the two branches on the left hand of P00156874, the right hand branch of A00054882, the two fruiting branches on the left hand of G00169234, G00169235 (collected in 1868), the left hand branch of W 1889-003666 and Z-000000949 could reasonably be considered as isolectotypes. BR0000006956394, G00169233, K000864171, NY 00345468, NY 00345469, P00156869, P00156870, P00156871, P00156872, P00156873 are not considered as isolectotypes because either they are Vieillard or Mus. Néocal. specimens, sterile, bear flowers, have narrower leaves or a different state of drying. P00156875 [*MuséeNéo. Cal. 116* (*Vieillard 951* and *Deplanche205 ?*)] is probably not a Deplanche specimen and not dated 1861–1867.

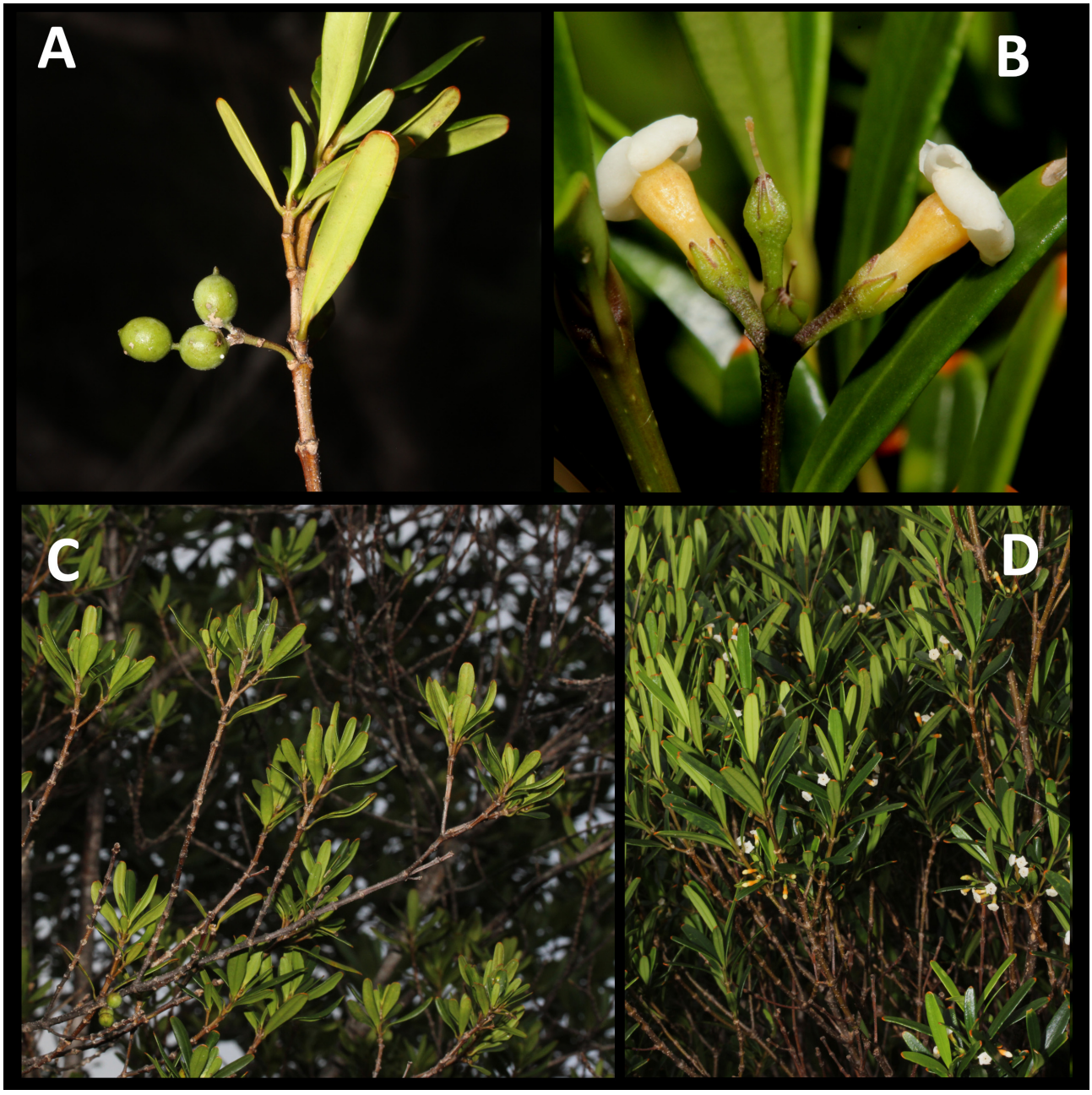

FIGURE 17. *Alyxia tisserantii* with detail of an immature fruit (A), flowers (B), habit (C), and flowering branches (D). Photographer: G. Lannuzel, A & C from Taom, C & D from Poum.

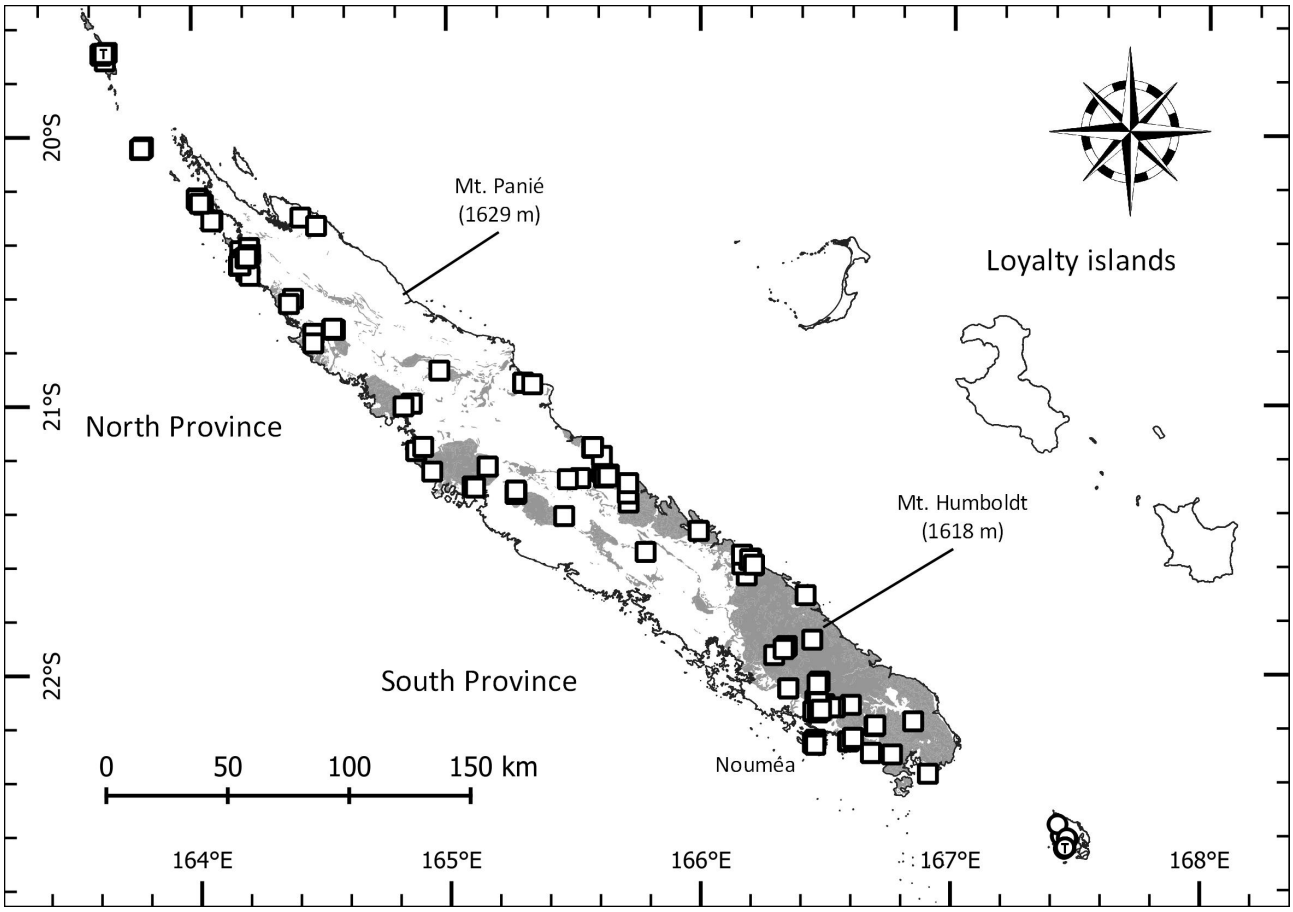

FIGURE 18. Known distribution of *Alyxia spathulata* (dots) and *Alyxia tisserantii* (squares). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

Specimens examined:—NEW CALEDONIA; North Province; À L'Embouchure de la Rivière D'Ouaïlou, *Balansa 2432* (P04225795!, P04225796!, P04225799!, P04236805!); Canala, 1 November 1869, *Balansa 2432a* (P04260835!, P04260838!, P04260839!); Mt. Koniambo, 21 December 1950, *Baumann-Bodenheim & Guillaumin 9500* (L.3735044!, P04225734!); Dôme de la Tiébaghi, elev. 600 m, 17 August 1965, *Bernardi 10293* (L.2699513!, P04225773!); Col d'Amos, elev. 150 m, 18 August 1965, *Bernardi 10335* (L.2699512!, P04225774!); Poro, 27 October 1977, *Bourret 1380* (NOU058159!); Néaria, elev. 100 m, March 1901, *Cribs 1208* (P04225763!, P04225764!); Pouembout, conservatoire botanique de Tiéa, 3 August 2000, *Dagostini 181* (NOU058337!); Méré, Poro-Kouaoua, 3 September 2003, *Dagostini 720* (NOU001275!); Baie d'Urville, 1 May 1869, *Delacour s.n.* (P04225766!, P05236785!); *s.l.*, 1861, *Deplanche 205* (P04225770!, P04226185!); Gatope, 1861, *Deplanche 429 [Vieillard 2969]* (P04220357!); Ile Art, elev. 200 m, 19°41'58"S, 163°38'42"E, 25 April 2017, *Gâteblé 857* (NOU105131!); Ile Art, elev. 200 m, 19°41'58"S, 163°38'42"E, 25 April 2017, *Gâteblé 870* (NOU105117!); *s.l.*, *Godefroy s.n.* (L.2699541!); Ouest du Dôme de Tiébaghi, 9 November 1980, *Hoff 3128* (NOU058236!, P04225721!); (Haute Tipindjé) vallée de la Paoué, elev. 500 m, 13 April 1951, *Hürlimann 1165* (P04225729!); Mt. Poudéhoume, elev. 180 m, 23 July 1951, *Hürlimann 1624* (P04225730!, US2316431!); Région de Poro, Mine «Cyclone», elev. 250 m, 6 May 1969, *Jaffré 223* (NOU058314!, P04236832!); Dôme de Tiébaghi, elev. 350 m, 15 October 1975, *Jaffré 1384* (NOU058319!, P04260834!); Ile Art: plateau Nord, 9 December 1975, *Jaffré 1545* (NOU058188!, P04260776!); Ile Art: plateau Nord, 9 December 1975, *Jaffré 1558* (NOU058187!, P04260775!); Ile Art: plateau Nord, 10 December 1975, *Jaffré 1664* (NOU058174!, P04260779!); Tiébaghi, 6 May 1978, *Jaffré 2471* (NOU058200!); Troulala, elev. 160 m, 20°37'53"S, 164°22'22"E, 9 January 2018, *Lannuzel 128* (NOU089019!); *s.l.*, *Le Rat 773* (P04260773!); Paagoumène, elev. 50 m, 12 November 1965, *MacKee 13887* (P04225755!); Montagne de Poum, elev. 380 m, 11 May 1966, *MacKee 14987* (NOU058243!, P04226202!, P05236765!, US3669592!image); Sommet Nord du Mt Kaala, elev. 1000 m, 25 December 1966, *MacKee 16127* (P04225817!); Paagoumène, elev. 5 m, 20 April 1967, *MacKee 16603* (P04225815!); Pente Ouest du Mt Ouazangou, elev. 100 m, 19 June 1967, *MacKee 16935* (L.2699554!, NOU058175!, P04236807!); Houaïlou - Cap Bocage, elev. 150 m, 1 May 1968, *MacKee 18753* (L.3729839!, NOU058246!, P04236785!); Houaïlou, presqu'île de Ba, elev. 200 m, 24 September 1969, *MacKee 20866* (L.3729840!, L.3729841!, NOU058255!, P04236784!); Taom Mt

Homédéboa, elev. 800 m, 16 October 1969, *MacKee 20993* (L.2702414!, NOU058208!, P04236859!); Ile Yandé: Oumbaïna, elev. 50 m, 7 October 1970, *MacKee 22705* (NOU058269!, P04225600!); Poum, Titch, elev. 2 m, 5 January 1971, *MacKee 23132* (NOU058176!, P04260833!); Poum, Titch, elev. 20 m, 5 January 1971, *MacKee 23144* (NOU058258!, P04236790!); Néhoué, elev. 30 m, 18 September 1973, *MacKee 27369* (L.3718454!, P04225590!); Houailou: Nessakouya, *MacKee 29630* (L.2702449!); Poindimié: Povila, elev. 200 m, 21 March 1975, *MacKee 29862* (BISH746230!, L.2702477!, NOU058249!, P04260861!); Plateau N Ile Art, elev. 150 m, 8 December 1975, *MacKee 30403* (P04225549!); Plateau N Ile Art, elev. 150 m, 8 December 1975, *MacKee 30416* (L.2702463!, NOU058256!, P04225545!, P05236809!); Plateau N de l'Ile Art, elev. 220 m, 9 December 1975, *MacKee 30439* (L.2702437!, NOU058177!, P04260836!); Plateau N Ile Art, elev. 200 m, 10 December 1975, *MacKee 30500* (L.2699537!, NOU058172!, P04260837!); Pouembout, elev. 30 m, 9 March 1976, *MacKee 30844* (L.2699517!, NOU058220!, P04225541!); Poum: Ile Tanlé, elev. 140 m, 16 February 1977, *MacKee 32818* (L.2699555!, MO1114599!, NOU058169!, P04225551!); Dent de Poya (Versant Nord-Ouest), elev. 200 m, 14 August 1977, *MacKee 33632* (L.2702442!, NOU058203!, P04236845!); Dent de Poya, elev. 500 m, 14 August 1977, *MacKee 33641* (P04236847!); Dent de Poya, elev. 500 m, 14 August 1977, *MacKee 33644* (L.2702455!, NOU058282!, P04236843!, P05236775!); Base NE Dôme Tiébaghi, elev. 100 m, 11 May 1978, *MacKee 35122* (P04236794!); Paagoumène, elev. 10 m, 9 May 1979, *MacKee 36867* (L.2702425!, NOU058207!, P04236793!); Paagoumène, elev. 10 m, 9 May 1979, *MacKee 36869* (L.2702439!, NOU058312!, P04236791!, P05236824!); Radio Tower Overlooking Houaïlou, 20 October 1980, *McPherson 3265* (MO1113727!, NOU058247!, P04236827!); Tiébaghi Massif, elev. 150 m, 22 December 1983, *McPherson 6201* (MO420941!, NOU058268!, P04225573!); Ile Art, 1860, *Montrouzier 156* (P00072146!); *s.l.*, *Mueller s.n.* (P04225575!); Massif Onajiele, 20°46'42"S, 164°28'4"E, 16 September 2016, *Munzinger (leg.Scopetra) 7856* (MPU640690!); *s.l.*, *Pancher s.n.* (L.2699534!, P04225572!, P04260853!); Auf den Bergen bei Paita., *Schlechter 14863* (E00098792!, L.2699528!); Pied de la Tiébaghi, 1 February 1969, *Schmid 2682* (P04226204!, P04551235!); Montagne des Sources, elev. 600 m, 10 March 1965, *Schmid 96* (P04551233!); Plaine des Gaïacs, 3 November 1975, *Sévenet & Boiteau 1087* (P04225556!); Dôme de Tiébaghi, 4 November 1975, *Sévenet & Boiteau 1113* (NOU058286!, P04225552!); Mt Tiébaghi, 5 November 1975, *Sévenet & Boiteau 1116* (P04225553!); Paagoumène, 24 November 1967, *Sévenet 39 S* (P04551182!); Col de Parari - Ouégoa, elev. 270 m, 27 November 1967, *Sévenet 48 S* (P04551230!); Boulinda, elev. 250 m, 10 March 1964, *Stauffer, Blanchon & Boulet 5787* (NOU058183!, P04225554!); Montagne de Poum, 25 March 1982, *Suprin 1750* (P04226205!); Dôme de Tiébaghi, elev. 550 m, 17 August 1965, *Veillon 352* (NOU058205!); Dôme de Tiébaghi, elev. 550 m, 17 August 1965, *Veillon 352* (P04220404!); Ile Yandé : centre Ouest, 23 August 1978, *Veillon 3660* (NOU058335!, P04260790!, P05236781!); Paagoumène Site de L'Usine, 13 May 1981, *Veillon 4488* (NOU058029!, NOU058030!); Poya: piste de la mine St. Louis, 2 December 1982, *Veillon 5351* (NOU058241!, P04260854!, P05236782!); Balade, 1855, *Vieillard 951* (P04220387!, P04220389!, P04236786!, P04236787!); Balade, 1855, *Vieillard 952* (P04220382!, P04220384!, P04220385!, P04260777!); Gatope, December 1868, *Vieillard 2968* (P04226174!, P04236772!, P04236773!, P04236774!); *s.l.*, *Vieillard 2969* (P04220354!, P04225762!); **South Province;** Baie de Prony, 1 October 1910, *d'Alleizette s.n.* (P04260771!); Bords de la Kouvélée, 30 January 1869, *Balansa 1405a* (P04225813!); *s.l.*, *Anderson s.n.* (BM000508524!); *s.l.*, *Balansa 2432 a* (L.2699549!); Collines ferrugineuses à l'embouchure du Dothio, *Balansa 3473* (A00054887!, P00072134!, P00072135!); Tontouta, 29 May 1975, *Debray 2305* (P04236802!); Tupiti, 1861, *Deplanche 429 [Vieillard 2969]* (P04220388!, P04220391!, P04225761!); Région de Nouméa, 1910, *Godefroy 111 NC* (P04260772!); Baie des Pirogues, *Guillaumin, Baumann-Bodenheim, Hürlimann 15817* (L.3735038!, US2316792!); Col de Plum, *Guillaumin, Baumann-Bodenheim & Hürlimann 5571* (L.3735037!); Rivière des Lacs, *Guillaumin & Baumann-Bodenheim 6652* (L.3718453!); Mt Dore, *Guillaumin & Baumann-Bodenheim 7959* (US2316499!); Mont Dzumac, elev. 100 m, 25 November 1979, *Hartley 15102* (L.2699551!, NOU058252!); Baie des Pirogues, elev. 60 m, 17 December 1950, *Hürlimann 411* (P04225723!); Mine du Plateau Supérieur au Dessus Du Belvédère, 3 April 1969, *Jaffré 189* (NOU058288!, P04226169!); Secteur du Mont Dore, 4 January 1978, *Jaffré 2122* (NOU058272!); Col de plum, 28 October 1970, *Jaffré 419* (NOU058271!); Route de Bourail à Kua, 1 July 1904, *Le Rat 2408* (P04236804!); Vallée de la Dumbéa, elev. 100 m, 17 March 1956, *MacKee 4073* (L.2702424!, P04236851!); Haute Vallée Tontouta: ancienne Mine Gallién, elev. 400 m, 14 October 1956, *MacKee 5442* (L.2702484!, P04226173!); Ouroué, elev. 10 m, 20 October 1965, *MacKee 13625* (P04225752; Ouroué, 20 April 1967, *MacKee 16697* (L.2702479!); Ouroué, elev. 10 m, 6 December 1965, *MacKee 14006* (L.3729838!, P04236833!); Basse Vallée de Thio, elev. 10 m, 25 February 1966, *MacKee 14475* (P05236810!); Basse Vallée de Thio, elev. 10 m, 25 February 1966, *MacKee 14475* (BISH745434!, L.2702443!, NOU058242!, P04225747!)); Ouroué, 8 August 1906, *MacKee 15476* (L.2702482!, NOU058211!, P04260815!); Ouroué, elev. 300 m, 30 April 1967, *MacKee 16697* (NOU058210!, P04260825!); Route de Yaté: Mt. Kouanenoa, elev. 250 m, 11 March 1969, *MacKee 20277* (NOU058330!, P04260844!); Vallée de la Dumbéa, elev. 30 m, 1 July 1974, *MacKee 28866* (L.2702464!, P04225588!); Vallée de la Dumbéa, elev. 30 m, 29 February 1976, *MacKee 30786* (BISH745305!, L.2702468!,

NOU058254!, P04225547!, P04551239!); Dumbéa, elev. 50 m, 30 July 1984, *MacKee 42079* (NOU058262!, P04236835!, P04551205!); Along road from Dumbéa river valley towards Mt Dzumac, elev. 300 m, 25 November 1979, *McPherson 2148* (NOU058292!, P04236810!); Vallée de la Tontouta, 11 March 2007, *Munzinger 4201* (NOU017409!, P04551212!); Auf den Bergen bei Païta, elev. 200m, 1 October 1902, *Schlechter14863* (L.2699527!, P04225562!); Port Bouquet. Ilôt Toupeti, face N.E, 3 June 1982, *Suprin 1899* (NOU058281!); Cours moyen de la Dumbéa, 16 September 1980, *Suprin 675* (NOU058197!); Port de France, 1855, *Vieillard 954* (P04260774!, P04260778!).

Alyxia urceolata **Lannuzel, *sp.nov*.** (Figs. 19, 20), (urn:lsid:ipni.org:names:77336420-1)

Diagnosis:—*Alyxia urceolata* is a small dense shrub characterized by its small linear leaves, and the urceolate shape of its small flowers. It is similar to *A. caletioides* when sterile but still differs by its narrower leaves (0.15–0.25 cm vs 0.15–0.45 cm in *A. caletioides*). When fertile, it is readily distinguishable by its smaller and axillary flowers. It is also similar to *A. minimiflora* and *A. rosmarinifolia* but differs from the former by longer flowers and from the second by the young parts' pubescence.

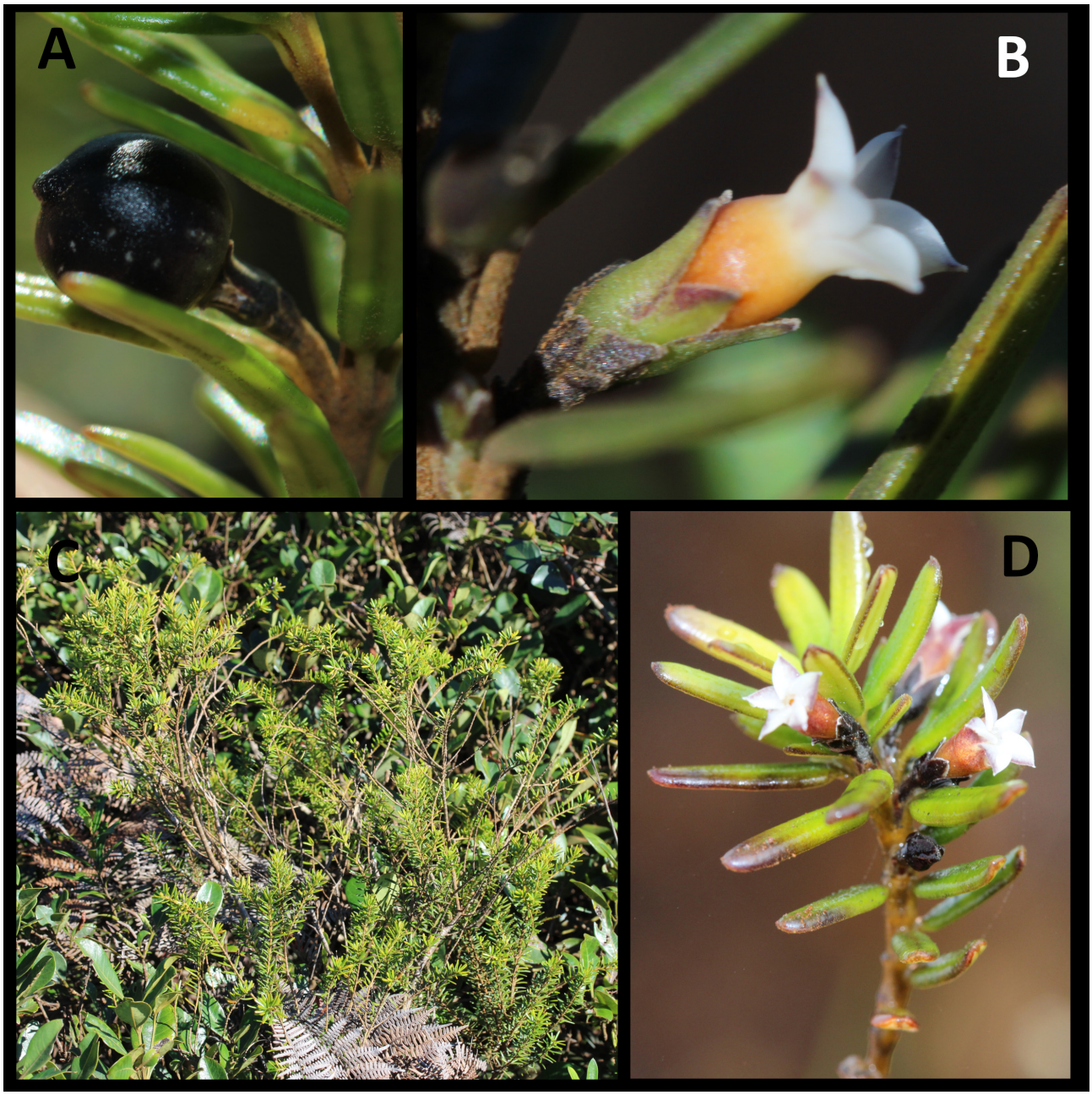

FIGURE 19. *Alyxia urceolata* with detail of a mature fruit (A), flower (B), habit (C) and a flowering branch (D). Photographer: G. Lannuzel from *Lannuzel 178*.

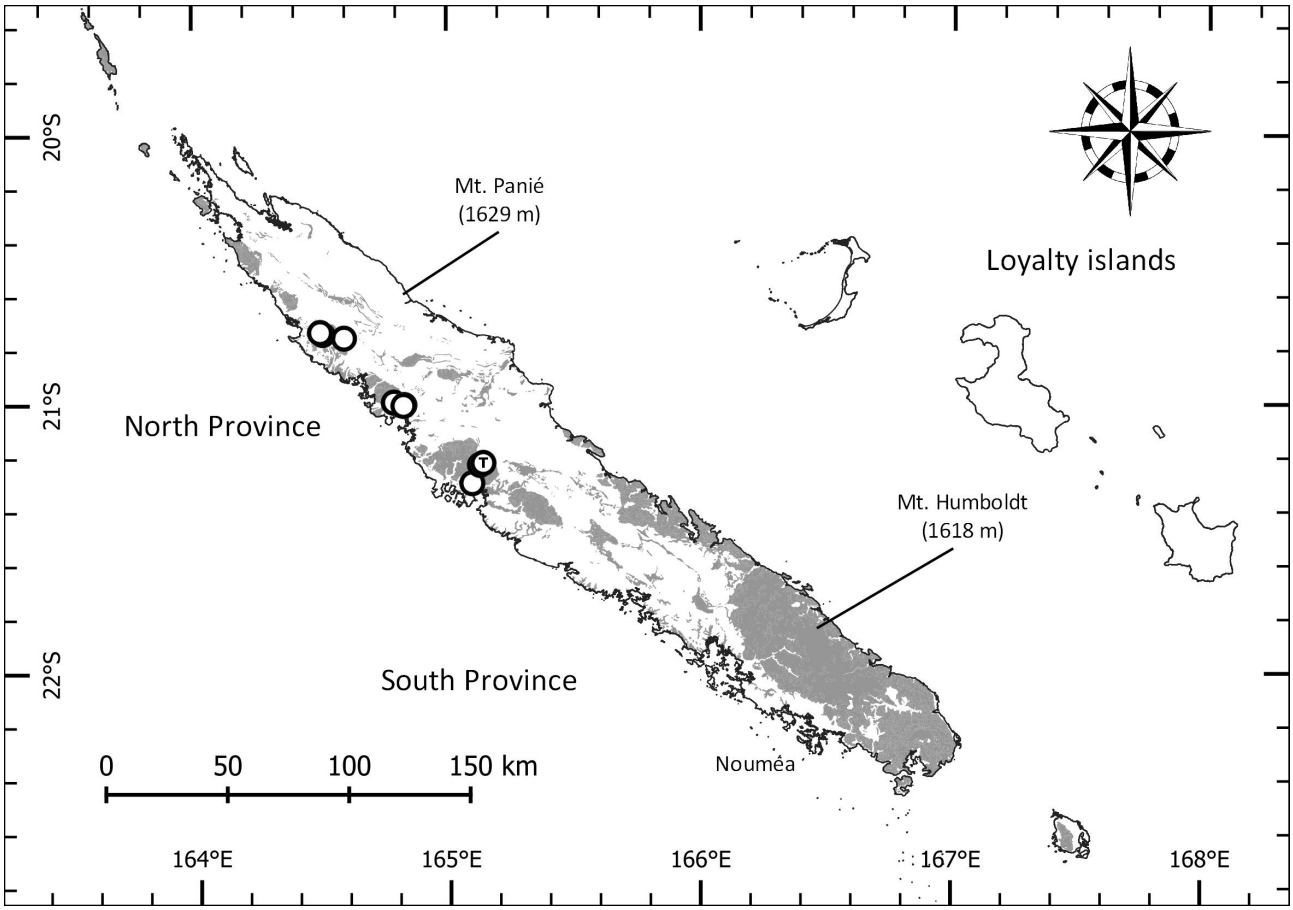

FIGURE 20. Known distribution of *Alyxia urceolata* (dots). Symbols with "T" represent type specimens. Grayed areas represent ultramafic substrates.

***Type:*—**NEW CALEDONIA, Mont Boulinda, elev. 1100 m, 5 September 1971, *Schmid 4031*, holotype: NOU [NOU022042!]; isotype: P [P05391605!]

Small shrub, up to 50 cm, young stems puberulent; latex white. Leaves ternate, subcoriaceous, green adaxially, light green abaxially when young, slightly revolutate, petiole 1–2.5 mm long, puberulent, lamina linear, 9.5–13.5 × 1.5–2.5 mm; base cuneate, apex rounded, mucronate, both surfaces looking lustrous but tomentulose and covered with very short hairs (ca. 0.01 mm long) on main veins abaxially, leaf venation not visible apart from the midrib. Flowers mostly axillary, sometimes subterminal, solitary and sometimes grouped in fascicules, axes green, pubescent, null to 2 mm, pedicels not visible, covered by 3–7 bracts, ca. 1 × 1 mm, blackish, pubescent.

Flower 5-merous, narrowly urceolate, 5.5 × 1.5 mm. Calyx lobes appressed to corolla, lanceolate, acute at apex, 2 mm long, green to blackish, pubescent, 5. Corolla tube yellowish, lobes white, tube ca. 3 × 1.5 mm, glabrous outside, with 2 rings of hairs inside, first around stigma, composed of 0.1mm long erected hairs, second around anthers, composed of 0.2 mm erected hairs, lobes sinistrorse, rounded, glabrous with some hairs at base outside, spreading, ca. 1 mm long.

Anther cone 0.8 mm long, not exserted; filaments 0.2 mm long, inserted at 2/3 of tube length. Ovary densely pubescent with 0.1 mm long hairs, style 0.8 mm long, glabrous, stigma ovoid, acute, hairy at top. Fruit black, fleshy, 1–2 article, 4–7 × 4–5 mm, globose to ovoid.

Distribution and habitat:—*Alyxia urceolata* is distributed on ultramafic massifs, in the northwestern part of Grande Terre, New Caledonia, from Mont Boulinda to Mont Ouazangou. It grows in open shrublands, from 500 to 1100 m elev., on ultramafic substrate.

Phenology:—From herbarium specimens and pictures available, the species may be able to flower all year round. Fruits were collected in January, July, and September.

Etymology:—The species is named after the urceolate shape of the corolla tube.

Notes:—Specimens of this new species were included in *Alyxia caletioides* by previous authors (Boiteau 1981

and Middleton 2002), but differs from it by its shorter and axillary flowers. On sterile specimens, this species is distinct by its narrower, strictly linear leaves, and the more regular phyllotaxy.

Specimens examined:—Koniambo, elev. 700 m, 22 February1972, *Jaffré 695* (NOU021991!; P05391638!); Massif du Koniambo, elev. 520 m, 1 June 1972, *Jaffré 767* (NOU022045!); Massif du Boulinda, elev. 800 m, 1 July 1972, *Jaffré 827* (NOU021992!); Koniambo, elev. 850 m, 22 November 2002, *Jaffré 3536* (NOU021997!); Mt Ouazangou, proche du sommet, elev. 850 m, 3 July 2018, *Lannuzel 178* (NOU090306!); Mt Ouazangou, elev. 844 m, 20°44'34'S, 164°29'42''E, 7 March 2019, *Lannuzel 246* (NOU107093!); Mt Ouazangou, elev. 840 m, 20°44'32'S, 164°29'43''E, 7 March 2019, *Lannuzel 249* (NOU107095!); Mt Boulinda, elev. 1100 m, 5 September 1971, *Schmid 4031* (NOU022042!); Mont Boulinda, elev. 700–800 m, 22 April 1968, *Veillon 1757* (NOU058244!; P04260811!).

Acknowledgement

This study was partly supported by a grant (CSF n°4PS2017-CNRT.IAC/ ERMINE) from "CNRT Nickel et son Environnement, Nouméa, New Caledonia" to study rare species threatened by nickel mining, and by a grant (n°FFB-22-0357) from "Office Français de la Biodiversité" to study taxonomically orphan groups of New Caledonia.

The authors are grateful to all the staff at the consulted herbaria, especially, but not limited to, the anonymous BR scientific Manager for providing AWH specimens, Corinne Sarthou in P for her welcome during our mission there, as well as Germinal Rouhan for transmitting hidden scans. Of course, the whole team of the NOU herbarium is thanked for giving access to the collections and providing wise advice during this study: David Bruy, Mathieu Donnat, Jacqueline Fambart, and William Nigote. We are also grateful to Christian Laudereau and Benoît Henry for their photographs, and Antonia Baumann, for giving access to her family's private herbarium. Last but not least, the whole Red List Authority team and Endemia members are thanked for their involvement in the process, and the often last-minute-specimen-that-changes-everything contributions.Finally, authors are grateful to Roy Benyon for English editing, Yohan Pillon and an anonymous reviewer for their help in improving this paper.

References

Baillon, H. (1889) Sur quelques *Gynopogon* néo-calédoniens. *Bulletin de la Société Linnéenne de Paris* 1 (82–100): 774–776.

Boiteau, P. & Allorge, L. (1979) Nouveaux taxons d'*Alyxia* (Apocynaceae) de Nouvelle-Calédonie. *Adansonia* sér. 2, 18: 443–457.

Boiteau, P. (1981) Apocynacées. *In:* Muséum national d'histoire naturelle, Laboratoire de phanérogamie (Org.) *Flore de la Nouvelle Calédonie et dépendance*, 10. Muséum National d'Histoire Naturelle, Paris, 306 pp.

Brown, R. (1810) *Prodromus florae Novae Hollandiae et Insulae van-Diemen*. Johnson, London, 590 pp.

Däniker, A.U. (1933) Ergebnisse der Reise von Dr A.U. Däniker nach Neu-Caledonien und den Loyalitäts-Inseln (1924-1925). Vierteljahrsschrift der Natur. *Gesellschaft in Zürich* 19 (78): 339–395.

de Moares, P.L.R. (2013) The collections of Lauraceae in the Herbarium of Henri Van Heurck (AWH). *Plant Ecology and Evolution* 146 (3): 360–383.
https://doi.org/10.5091/plecevo.2013.859

Endress, M.E., Meve, U., Middleton, D.J. & Liede-Schumann, S. (2018) Apocynaceae. *In*: Kadereit, J. & Bittrich, V. (Eds.) *The Families and Genera of Vascular Plants*, vol. 15: Flowering Plants. Eudicots. Springer, Heidelberg, 570 pp.

Forster, J.R. & Forster, G. (1776) *Characteres generum plantarum quas in itinere ad insulas maris australis*. Londini, 150pp.

Guillaumin, A. (1911) Catalogue des plantes phanérogames de la Nouvelle-Calédonie et dépendances. *Annales du Musée colonial de Marseille* sér. 2, 9: 80–290.

Guillaumin, A. (1941) Matériaux pour la flore de la Nouvelle-Calédonie. LIX. Révision des Apocynacées. *Bulletin de la Société Botanique de France* 88: 358–380.
https://doi.org/10.1080/00378941.1941.10834233

Guillaumin, A. (1957) Résultats scientifiques de la mission Franco-Suisse de botanique en Nouvelle-Calédonie (1950–1952). *Mémoires du Muséum National d'Histoire Naturelle*, Sér. B, Botanique 8: 1–120.

Guillaumin, A. (1958) Contribution à la flore de la Nouvelle-Calédonie. CXV. Plantes récoltées par MacMillan. *Bulletin du Museum National d'Histoire Naturelle* sér. 2, 30: 393–401.

Harris, J.G. & Harris, M.W. (2001) *Plant identification terminology, an illustrated glossary*, 2nd edition. Spring Lake Publishing, Spring Lake, 206 pp.

IUCN (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee. Available from: http://www.iucnredlist.org/documents/RedListGuidelines.pdf (accessed 18 November 2022)

Jost, X., Ansel, J.-L., Lecellier, G., Raharivelomanana, P. & Butaud, J-F. (2016) Ethnobotanical survey of cosmetic plants used in Marquesas Islands (French Polynesia). *Journal of Ethnobotany and Ethnomedicine* 12: 55. https://doi.org/10.1186/s13002-016-0128-5

Kamelamela, K.L., Chamberlain, J., Lehman, A.D., Sprecher, I., Friday, J.B. & Ticktin, T. (2023) *Hawai'i nontimber forest products: cultural and economic foundations*. Gen. Tech. Rep. PNW-GTR-1011. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 68 pp. https://doi.org/10.2737/PNW-GTR-1011.

Kuntze, O. (1891) *Revisio generum plantarum.* Vol. 2, Leipzig.

Lannuzel, G., Pouget, L., Bruy, D., Hequet, V., Meyer, S., Munzinger, J. & Gâteblé, G. (2022a) Mining rare Earth elements: Identifying the plant species most threatened by ore extraction in an insular hotspot. *Frontiers in Ecology and Evolution* 10: 952439. https://doi.org/10.3389/fevo.2022.952439

Lannuzel, G., Bruy, D., Munzinger, J., Meyer, S., Fourdrain, A., Fogliani, B., Isnard, S., Hequet, V., Karnadi-Abdelkader, G., Warimavute, G. & Gâteblé, G. (2022b) *Rapport final.* Programme « ERMines ». CNRT « Nickel & son environnement. 25 pp.

Lannuzel, G., Pignal, M. & Gâteblé, G. (2022c) Critical comments on the article by Wang *et al.* «Lectotypification of the name *Brachyscome neocaledonica* = *Pytinicarpa neocaledonica* (Asteraceae: Astereae)". *Ukrainian Botanical Journal* 79 (2): 77–83». *Ukrainian Botanical Journal* 79 (5): 271–276. https://doi.org/10.15407/ukrbotj79.05.271

Meyer, S., Birnbaum, P., Bruy, D., Cazé, H., Garnier, D., Gâteblé, G., Lannuzel, G., McCoy, S., Tanguy, V. & Veillon, J.-M. (2022) *The New Caledonia Plants RLA: Bringing botanists together for the conservation of the archipelago's crown jewel*. The Encyclopedia of Conservation, Imperiled, pp. 859–874. https://doi.org/10.1016/B978-0-12-821139-7.00171-9

Middleton, D.J. (2000) Revision of *Alyxia* (Apocynaceae). Part 1 : Asia and Malesia. *Blumea* 45: 100–146. [https://repository.naturalis.nl/pub/524688]

Middleton, D.J. (2002) Revision of *Alyxia* (Apocynaceae). Part 2 : Pacific Islands and Australia. *Blumea* 47: 1–93. [https://repository.naturalis.nl/pub/524530]

Montrouzier, R.P. (1860) Flore de l'Île Art, près de la Nouvelle-Calédonie. *Mémoires de l'Académie Royale des Sciences, Belles-lettres et Arts de Lyon* Sér. 2, 10: 173–254.

Morat, P. (2010) Les botanistes récolteurs en Nouvelle-Calédonie de 1774 à 2005. *Adansonia* sér. 3, 32 (2): 159–216. https://doi.org/10.5252/a2010n2a1

Moore, S.L.M. (1921) Apocynaceae. A Systematic account of the plants collected in New Caledonia and the Isle of Pines by Prof. R. H. Compton, M.A., in 1914 – Part I. Flowering Plants (Angiosperms). *Botanical Journal of the Linnean Society* 45: 245–417. https://doi.org/10.1111/j.1095-8339.1921.tb00125.x

Müller, J. (1870) Neue Apocyneen von Neu-Caledonien. *Flora* 51: 168–172.

POWO (2023) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet. Available from: http://www.plantsoftheworldonline.org/ (accessed 27 January 2023)

QGIS Development Team (2022) QGIS Geographic Information System. Open Source Geospatial Foundation Project. [http://qgis.osgeo.org]

Schlechter, R. (1906) Beiträge zur Kenntnis der Flora von Neu-Kaledonien. *Botanische Jahrbücher für Systematik and Pflanzengeographie* 1 39: 1–274.

Thiers, B. (2020 onwards) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's virtual herbarium. Available from: http://sweetgum.nybg.org/science/ih (accessed 25 January 2023)

Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Kusber, W.-H., Li, D.-Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (2018) International Code of Nomenclature for algae, fungi, and plants (Shenzhen Code) adopted by the Nineteenth International Botanical Congress Shenzhen, China, July 2017. Glashütten: Koeltz Botanical Books. *Regnum Vegetabile* 159: i–xxxviii + 1–254. https://doi.org/10.12705/Code.2018

van Heurck, H. (1871) *Observationes botanicae et decriptiones plantarum novarum herbaria van Heurckiani*. 268 pp.

Whistler, W.A. (1990) Ethnobotany of the Cook Islands: the plants, their Maori names and their uses. *Allertonia* 5 (4): 347–424.

APPENDIX.

	Branchlet shape	Branchlet colour	Branchlet pubescence	Leave per whorl	Leave shape	Leave mucronate	Leave pubescence	Leaf size	Leave texture	Leave colour	Secondary venation	Petiole length
Alyxia baillonii	Weakly angled	Green	Glabrous	2 or 3	Elliptic, obovate or spathulate	No	Glabrous	2.6–10 × 1.1–4.7 cm	Coriaceous	Discolor, dark green above, glaucous beneath	Obscure to weakly prominent beneath	0.3–1.4 cm
Alyxia caletioides	Weakly angled	Brown	Puberulent to tomentose	3 or 4	Linear or narrowly elliptic	No	Pubescent	0.5–2.2 × 0.15–0.45 cm	Coriaceous	Concolour	Obscure	0.1 cm
Alyxia celastrinea	Weakly or strongly angled	Green to reddish	Glabrous	3	Obovate	No	Glabrous	2.3–5.5 × 1–2.2 cm	Subcoriaceous to coriaceous	Concolour	Obscure	0.2–0.4 cm
Alyxia clusiophylla	Weakly or strongly angled	Brown	Sparsely to densely pubescent or glabrescent	3	Linear, elliptic, broadly elliptic or spathulate	No	Sparsely puberulent only on midrib	21–13 × 0.8–2.7 cm	Thickly coriaceous	Discolor, dark green above, pale green beneath	Obscure	0.4–0.7 cm
Alyxia cylindrocarpa	Weakly angled	Green	Glabrous	2	Narrowly elliptic, elliptic or ovate	Yes	Glabrous	0.8–8.4 × 0.3–3.3 cm	Subcoriaceous or chartaceous	Concolour	Weakly distinguishable	0.2–0.7 cm
Alyxia dolioliflora	Weakly or strongly angled	Reddish	Glabrous	3	Linear	No	Glabrous	2.2–4.7 × 0.2–0.5 cm	Coriaceous	Concolour	Obscure	0.1–0.4 cm
Alyxia glaucophylla	Weakly angled	Brown to blackish	Sparsely to densely pubescent	3	Broadly elliptic, ovate or spathulate	No	Glabrous	1–6.1 × 0.6–3.9 cm	Coriaceous	Slightly discolor, pale green beneath	Obscure	0.2–0.6 cm
Alyxia humboldtiensis	Strongly angled	Green	Puberulent	3 to 5	Obovate or spathulate, strongly revolutate	Yes	Both surfaces minutely pubescent	2.4–2.7 × 1.3–1.8 cm	Thickly coriaceous	Green	Obscure	null
Alyxia hurlimannii	Weakly or strongly angled	Greyish	Glabrous	3 or 4	Narrowly obovate or elliptic	No	Glabrous	1.6–6.5 × 0.3–2.6 cm	Coriaceous	Concolour	Obscure	0.3–0.5 cm
Alyxia kaalaensis	Weakly angled	Brown	Densely pubescent on young parts	3	Oblong to orbicular	No	Glabrous	0.6–1 × 0.6–1 cm	Coriaceous	Slightly discolor, pale green beneath	Obscure	0.1–0.3 cm
Alyxia leucogyne	Strongly angled	Green	Glabrous or sparsely puberulent or glabrescent	4 or 5	Obovate or spathulate, margin weakly to strongly inrolled	No	Glabrous	3.2–16.4 × 1.9–6.2 cm	Coriaceous	Green	Secondary veins weakly prominent	1–2 cm

...Continued on the next page

APPENDIX. (Continued)

	Branchlet shape	Branchlet colour	Branchlet pubescence	Leave per whorl	Leave shape	Leave mucronate	Leave pubescence	Leaf size	Leave texture	Leave colour	Secondary venation	Petiole length
Alyxia loeseneriana	Weakly or strongly angled	Green to brownish	Glabrous	2 or 4	Elliptic or obovate	No	Glabrous	2.4–10.4 × 1–3.8 cm	Coriaceous to chartaceous	Slightly discolor, pale green beneath	Weakly to clearly visible beneath	0.3–1.1 cm
Alyxia margaretiae	Terete to weakly angled	Green	Glabrous	2	Elliptic, ovate or oblong	Yes	Glabrous	3.3–10.3 × 0.8–4.8 cm	Coriaceous to thickly coriaceous	Concolour	Weakly distinguishable to obscure	0.4–1.3 cm
Alyxia minimiflora	Weakly angled	Blackish	Densely pubescent	3	Linear	No	Looking lustrous but with sparse very short hairs	1–3 × 0.1–0.2 cm	Subcoriaceous	Slightly discolor, pale green beneath	Obscure	0.1–0.3 cm
Alyxia mucronata	Weakly angled	Green	Sparsely pubescent to tomentose or glabrescent	2	Elliptic or ovate	Yes	Pubescent or glabrous beneath	1–3.5 × 0.6–1.9 cm	Coriaceous	Green	Weakly distinguishable to obscure	0.1–0.3 cm
Alyxia nummularia	Weakly angled	Brown	Densely pubescent	3	Orbicular	No	Densely pubescent	0.9–2.6 × 0,6–1,7 cm	Coriaceous	Concolour	Obscure	0.1–0.2 cm
Alyxia oppositifolia	Weakly angled	Green	Glabrous to densely pubescent	2 or 3	Linear to lanceolate	No	Glabrous to densely pubscent	0.8–3.9 × 0.2–1.2 cm	Chartaceous to coriaceous	Concolour	Obscure to weakly prominent beneath	0.1–0.2 cm
Alyxia oubatchensis	Weakly angled	Green	Glabrous to densely puberulent	3	Elliptic, obovate or spathulate	No	Sparsely puberulent beneath	1.7–10 × 1–4.5 cm	Coriaceous	Slightly discolor, pale green beneath	Strongly to weakly distinguishable beneath	0.4–1 cm
Alyxia paniensis	Weakly angled	Brown	Glabrous	3	Elliptic	No	Glabrous	5.3–8.4 × 2.8–4 cm	Chartaceous	Concolour	Weakly to clearly visible beneath	0.6–1.3 cm
Alyxia podocarpa	Weakly angled	Green	Sparsely pubescent	3	Elliptic to obovate	No	Glabrous beneath, glabrous or puberulent only on midrib above	1.5–8 × 0.5–1.8 cm	Coriaceous	Slightly discolor, pale green beneath	Weakly distinguishable to obscure	0.2–0.7 cm

...Continued on the next page

APPENDIX. (Continued)

	Branchlet shape	Branchlet colour	Branchlet pubescence	Leave per whorl	Leave shape	Leave mucronate	Leave pubescence	Leaf size	Leave texture	Leave colour	Secondary venation	Petiole length
Alyxia poyaensis	Strongly angled	Red	Glabrous	2	Narrowly to broadly elliptic	Yes	Glabrous	1.1–5.4 × 0.2–2.1 cm	Coriaceous	Slightly discolor, pale green beneath	Weakly distinguishable to obscure	0.3–0.5 cm
Alyxia pseudoserpentina	Weakly angled	Green to brownish	Glabrous	3	Oblong	No	Glabrous	3–4.7 × 0.6–0.7 cm	Chartaceous	Concolour	Obscure	0.2–0.3 cm
Alyxia rosmarinifolia	Weakly or strongly angled	Reddish	Glabrous	3	Linear	No	Glabrous	1.7–3.8 × 0.1–0.3 cm	Coriaceous	Concolour	Obscure	0.1–0.3 cm
Alyxia rubricaulis	Weakly angled	Red	Glabrous	2	Elliptic or ovate	Yes	Glabrous	1.4–8.2 × 0.7–3.2 cm	Coriaceous to thickly coriaceous	Concolour	Weakly distinguishable	0.6–1.2 cm
Alyxia sarasinii	Weakly angled	Green	Glabrous to densely and minutely pubescent	3	Elliptic or obovate	No	Densely pubescent beneath, above glabrous	0.8–2.4 × 0.3–1 cm	Thickly coriaceous	Slightly discolor, pale green beneath	Weakly distinguishable to obscure	0.2–0.5 cm
Alyxia spathulata	Weakly angled	Blackish	Glabrous	2	Spathulate	No	Glabrous	1.3–2.1 × 3.6–5.7 cm	Coriaceous	Concolour	Obscure	0.2–0.3 cm
Alyxia stellata	Terete, weakly or strongly angled	Green to brownish	Glabrous to densely and minutely puberulent	3	Linear, narrowly to broadly elliptic, ovate, obovate, or lanceolate	No	Glabrous	2.8–3.7 × 1.1–1.8 cm	Coriaceous to chartaceous	Concolour	Obscure	0–0.1 cm
Alyxia tisserantii	Weakly or strongly angled	Reddish	Glabrous	3	Obovate	No	Glabrous	2.3–3 × 0.7–1 cm	Coriaceous	Concolour	Obscure	0.1–0.4 cm
Alyxia torquata	Terete to weakly angled	Green to brownish	Glabrous	3	Elliptic	No	Glabrous	1.5–8.5 × 0.7–3.1	Chartaceous	Concolour	Obscure	0.1–0.2 cm
Alyxia urceolata	Weakly angled	Green to blackish	Young puberulent then glabrous	3	Linear	No	Puberulent	0.9–1.4 × 0.15–0.25 cm	Subcoriaceous	Slightly discolor, pale green beneath	Obscure	0.1–0.2 cm
Alyxia veillonii	Strongly angled	Reddish	Glabrous	3	Elliptic	No	Glabrous	3–5.3 × 0.9–2.4 cm	Coriaceous	Slightly discolor, pale green beneath	Obscure	0.3–0.4 cm

...Continued on the next page

APPENDIX. (Continued)

	Inflorescence	Inflorescence pubescence	Inflorescence position	Peduncle length	Peduncle shape	Pedicel length	Corolla tube length	Corolla tube pubescence outside	Sepal shape	Ovary pubescence	Stamen insertion distance from corolla base	Fruit article shape	Fruit article length
Alyxia baillonii	4- or 5-flowered, a simple unbranched pleiochasium	Glabrous or sparsely pubescent	Axillary	0–0.3 cm	Weakly flattened	1.2–2.8 mm	5.5–9 mm	Glabrous	Ovate, apex acute	Densely pubescent all over, or around base only	4.2–7.2 mm	Ellipsoid of fusiform	6.3–23.5 mm
Alyxia caletioides	Solitary flower	null	Subterminal ot terminal	0	null	1 mm	5.3–8 mm	Glabrous	Ovate, apex acute	Densely pubescent all over	4.3–5.4 mm	Ellipsoid or subglobose	4.5–7 mm
Alyxia celastrinea	4- to 5-flowered simple pleiochasium	Glabrous	Axillary	0.5–0.6 cm	Weakly flattened	0.3–0.8 mm	2.3–2.8 mm	Glabrous	Ovate, apex obtuse to rounded	Hairy around base	1.8 mm	Globose to subglobose, fleshy	7.3–9.1 mm
Alyxia clusiophylla	4-flowered, a simple unbranched pleiochasium	Sparsely pubescent	Axillary	0.6–1 cm	Weakly flattened	1–5.5 mm	3.7–5.5 mm	Glabrous	Lanceolate, apex acute to acuminate	Densely pubescent all over to pubscent around base only	3.7–4.2 mm	Ellipsoid or subglobose	6–7 mm
Alyxia cylindrocarpa	1-3 flowered	Glabrous	Variable	0.1–0.7 cm	Rounded	1.2–2.2 mm	7.7–10.2 mm	Glabrous	Ovate, apex acute or acuminate	Densely pubescent all over or only at top	6.4–7.2 mm	Cylindrical or narrowly ellipsoid	16–36.5 mm
Alyxia dolioliflora	4- flowered simple pleiochasium	Glabrous	Axillary	0.2–0.9 cm	Weakly flattened	0.2–1 mm	2.9–4.1 mm	Glabrous	Narrowly triangular, apex acute	Densely pubescent all over	ca. 2 mm	Ellipsoid	6.8–9.5 mm
Alyxia glaucophylla	3- to 6-flowered simple pleiochasium, sometime with 1 or 2 internode	Sparsely to densely puberulent	Axillary	0.2–0.5 cm	Weakly flattened	1.3–3 mm	3.6–5.1 mm	Glabrous or sparsely puberulent around top of tube	Ovate, apex acute	Densely pubescent all over	2.7–3.6 mm	Globose	8–16 mm
Alyxia humboldtiensis	Reduced and sessile to subsessile dichasial cyme	Sparsely pubescent	Axillary	0–0.1 cm	Rounded	null to ca. 0.5 mm	4.5 mm	Glabrous	Narrowly triangular	Very hairy at base	ca. 3 mm	Fusiform	Mature fruit unknown

...*Continued on the next page*

APPENDIX. (Continued)

	Inflorescence	Inflorescence pubescence	Inflorescence position	Peduncle length	Peduncle shape	Pedicel length	Corolla tube length	Corolla tube pubescence outside	Sepal shape	Ovary pubescence	Stamen insertion distance from corolla base	Fruit article shape	Fruit article length
Alyxia hurlimannii	4- to 6- simple pleiochasium	Glabrous	Axillary	0.1–0.7 cm	Weakly flattened	0.9–3.8 mm	2.3–3 mm	Glabrous	Ovate, apex acute	Densely pubescent all over	1.4–1.6 mm	Ellipsoid or fusiform	14–20 mm
Alyxia kaalaensis	3- to 7- flowered compound pleichasium	Sparsely to densely puberulent all over	Subterminal	0–0.4 cm	Rounded	0.8–2.2 mm	3–3.4 mm	Glabrous	Ovate, apex acute	Densely pubescent	2.2–2.7 mm	Globose	4.6–5.8 mm
Alyxia leucogyne	Long, branched several times, with > 20 flowers	Densely puberulent	Axillary	0.7–3.6 cm	Rounded	0.7–3.6 cm	2.8–3.6 mm	Glabrous to sparsely pubescent around top of tube outside	Ovate, apex acuminate	Densely pubescent	1.9–2.3 mm	Fusiform to globose	7.4–16.1 mm
Alyxia loeseneriana	3-7-flowered simple or compound pleiochasium	Glabrous	Axillary	0–0.5 cm	Weakly flattened	0.7–2 mm	3.4–5.6 mm	Glabrous	Ovate, apex acute	Densely pubescent all over	2.4–3.9 mm	Ellipsoid to fusiform	15.5–38 mm
Alyxia margaretiae	Very lax, 4,8-14 cm	Glabrous	Axillary or terminal	2.2–5.2 cm	Rounded	2,8–22 mm	8.7–10.5 mm	Glabrous	Ovate, apex obtuse	Densely pubescent all over or only at top	6–6.1 mm	Sickle-shaped	24–57 mm
Alyxia minimiflora	3- flowered trichasial cyme	Pubescent	Axillary	0–0.2 cm	Rounded	0.2–0.8 mm	1.6 mm	Glabrous	Widely triangular, apex acute to obtuse	Hairy around base	ca. 1 mm	Ovoid	6–7 mm
Alyxia mucronata	3-flowered, simple unibranched pleiochasium	sparsely to densely pubescent	Axillary or terminal	0.15–0.18 cm	Rounded	1.3–3 mm	7.2–9.4 mm	Sparsely pureulent around top of tube	Ovate, apex acute	Densely pubescent	5.8–7.5 mm	Fusiform	17–22 mm
Alyxia nummularia	4- flowered simple pleiochasium	Densely pubescent	Axillary	0.4–1.2 cm	Rounded	1.3–5.5 mm	2.1–3.1 mm	Glabrous	Lanceolate, apex rounded to obtuse	Densely pubescent all over	2 mm	Globose	6.6–8.4 mm

...*Continued on the next page*

APPENDIX. (Continued)

	Inflorescence	Inflorescence pubescence	Inflorescence position	Peduncle length	Peduncle shape	Pedicel length	Corolla tube length	Corolla tube pubescence outside	Sepal shape	Ovary pubescence	Stamen insertion distance from corolla base	Fruit article shape	Fruit article length
Alyxia oppositifolia	Solitary of 3-flowered, on a slender 6 mm peduncle	Pubescent	Axillary	0.6–2 cm	Rounded, thin	1.5–10 mm	4.3–7.8 mm	Glabrous	Ovate, apex obtuse to acute	Glabrous or pubescent in a tuft between the carpels	4.3–6.4 mm	Ellipsoid	7.8–16 mm
Alyxia oubatchensis	3- to 7- flowered simple or compound pleiochasium	Sparsely to densely puberulent all over	Axillary	0.2–0.5 cm	Robust, weakly flattend	1.6–4.5 mm	6.5–7.2 mm	Glabrous or sparsely puberulent	Ovate, apex acute	Densely pubescent all over	5–5.1 mm	Ellipsoid	17–26 mm
Alyxia paniensis	3- to 4-flowered simple pleiochasium	Glabrous	Axillry	0.3–0.8 cm	Rounded	4.5–5.5 mm	8.5 mm	Glabrous	Narrowly triangular, apex acute	Unknown	Unknown	Sickle-shaped	35–40 mm
Alyxia podocarpa	4 flowered, a simpled unbranched pleiochasium	Glabrous or sparsely pubescent	Axillary	0.3–0.5 cm	Weakly flattened	0.7–1 mm	5.5–7 mm	Glabrous	Ovate, apex obtuse	Densely pubescent all over	4.1–4.4 mm	Subglobose, densely pubescent	7.2–12 mm
Alyxia poyaensis	Simple 3-flowered unbranched pleiochasium	Glabrous or sparsely pubescent	Axillary	1.1–2.2 cm	Strongly flattened	2-–8.5 mm	5.8–7 mm	Glabrous	Ovate, apex acute	Densely pubescent all over	4.4–4.7 mm	Ellipsoid	7–7.3 mm
Alyxia pseudoserpentina	3- to 5-flowered simple pleiochasium	Sparsely pubescent	Axillary	0–0.4 cm	Rounded	0.2–1.5 mm	2.6–3.6 mm	Glabrous	Lanceolate, apex acute	Sparsely pubescent	ca. 2 mm	Ellipsoid to globose	3.7–5.4 mm
Alyxia rosmarinifolia	4- to 5-flowered simple pleiochasium	Glabrous	Axillary	0.3–0.5 cm	Weakly flattened	0.9–3.4 mm	0.9–2 mm	Glabrous	Unknown	Unknown	Unknown	Globose to subglobose	4.4–7 mm
Alyxia rubricaulis	7-11 flowered	Glabrous	Axillary	0.7–1.7 cm	Weakly flattened	0.8–5.8 mm	3.2–4.2 mm	Glabrous	Ovate, apex acute	Densely pubescent all over	2.6 mm	Ellipsoid	11.5–17 mm

...*Continued on the next page*

APPENDIX. (Continued)

	Inflorescence	**Inflorescence pubescence**	**Inflorescence position**	**Peduncle length**	**Peduncle shape**	**Pedicel length**	**Corolla tube length**	**Corolla tube pubescence outside**	**Sepal shape**	**Ovary pubescence**	**Stamen insertion distance from corolla base**	**Fruit article shape**	**Fruit article length**
Alyxia sarasinii	Simple 3-10 flowered pleiochasium or short congested compound pleiochasium	Densely puberulent	Axillary or terminal	0.5–1.2 cm	Weakly flattened	1–8 mm	3.3–4 mm	Densely puberulent	Oblong, leafy, apex rounded to obtuse	Densely pubescent all over	1.7–1.9 mm	Globose	2.5–6 mm
Alyxia spathulata	4- to 5-flowered simple pleiochasium	Glabrous	Axillary	0.1–0.6 cm	Weakly flattened	0.7–1.4 mm	1.1–1.6 mm	Glabrous	Ovate, apex obtuse	Hairy around base	Unknown	Globose	4.7–6.1 mm
Alyxia stellata	2- to 6-flowered simple pleiochasium	Generally glabrous	Axillary, sometimes subterminal	0.4–0.7 cm	Weakly flattened	0.4–1 mm	2.8–3.8 mm	Glabrous	Narrowly triangular, apex acute	Hairy around base	ca. 3 mm	Ellipsoid, fleshy	9–15 mm
Alyxia tisserantii	3- to 7- flowered simple or compound pleiochasium	Glabrous	Axillary	0.4–1.2 cm	Weakly flattened	0.6–3.5 mm	1.9–2.1 mm	Glabrous	Ovate, apex rounded	Hairy around base	Unknown	Globose to subglobose	3.7–5 mm
Alyxia torquata	3- to 4- simple pleiochasium	Glabrous	Axillary	1.1–3.1 cm	Weakly flattened	1.2–4 mm	2.2–2.5 mm	Glabrous	Ovate, apex acute	Pubescent around base only	1.2 mm	Globose	4 mm
Alyxia urceolata	Solitary or in fascicules	Pubescent	Axillary, sometimes subterminal	0–0.2 cm	Rounded	null	3 mm	Glabrous	Lanceolate, apex acute	Densely pubescent	2 mm	Globose to ovoid	4–7 mm
Alyxia veillonii	4- or 5-flowered, a simple unbranched pleiochasium	Glabrous	Axillary	0.4–0.7 cm	Weakly flattened	2–3.5 mm	6.7 mm	Glabrous	Ovate, apex acute	Pubescent in tuft between carpels	4.6 mm	Globose	ca. 5 mm