Grant # 7579-04 –Progress report

Results from the Inventory of the Kouakoué Massif, New Caledonia

Jérôme Munzinger[1] (PI), Gordon McPherson[2] and Porter P. Lowry II[2, 3]

[1.] Laboratoire de Botanique (NOU), Institut de Recherche pour le Développement, P.B. A5, 98848 Nouméa Cedex, New Caledonia
[2.] Missouri Botanical Garden, P.O. Box 299, St. Louis, Missouri 63166-0299, U.S.A.
[3.] Département de Systématique et Evolution, Phanérogamie, Muséum National d'Histoire Naturelle, 16 rue Buffon, 75005 Paris, France.

Abstract –During two years the little-known Kouakoué Massif was explored by a team of seven botanists and five students. Nine hundred sixty-six collections of vascular plants were made, of which three-quarters have thus far been identified to species. Earlier collections have also been taken into account in order to summarize botanical knowledge of this mountain. As a result, 591 vascular plant taxa are now known from the massif, of which 284 have been brought to light by the present inventory. Of the new species thus far discovered, several have been published or are in press. Some particularly rare species have been observed, several of which had not previously been known from this mountain. The first bryological data for the region, as well as the first information concerning the bee fauna, have been gathered.

- **Background**

The Kouakoué Massif has been identified by the authorities of the Southern Province as a site possibly to be recognized as a UNESCO Biosphere Reserve. This isolated and mountainous zone is mostly covered by maquis and forest on ultramafic terrain, and could harbor nearly half the indigenous vegetation of New Caledoinia. However, it has been visited by very few botanists, and very little information is currently available on the plants present on this site. In order to justify an eventual classification as a Biosphere Reserve, a detailed floristic inventory taking into account the specific diversity and level of endemism of these plants is needed. This inventory project was therefore undertaken, with the first fieldtrip taking place in 2002, financed by the MacArthur Foundation and conducted in collaboration with the Museum National d'Histoire Naturelle (MNHN), Paris.

Since this massif is extremely difficult of access, and has very little water available on its higher slopes, it was necessary to make rather lengthy fieldtrips (at least one week long) and to develop a significant support system.

Base camp, Kouakoué, 1260 m, April 2006 (Photo P. Lowry), a misty dawn after a cold night.

The abundance of huge blocks of rock also made hiking extremely difficult.

High altitude maquis, with blocks of peridotite (Photo P. Lowry)

The Southern Province contributed very significantly to the successful accomplishment of the project by providing helicopter transport for several fieldtrips.

Helicopter of the Southern Province (Photo P. Lowry)

This support by the Southern Province permited us to enlarge the inventory to include the bryophytes, very little studied in New Caledonia. Elisabeth Brown, bryologist at the Royal Botanic Gardens in Sydney, was invited to join the team, and her presence has resulted in the very first bryological data from the massif.

- **Participants:**

➢ Researchers:

- Jérôme Munzinger, Institut de Recherche pour le Développement, Nouméa, New Caledonia (JM),
- Pete Lowry, Missouri Botanical Garden, Museum Nat. Hist. Naturelle, Paris, France (PL),
- Gordon McPherson, Missouri Botanical Garden, Saint Louis, USA (GM),
- Marc Pignal, MNHN, Paris, France (MP),
- Jean-Noël Labat, MNHN, Paris, France (JNL),
- Elisabeth Brown, Royal Botanic Gardens, Sydney (EB),
- Myriam Gaudeul, MNHN, Paris, France (MG).

➢ Students:

- Thomas Le Borgne, (former) student at the University of New Caledonia (TL),
- Anaïs Oddi, (former) student at the University of New Caledonia (AO),
- Frédéric Tronchet, graduate student at MNHN (FT),
- Arnaud Mouly, (former) graduate student at MNHN (AM),
- Yohan Pillon, graduate student at the University of New Caledonia (YP).

- **Summary of earlier collecting work**

A systematic search for specimens collected by earlier botanists has been completed, based on the herbarium of Nouméa (NOU), the fieldbooks deposited at NOU, and on the available literature.

- **Collecting Methods**

Three approaches have been used in this study:

-a general collection, in which the individuals observed in flower or fruit along various routes are collected

-the establishment of transects, using Cottam and Curtis (1956) method, in which transects have been made perpendicularly to the slope. Lines are thus traced, and a point marked every 20 m. From each point, the space is divided into four squares, and in each square the nearest tree with a diameter greater than 10 cm is marked with a forester's label and is identified.

Tagging of individuals for later restudy (Photo J. Munzinger)

-the setting-up of 400m square plots (20 x 20m), inside which all the trees of a diameter greater than 5 cm at breast height have been tagged and identified. This system of plots will be completed in the near future with new plots at 600 and 900 m, with the aim of establishing an altitudinal gradient on this ultramafic massif. This will enable comparisions to be made with an identical system of plots already in place on the Panié Massif (northeastern New Caledonia, on metamorphic rock), as well as with the plots set up in the valley of the Pénaorou, on the island of Santo in Vanuatu during the Santo2006 expedition.

-the specimens were collected, whenever it was possible, with several duplicates, and deposited in these herbaria in the following order: NOU, P, MO, with the fourth duplicate being sent to the specialist in the taxonomic group concerned. Some samples in silica gel were taken from species that had not yet been included in molecular phylogenetic studies.

Pressing collected material (Photo, M. Gaudeul).

- **Fieldtrip Outline**

Dates	Locality	Participants	Transport	Number of Collections
Oct. 2002	Kouakoué,1300m	JM, FT, TL, AO	Helicopter	199
Nov. 2003	Upper Ni River	GM, AM	Vehicle	154
Apr-May 2004	Upper Ni River	JM, PL, MP	Vehicle	245
Oct. 2004	Upper Ni River	JM, GM	Vehicle	55
Nov. 2004	Kouakoué,1100m	JM, GM, JNL	Helicopter	142
Apr. 2006	Kouakoué,1300m	GM, MG, EB, YP	Helicopter	89
May 2006	Kouakoué,1300m	JM, PL, GM, EB, MG	Helicopter	82
			Total	966

- **Results**

  - **Phanerogams**

During these seven fieldtrips, 966 collections were made, corresponding to 492 taxa (this figure fluctuates as the identification of the specimens continues).

This includes 190 taxa identified only to genus level, 46 only to family level, and 1 not assigned to family.

At the date of writing this report, 75.5% of the material has been identified to the species level.

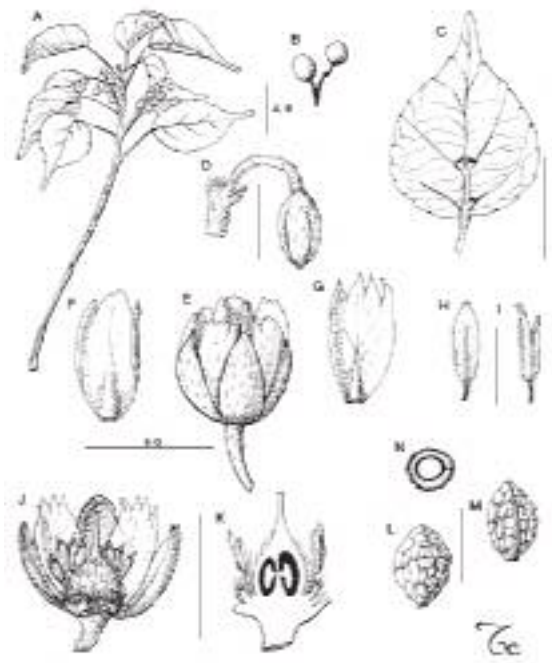
Of these 492 taxa, 284 have not previously been collected on the Kouakoué Massif. The total number of taxa for Kouakoué is 591 (older collections + the present ones).

New or probably new taxa

Cunonia dickisonii Pillon & Hopkins ined. (Cunoniaceae): this very pretty plant, identified as new by Y. Pillon and H. Hopkins, has been collected on two occasions, at 1100 and 1300 m. It is also present on the Humboldt Massif (Pillon & Munzinger pers. obs.). The species is in the process of being described (Pillon, Hopkins & Bradford, in press).

Cunonia dickisonii ined. (Photo J. Munzinger)

Elaeocarpus tremulus Tirel & McPherson (Elaeocarpaceae): this tree was collected for the first time, in flower, during one of the early fieldtrips of this inventory. The plant is common in the Ni valley, but has also been seen on the southern flank of the Kouakoué Massif. A collection in fruit made in early 2005 completed the material necessary for describing the new species (Tirel & McPherson, 2006).



Elaeocarpus tremulus (Tirel & McPherson, 2006)

Elaeocarpus tremulus (Photo J. Munzinger)

Gastrolepis alticola Munzinger, McPherson & Lowry ined. (Stemonuraceae): the genus *Gastrolepis*, endemic to New Caledonia, formerly included only one species (Villiers, 1980). Several collections made during this project have permitted us to identify a second species, which had already been collected on this massif as well as on Montagne des Sources, but which had been incorrectly identified as *G. austrocaledonica*. This new species is in the process of being described (Munzinger et al., accepted).

Gastrolepis alticola Munzinger, McPherson & Lowry ined. (Photo P. Lowry)

***Grammitis* cf. sp. nov**. (Grammitidaceae): the various fieldtrips have permitted the documentation of all three species of *Grammitis* known from New Caledonia (Brownlie, 1969), to which can be added this taxon, which is very likely new, according to G. Rouhan (pteridologist at MNHN). A single individual of this species was observed, despite careful searches on subsequent fieldtrips.

Grammitis cf. sp. nov. the only collection known.

Meryta cf. sp. nov. (Araliaceae): observed in sterile condition only, in dense forest near 1200 m, does not seem to match any known species in the genus.

***Piliocalyx* sp. nov.** (Myrtaceae): since this genus is currently being studied and the Nouméa specimens are on loan to the specialist, it is not possible to give the distribution of this species.

Piliocalyx sp. (Photo P. Lowry)

Rapanea "munzingeri" sp. nov. ined. (Myrsinaceae): this species, studied by M. Schmid (MNHN), seems to be undescribed. It has been encountered three times within the study area, and is not known elsewhere.

Sebertia cf. sp. nov.: this tree with blue sap was found sterile once in 2002. The very revolute leaves distinguish it from *Sebertia acuminata*. Molecular studies also show some differences (Bartish, Swenson, Munzinger & Anderberg, 2005; Swenson, Bartish & Munzinger, 2007). Flowers have been collected during the last fieldtrip and are currently being studied.

Sebertia sp. (Photo M. Gaudeul)

Sapotaceae gen.? et sp. nov. (Munzinger 1717): this Sapotaceae is known from only two localities, the Sailles Forest and the Kouakoué Massif. It has only been collected with old, spent flowers and has not proven identifiable, despite the revision of the family currently underway (J. Munzinger, IRD Nouméa and U. Swenson , Stockholm Museum).

***Tarenna* cf. sp. nov**. (Rubiaceae): a potentially new species of this genus is presently under study by A. Mouly at the MNHN.

Species formerly misplaced

Several individuals of a species of the genus *Elaeocarpus* (Elaeocarpaceae) posed a problem of identification, and after consultation with the specialist C. Tirel (MNHN), it became evident that they represent ***Elaeocarpus combouiensis*** Guillaumin. This species had been considered doubtfully distinct, and had been placed in synonymy (Tirel, 1982) under *E. alaternoides*. However, the new material collected as part of this project has permitted the confirmation of the distinctness of *Elaeocarpus combouiensis*.

Elaeocarpus combouiensis (Photo of P. Lowry)

Notable species

Beauprea congesta Virot (Proteaceae): this species had been known from only the Humboldt Massif (Bradford & Jaffré, 2004), and thus the Kouakoué is the second locality recorded.

Bikkia pachyphylla Guillaumin (Rubiaceae): this species is known only from the high altitude maquis of Montagne des Sources and the Kouakoué Massif.

Bikkia pachyphylla (Photo P. Lowry)

Cunonia alticola Guillaumin (Cunoniaceae): this species is known from a few individual plants isolated in four localities, Mt. Mou, Montagne des Sources, Kouakoué, and Dzumac.

Cunonia pseudoverticillata Guillaumin (Cunoniaceae): known from only Montagne des Sources and Kouakoué.

Cunonia pseudoverticillata (Photo P. Lowry)

Cunonia rotundifolia Danikër (Cunoniaceae): known from only Mt. Humboldt and the Kouakoué (Bradford & Jaffré), 2004).

Cunonia rotundifolia (Photo J. Munzinger)

Dubouzetia guillauminii **Virot** (Elaeocarpaceae): this species is recorded from only the Humboldt and Kouakoué Massifs, and has been seen several times during this study at elevations above 1100 m.

Dubouzetia guillauminii (Photo P. Lowry)

***Hibbertia nana* Däniker** (Dilleniaceae): this high altitude species is known only from Montagne des Sources, Humboldt, Kouakoué, and the ridge between the Tontouta and the Ouenghi Rivers.

Hibbertia nana (Photo M. Gaudeul)

Eugenia myrtopsidoides Guillaumin (Myrtaceae): this little-known species was described from Montagne des Sources and Pic de la Sunshine (Guillaumin, 1962), and thus the Kouakoué Massif is a new locality.

Eugenia myrtopsidoides (Photo J. Munzinger)

Litsea neocaledonica Moore (Lauraceae): this rare species is known from only four localities, Humboldt, Koghis, Canala and Dogny (Kostermans, 1974).

Logania imbricata (Guillaumin) Steenis & Leenh. (Loganiaceae): this species, classified as Endangered (EN) (Jaffré, Bouchet & Veillon, 1998), is known only from the Humboldt Massif, and thus Kouakoué is the second locality recorded.

Logania imbricata (Photo J. Munzinger)

Metrosideros tetrasticha Guillaumin (Myrtaceae): this species is known from only the Humboldt and Kouakoué Massifs (Dawson, 1992).

Metrosideros tetrasticha (Photo J. Munzinger)

Pancheria humboldtiana Guillaumin (Cunoniaceae): documented from only Humboldt and Kouakoué (Bradford & Jaffré, 2004).

Pancheria humboldtiana (Photo J. Munzinger)

Pancheria robusta Guillaumin (Cunoniaceae): this species is known from only three sites, Montagne des Sources, the upper Thy Valley, and Kouakoué.

Pancheria robusta (Photo P. Lowry)

Pancheria multijuga Guillaumin (Cunoniaceae): known from three localities, Montagnes des Sources, Kouakoué, and Humboldt.

Platyspermation crassifolium Guillaumin (Escalloniaceae): known from only the high altitude maquis of Humboldt-Nekando, Kouakoué, and Montagne des Sources.

Platyspermation crassifolium (Photo J. Munzinger)

Schefflera emiliana Baill. (Araliaceae): known from only Kouakoué and Humboldt, and limited to the high altitude maquis above 1300 m.

Schefflera emiliana (Photo P. Lowry)

Tieghemopanax weinmanniae (Baill.) R. Viguier (Araliaceae): found only at a few stations in the south (Kouakoué, Humboldt, Montagne des Sources, Haute Ouinnée).

Tieghemopanax weinmanniae (Photo J. Munzinger)

Weinmannia paitensis Schltr. (Cunoniaceae): known from four localities, Mt Mou, Aoupinié, Kouakoué, Humboldt.

Zygogynum tieghemii **Vink ssp.** ***tieghemii*** (Winteraceae): previously known from four localities, with Kouakoué being a new station for this subspecies. The species is classified as Endangered (EN) according to the criteria of the IUCN (Jaffré et al, 1998).

Zygogynum tieghemii ssp. *tieghemii* (Photo P. Lowry).

An interesting finding

Garnieria spathulaefolia (Brongn. & Gris) Brongn. & Gris (Proteaceae): the observation of this species in the upper Ni Valley (750 m) enlarges the distribution of a species that Virot (1968) assumed "not to exist on the highest southern mountains (Dzumacs, Humboldt)".

Garnieria spathulaefolia (Photo J. Munzinger)

Bryophytes

The bryophytes of New Caledonia are very poorly known, with the early literature and access to types often difficult. As a result, the identification process is particularly lengthy and several years will be needed to obtain names for all the collected specimens. However, this first investigation by a bryologist of the Kouakoué Massif has permitted the recognition of 52 species belonging to 46 genera. One new species, belonging to the genus *Mnioloma* (a very small hepatic) has been found. Unfortunately no photo was taken in the field of this species.

Mosses and hepatics observed on Kouakoué during the 2006 fieldtrips.

Acrobolbus sp.
Acrolejeunea sp.
Acromastigum sp.
Aneura sp.
Austroschistochila sp.
Balantiopsis sp.
Bazzania sp.
Bazzania deplanchei
Bazzania franciana
Campylopus sp.
Chiloscyphus sp.
Dicranoloma sp.
Dicranoloma menziesii
Distichophyllum sp.
Eurrhynchium sp.
Fissidens sp.
Fossombronia sp.
Frullania sp.
Garovaglia sp.
Heteroscyphus sp.
Hypnodendron sp.
Hypnum sp.
Kurzia sp.
Lejeunea sp.
Lepidozia sp.
Leucobryum sp.
Leucophanes sp.
Macrocoma sp.
Macromitrium sp.
Mastigophora sp.
Metzgeria sp.
Mnioloma sp. nov.
Parisia ciliatus
Pinnatella sp.
Plagiochila sp.
Pleurozia sp.
Porella sp.
Psiloclada clandestina
Ptychomnion aciculare
Radula sp.
Rhizogonium sp.
Riccardia sp.
Riccardia filicina
Rosulabryum sp.
Schistochila sp.
Sematophyllum sp.
Telaranea sp.
Telaranea chaetophylla
Tetracymbaliella sp.
Treubia sp.
Trichocolea sp.
Zoopsis sp.

Macromitrium sp. (Photo P. Lowry)

Bees

Fieldwork on this project provided the opportunity to observe and capture a few bees, notably at high elevations. The domesticated honey bee is extremely abundant but no specimens were taken.

Apis mellifera, common throughout the island. (Photo J. Munzinger)

In total, 24 specimens were captured, representing 6 species, 3 of which are new to science. The identifications have been made by Alain Pauly, of the Royal Institute of Natural Sciences, Belgium. The captured bees comprise:

-*Austronomia sichelii*, an endemic species, probably the commonest in New Caledonia after the introduced domesticated bee, *Apis mellifera*.

Austronomia sichelii (Photo J. Munzinger)

-*Homalictus urbanus*, a tiny bee with green metallic luster, common in places disturbed by man, rarer in natural habitats.

Homalictus urbanus, on "heath" (Photo J. Munzinger)

-***Homalictus* sp. nov**., a new species, one that we had not previously encountered but which had earlier been collected by B. Donovan, entomologist at DSIR, New Zealand (pers. comm.).

-***Lasioglossum*** *(Chilalictus) polygoni*, this discreet species had previously been recorded from only two localities, Bourail and Prony (Pauly & Munzinger, 2003).

-***Lasioglossum*** *(Chilalictus)* sp. nov., this species, now in the process of being described, seems restricted to high elevation habitats, and is localized on the southern massifs of the island: Kouakoué, Dzumacs, and the Sailles Forest.

-***Lasioglossum*** *(new subgenus)* sp. nov., this new species also represents a new subgenus. The only specimen known, a very unusual parasitic bee was captured on the Kouakoué during this study.

Lasioglossum (new subgenus) sp. nov. (Photo A. Pauly).

Conclusion

This inventory, while by no means exhaustive, has nevertheless made a major contribution to improving our knowledge of the Kouakoué massif. The results clearly show that Kouakoué is of exceptional interest and must be taken into consideration in the context of conserving high altitude maquis and the many rare species that occur only in this vegetation type.

A report including a list of the species documented during our inventory will be provided to the Environment Service of New Caledonia's Southern Province.

References:

Barrabé L., Mouly A., Lowry II, P.P., Munzinger J. in prep. A morphological phylogenetic study of *Bikkia* (Rubiaceae): polyphyly necessitates reinstatement of the endemic New Caledonian genus *Thiollierea*.

Bartish IV, Swenson U, Munzinger J, and Anderberg AA. 2005. Phylogenetic relationships among New Caledonian Sapotaceae (Ericales): molecular evidence for generic polyphyly and repeated dispersal. *Am. J. Bot.* **92:** 667-673.

Bradford J, and Jaffré T. 2004. Plant species microendemism and conservation of montaine maquis in New Caledonia: two new species of *Pancheria* (Cunoniaceae) from Roche Ouaième. *Biodiv. Conserv.* **13:** 2253-2273.

Brownlie G. 1969. Ptéridophytes. In: Aubréville A, ed. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 1-293.

Cottam G, Curtis JT. 1956. The use of distance measurements in phytosociological sampling. *Ecology* **37:** 451-460.

Dawson JW. 1992. Myrtaceae - Leptospermoideae. In: Morat P and MacKee HS, eds. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 1-251.

Guillaumin A. 1962. Résultats scientifiques de la mission Franco-Suisse de botanique en Nouvelle-Calédonie (1950-1952) II. *Mémoires du Muséum National d'Histoire Naturelle, Sér. B, Botanique* **8:** 193-330.

Jaffré T, Bouchet P, and Veillon JM. 1998. Threatened plants of New Caledonia: Is the system of protected areas adequate? *Biodiv. Conserv.* **7:** 107-135.

Kostermans A. 1974. Lauracées. In: Aubréville A and Leroy J-F, eds. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 1-120.

Munzinger J, McPherson G, Lowry II PP. accepted. A second species in the endemic New Caledonian genus *Gastrolepis* (Stemonuraceae) and its implications for the conservation status of high-altitude maquis vegetation. *Botanical Journal of Linnean Society*.

Pauly A, and Munzinger J. 2003. Contribution à la connaissance des Hymenoptera Apoidea de Nouvelle-Calédonie et de leurs relations avec la flore butinée. *Ann. Soc. Entom. Fr.* **39:** 153-166.

Pillon Y, Hopkins HC, and Bradford JC. in press. Two new species of *Cunonia* (Cunoniaceae) from New Caledonia. *Kew Bulletin*.

Swenson U, Bartish I, Munzinger J. 2007. Phylogeny, diagnostic characters, and generic limitation of Australasian Chrysophylloideae (Sapotaceae, Ericales): Evidence from ITS sequence data and morphology. *Cladistics* **23:** 201-228.

Tirel C. 1982. Eléocarpacées. In: Aubréville A and Leroy J-F, eds. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 1-126.

Tirel C, and McPherson G. 2006. *Elaeocarpus tremulus* Tirel & McPherson, nouvelle espèce d'Elaeocarpaceae de Nouvelle-Calédonie *Adansonia, sér. 3* **28:** 137-141.

Villiers J-F. 1980. Icacinacées. In: Aubréville A and Leroy J-F, eds. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 159-174.

Vink W. 1993. Winteraceae. In: Morat P and MacKee HS, eds. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 90-171.

Virot R. 1968. Protéacées. In: Aubréville A, ed. *Flore de la Nouvelle-Calédonie et Dépendances*. Paris: Muséum National d'Histoire Naturelle. 1-254.

Vascular plant species observed during 2002-2006 missions on Kouakoué.

Alseuosmiaceae Periomphale balansae
Alseuosmiaceae Periomphale sp.
Anacacardiaceae Euroschinus rubromarginatus
Anacardiaceae Euroschinus sp.
Apocynaceae
Apocynaceae Alstonia legouixiae
Apocynaceae Alstonia sp.
Apocynaceae Alstonia vieillardii Arg.
Apocynaceae Alyxia hurlimannii
Apocynaceae Alyxia sp.
Apocynaceae Artia balansae
Apocynaceae Parsonsia crebriflora
Apocynaceae Parsonsia flexuosa
Apocynaceae Parsonsia macrophylla
Apocynaceae Rauvolfia sp.
Aquifoliaceae Ilex sebertii
Araliaceae Apiopetalum velutinum
Araliaceae Arthrophyllum otopyrenum
Araliaceae Canacoschefflera neocaledonica
Araliaceae Meryta balansae
Araliaceae Meryta coriacea
Araliaceae Meryta coriacea
Araliaceae Meryta sp.Munz1696
Araliaceae Schefflera crassipes
Araliaceae Schefflera elongata
Araliaceae Schefflera emiliana
Araliaceae Schefflera gabriellae
Araliaceae Schefflera neocaledonica
Araliaceae Schefflera reginae
Araliaceae Schefflera sp.
Araliaceae Tieghemopanax bracteatus
Araliaceae Tieghemopanax dioicus
Araliaceae Tieghemopanax pancheri
Araliaceae Tieghemopanax sp.
Araliaceae Tieghemopanax veillonii
Araliaceae Tieghemopanax weinmanniae
Araucariaceae Agathis ovata
Araucariaceae Araucaria bernieri
Araucariaceae Araucaria biramulata
Araucariaceae Araucaria humboldtensis
Araucariaceae Araucaria laubenfelsii
Arecaceae Basselinia deplanchei
Arecaceae Basselinia gracilis
Arecaceae Basselinia sp.
Arecaceae Brongniartikentia vaginata
Arecaceae Burretiokentia vieillardii
Asclepiadaceae Leichardtia cf. billardieri
Asclepiadaceae Marsdenia ericoides
Atherospermataceae Nemuaron vieillardii
Balanopaceae Balanops balansae
Balanopaceae Balanops pancheri
Balanopaceae Balanops sparsifolia
Balanophoraceae Hachettea austrocaledonica
Bignoniaceae Deplanchea speciosa
Campynemataceae Campynemanthe parva
Campynemataceae Campynemanthe viridiflora
Cardiopteridaceae Citronella sarmentosa
Casuarinaceae Casuarina sp.
Casuarinaceae Gymnostoma deplancheanum
Casuarinaceae Gymnostoma sp.
Celastraceae Menepetalum cassinoides
Celastraceae Menepetalum cf. balansae
Celastraceae Menepetalum schlechteri
Celastraceae Menepetalum schlechteri subsp. schlechteri
Celastraceae Peripterygia marginata
Celastraceae Salaciopsis glomerata
Chloranthaceae Ascarina rubricaulis
Chloranthaceae Ascarina solmsiana
Clusiaceae Calophyllum caledonicum
Clusiaceae Garcinia hennecartii
Clusiaceae Montrouziera sp.
Clusiaceae Montrouziera sphaeroidea
Clusiaceae Montrouziera verticillata
Cunoniaceae
Cunoniaceae Acsmithia elliptica
Cunoniaceae Acsmithia meridionalis
Cunoniaceae Acsmithia pubescens
Cunoniaceae Codia discolor
Cunoniaceae Cunonia alticola
Cunoniaceae Cunonia atrorubens
Cunoniaceae Cunonia balansae
Cunoniaceae Cunonia bullata
Cunoniaceae Cunonia lenormandii
Cunoniaceae Cunonia montana
Cunoniaceae Cunonia pseudoverticillata
Cunoniaceae Cunonia pterophylla
Cunoniaceae Cunonia rotundifolia
Cunoniaceae Cunonia sp.
Cunoniaceae Cunonia sp. nov. (dickisonii)
Cunoniaceae Cunonia vieillardii
Cunoniaceae Pancheria alaternoides
Cunoniaceae Pancheria calophylla
Cunoniaceae Pancheria engleriana
Cunoniaceae Pancheria hirsuta
Cunoniaceae Pancheria humboldtiana
Cunoniaceae Pancheria multijuga
Cunoniaceae Pancheria robusta
Cunoniaceae Pancheria sebertii
Cunoniaceae Pancheria sp.
Cunoniaceae Weinmannia dichotoma
Cunoniaceae Weinmannia paitensis
Cupressaceae Callitris neocaledonica
Cupressaceae Libocedrus austro-caledonica
Cupressaceae Libocedrus chevalieri
Cyperaceae Baumea deplanchei
Cyperaceae Costularia neocaledonica
Cyperaceae Costularia cf. xyridioides
Cyperaceae Costularia fragilis
Cyperaceae Costularia montis-fontium
Cyperaceae Costularia nervosa
Cyperaceae Costularia setacea
Cyperaceae Costularia sp.
Cyperaceae Costularia sylvestris
Cyperaceae Costularia xyrioides
Cyperaceae Gahnia novocaledonensis
Cyperaceae Gahnia sinuosa
Cyperaceae Lepidosperma pauperum
Cyperaceae Lepidosperma perteres
Cyperaceae Lepidosperma sp.
Cyperaceae Schoenus caledonicus
Cyperaceae Schoenus juvenis
Cyperaceae Schoenus tendo var. triander
Cyperaceae Uncinia uncinata
Dilleniaceae Hibbertia altigena
Dilleniaceae Hibbertia baudouinii
Dilleniaceae Hibbertia emarginata
Dilleniaceae Hibbertia lucens
Dilleniaceae Hibbertia nana
Dilleniaceae Hibbertia pancheri
Dilleniaceae Hibbertia patula
Dilleniaceae Hibbertia sp.
Dilleniaceae Hibbertia trachyphylla
Dilleniaceae Hibbertia virotii
Droseraceae Drosera neocaledonica
Ebenaceae Diospyros macrocarpa
Elaeocarpaceae Dubouzetia campanulata
Elaeocarpaceae Dubouzetia elegans
Elaeocarpaceae Dubouzetia guillauminii
Elaeocarpaceae Elaeocarpus baudouinii
Elaeocarpaceae Elaeocarpus combouiensis
Elaeocarpaceae Elaeocarpus dognyensis
Elaeocarpaceae Elaeocarpus gummatus
Elaeocarpaceae Elaeocarpus pulchellus
Elaeocarpaceae Elaeocarpus pulchellus var. oreogena
Elaeocarpaceae Elaeocarpus seringii
Elaeocarpaceae Elaeocarpus sp.
Elaeocarpaceae Elaeocarpus tremulus
Elaeocarpaceae Elaeocarpus weibelianus
Elaeocarpaceae Elaeocarpus yateensis
Ericaceae Dracophyllum alticola
Ericaceae Dracophyllum balansae
Ericaceae Dracophyllum involucratum
Ericaceae Dracophyllum ramosum
Ericaceae Dracophyllum sp.
Ericaceae Styphelia balansae
Ericaceae Styphelia coryphila
Ericaceae Styphelia cymbulae
Ericaceae Styphelia cymbulae "petites fleurs"
Ericaceae Styphelia macrocarpa var. breviloba
Ericaceae Styphelia sp.
Ericaceae Styphelia veillonii
Escalloniaceae Argophyllum ellipticum
Escalloniaceae Argophyllum sp.
Escalloniaceae Platyspermation crassifolium
Escalloniaceae Quintinia resinosa
Escalloniaceae Quintinia major
Euphorbiaceae Austrobuxus brevipes
Euphorbiaceae Austrobuxus carunculatus
Euphorbiaceae Austrobuxus cuneatus
Euphorbiaceae Austrobuxus ellipticus
Euphorbiaceae Austrobuxus eugeniifolius
Euphorbiaceae Baloghia deplanchei
Euphorbiaceae Baloghia drimiflora
Euphorbiaceae Cocconerion minus
Euphorbiaceae Phyllanthus aeneus var. aeneus
Euphorbiaceae Phyllanthus castus
Euphorbiaceae Phyllanthus vulcanii ?
Flacourtiaceae Lasiochlamys koghiense
Flacourtiaceae Xylosma cf. nervosum
Flacourtiaceae Xylosma kaalense
Flacourtiaceae Xylosma sp.
Flindersiaceae Flindersia fournieri
Gesneriaceae Coronanthera aspera
Gesneriaceae Coronanthera pancheri

Gesneriaceae Coronanthera sp.
Gesneriaceae Coronanthera squamata
Goodeniaceae Scaevola balansae
Goodeniaceae Scaevola cylindrica
Goodeniaceae Scaevola erosa
Goodeniaceae Scaevola macropyrena
Goodeniaceae Scaevola sp.
Hippocrateceae
Hippocrateceae Dicarpellum pancheri
Hippocrateceae Dicarpellum sp.
Icacinaceae Apodytes clusiifolia
Labiatae Oxera crassifolia
Labiatae Oxera macrocalyx subsp. macrocalyx
Labiatae Oxera neriifolia subsp. neriifolia
Labiatae Oxera oreophila
Labiatae Oxera sp.
Lauraceae Adenodaphne uniflora
Lauraceae Beilschmiedia oreophila
Lauraceae Cryptocarya aristata
Lauraceae Cryptocarya cf. transervsa
Lauraceae Cryptocarya gracilis vel aff.
Lauraceae Cryptocarya guillauminii
Lauraceae Cryptocarya transversa
Lauraceae Endiandra aff. neocaledonica
Lauraceae Endiandra baillonii
Lauraceae Endiandra sebertii
Lauraceae Litsea miana
Lauraceae Litsea neocaledonica
Lauraceae Litsea triflora
Leguminosae Archidendropsis granulosa
Liliaceae Astelia neocaledonia
Liliaceae Dianella revoluta
Liliaceae Dianella sp.
Linaceae Hugonia sp.
Loganiaceae Geniostoma balanseanum
Loganiaceae Geniostoma sp.
Loganiaceae Logania imbricata
Loranthaceae Amyema scandens
Malvaceae Acropogon dzumacensis
Malvaceae Acropogon sp.
Meliaceae Dysoxylum roseum
Monimiaceae Hedycarya parvifolia
Monimiaceae Hedycarya sp.
Moraceae Ficus nitidifolia
Moraceae Ficus sp.
Moraceae Sparattosyce dioica
Myodocarpaceae Myodocarpus "hybride"
Myodocarpaceae Myodocarpus crassifolius
Myodocarpaceae Myodocarpus gracilis
Myodocarpaceae Myodocarpus involucratus
Myodocarpaceae Myodocarpus lanceolatus
Myodocarpaceae Myodocarpus sp.
Myricaceae Canacomyrica monticola
Myrsinaceae Rapanea "munzingeri"
Myrsinaceae Rapanea assymetrica
Myrsinaceae Rapanea diminuta
Myrsinaceae Rapanea macrocarpa
Myrsinaceae Rapanea macrophylla
Myrsinaceae Rapanea microcarpa var. pachyphylla
Myrsinaceae Rapanea modesta
Myrsinaceae Rapanea sp.
Myrsinaceae Tapeinosperma deflexum
Myrsinaceae Tapeinosperma sp.
Myrsinaceae Tapeinosperma vestitum
Myrtaceae Archirhodomyrtus turbinatus
Myrtaceae Archirhodomyrtus vieillardii
Myrtaceae Austromyrtus pancheri
Myrtaceae Austromyrtus sp.
Myrtaceae Austromyrtus vieillardii
Myrtaceae Babingtonia leratii
Myrtaceae Carpolepis laurifolia var. demonstrans
Myrtaceae Carpolepis laurifolia var. laurifolia
Myrtaceae Carpolepis tardiflora
Myrtaceae Cloezia floribunda
Myrtaceae Eugenia myrtopsidoides
Myrtaceae Eugenia sp.
Myrtaceae Eugenia stricta
Myrtaceae Gossia conspicua
Myrtaceae Melaleuca buceana
Myrtaceae Metrosideros brevistylis
Myrtaceae Metrosideros dolichandra
Myrtaceae Metrosideros engleriana
Myrtaceae Metrosideros humboltiana
Myrtaceae Metrosideros microphylla
Myrtaceae Metrosideros operculata
Myrtaceae Metrosideros operculata var. francii
Myrtaceae Metrosideros porphyrea
Myrtaceae Metrosideros punctata
Myrtaceae Metrosideros sp.
Myrtaceae Metrosideros tetrasticha
Myrtaceae Myrtastrum rufopunctatum
Myrtaceae Piliocalyx cf. "Mou"
Myrtaceae Pleurocalyptus pancheri
Myrtaceae Rhodamnia andromedoides
Myrtaceae Rhodomyrtus locellata
Myrtaceae Syzygium aff. coccineum
Myrtaceae Syzygium baladense
Myrtaceae Syzygium brongniartii
Myrtaceae Syzygium frutescens
Myrtaceae Syzygium macranthum
Myrtaceae Syzygium mouanum
Myrtaceae Syzygium quadrangulare
Myrtaceae Syzygium quadrangulare var. quadrangulare
Myrtaceae Syzygium rhopalanthum
Myrtaceae Syzygium tripetalum
Myrtaceae Tristaniopsis calobuxus
Myrtaceae Tristaniopsis guillainii
Myrtaceae Uromyrtus emarginatus
Myrtaceae Uromyrtus emos
Myrtaceae Uromyrtus sp.
Myrtaceae Uromyrtus sunshinensis
Myrtaceae Xanthostemon sulfureus
Nepenthaceae Nepenthes vieillardii
Nothofagaceae Nothofagus aequilateralis
Nothofagaceae Nothofagus baumanniae
Oleaceae Chionanthus brachystachys
Oleaceae Osmanthus austrocaledonicus var. crassifolius
Oleaceae Osmanthus monticola
Oleaceae Osmanthus sp.
Oncothecaceae Oncotheca humboltiana
Orchidaceae Acianthus atepalus
Orchidaceae Acianthus cf. grandiflorus
Orchidaceae Acianthus grandiflorus
Orchidaceae Acianthus heptadactylus
Orchidaceae Acianthus sp.
Orchidaceae Acianthus tenuilabris
Orchidaceae Bulbophyllum aphanopetalum
Orchidaceae Bulbophyllum betschii
Orchidaceae Bulbophyllum ligulatum
Orchidaceae Bulbophyllum longiflorum
Orchidaceae Bulbophyllum neocaledonicum
Orchidaceae Bulbophyllum pallidiflorum
Orchidaceae Bulbophyllum sp.
Orchidaceae Calanthe balansae
Orchidaceae Chaemanthus sp.
Orchidaceae Clematepistephium smilacifolium
Orchidaceae Coilochilus neocaledonicus
Orchidaceae Corybas neocaledonica
Orchidaceae Dendrobium aff. closterium
Orchidaceae Dendrobium chalandei
Orchidaceae Dendrobium crassicaule
Orchidaceae Dendrobium finetianum
Orchidaceae Dendrobium macranthum
Orchidaceae Dendrobium ngoyense
Orchidaceae Dendrobium odontochilum
Orchidaceae Dendrobium oppositifolium
Orchidaceae Dendrobium pectinatum
Orchidaceae Dendrobium sarcochilus var. sarcochilus
Orchidaceae Dendrobium sp.
Orchidaceae Dendrobium sylvanum
Orchidaceae Dendrobium viroti
Orchidaceae Earina deplanchei
Orchidaceae Eria caricouyensis
Orchidaceae Glossorhyncha macdonaldii
Orchidaceae Gonatostylis vieillardii
Orchidaceae Liparis cf. zosterops
Orchidaceae Liparis chalandei
Orchidaceae Liparis sp.
Orchidaceae Liparis sula
Orchidaceae Malaxis taurina
Orchidaceae Megastylis glandulosa
Orchidaceae Megastylis latilabris
Orchidaceae Megastylis latissimus
Orchidaceae Megastylis montana
Orchidaceae Megastylis rara
Orchidaceae Microtatorchis schlechteri
Orchidaceae Microtatorchis schlechteri var. productilis
Orchidaceae Orthoceras strictum
Orchidaceae Pachyplectron neocaledonicum
Orchidaceae Phreatia pachyphylla
Orchidaceae Phreatia sp.
Orchidaceae Phreatia? Oberonia?
Orchidaceae Pristiglottis montana
Orchidaceae Pterostylis bureaviana
Orchidaceae Taeniophyllum fasciola
Orchidaceae Taeniophyllum trachypus
Orchidaceae Thelymitra longifolia
Orchidaceae Thelymitra sp.
Pandanaceae Freycinetia sp.
Pandanaceae Pandanus altissimus
Pandanaceae Pandanus balansae
Pandanaceae Pandanus sp.
Phellinaceae Phelline sp.
Phellinaceae Phelline lucida
Phellinaceae Phelline macrophylla
Piperaceae Piper sp.
Pittosporaceae Pittosporum deplanchei
Pittosporaceae Pittosporum dzumacense
Pittosporaceae Pittosporum koghiense
Pittosporaceae Pittosporum oubatchense
Pittosporaceae Pittosporum pronyense
Pittosporaceae Pittosporum kaalense
Pittosporaceae Pittosporum xanthanthum
Poaceae Greslania circinata

Poaceae Greslania sp.
Podocarpaceae Acmopyle pancheri
Podocarpaceae Dacrydium lycopodioides
Podocarpaceae Falcatifolium taxoides
Podocarpaceae Parasitaxus usta
Podocarpaceae Podocarpus decumbens
Podocarpaceae Podocarpus gnidioides
Podocarpaceae Podocarpus lucienii
Podocarpaceae Podocarpus sylvestris
Podocarpaceae Prumnopitys ferruginoides
Podocarpaceae Retrophyllum comptonii
Proteaceae Beauprea congesta
Proteaceae Beauprea montana
Proteaceae Beauprea montis-fontium
Proteaceae Beauprea pancheri
Proteaceae Beauprea sp.
Proteaceae Beaupreopsis paniculata
Proteaceae Garnieria spathulaefolia
Proteaceae Grevillea exul
Proteaceae Grevillea exul fa. rubuginosa
Proteaceae Grevillea sp.
Proteaceae Stenocarpus milnei
Proteaceae Stenocarpus trinervis
Proteaceae Stenocarpus umbelliferus
Pteridophyta
Pteridophyta Asplenium sp.
Pteridophyta Asplenium subflexuosum
Pteridophyta Belvisia mucronata
Pteridophyta Blechnum contiguum
Pteridophyta Blechnum sp.
Pteridophyta Crepidomanes pallidum
Pteridophyta Crepidomanes saxifragoides
Pteridophyta Ctenopteris blechnoides
Pteridophyta Ctenopteris contigua
Pteridophyta Ctenopteris lasiostipes
Pteridophyta Ctenopteris sp.
Pteridophyta Cyathea albifrons
Pteridophyta Cyathea cf. vieillardii
Pteridophyta Cyathea sp.
Pteridophyta Elaphoglossum sp.
Pteridophyta Grammitis Munz. 1681
Pteridophyta Grammitis neocaledonica
Pteridophyta Grammitis pseudoaustralis
Pteridophyta Grammitis sp.
Pteridophyta Humata sp.
Pteridophyta Hymenophyllum dimidiatum
Pteridophyta Hymenophyllum sp.
Pteridophyta Hymenophyllum streptophyllum
Pteridophyta Leptopteris wilkesiana
Pteridophyta Lindsaea rufa
Pteridophyta Lindsaea sp.
Pteridophyta Lycopodium laterale
Pteridophyta Lycopodium nutans
Pteridophyta Lycopodium sp.
Pteridophyta Schizaea sp.
Pteridophyta Scleroglossum sp.
Pteridophyta Scleroglossum wooroonooran
Pteridophyta Selaginella sp.
Pteridophyta Selliguea lanceolata
Pteridophyta Stromatopteris moniliformis
Pteridophyta Tmesipteris lanceolata
Pteridophyta Tmesipteris sp.
Pteridophyta Tmesipteris vieillardii
Pteridophyta Trichomanes dentatum
Pteridophyta Trichomanes laetum
Pteridophyta Trichomanes sp.
Pteridophyta Vittaria elongata
Rhamnaceae Alphitonia eriocarpa
Rhamnaceae Alphitonia neocaledonica
Rubiaceae Atractocarpus sp.
Rubiaceae Bikkia pachyphylla
Rubiaceae Caelospermum crassifolium
Rubiaceae Caelospermum sp.
Rubiaceae Guettarda heterosepala
Rubiaceae Guettarda sp.
Rubiaceae Guettarda sp. D. ined.
Rubiaceae Ixora francii
Rubiaceae Morinda sp.
Rubiaceae Morinda candollei
Rubiaceae Morinda collina
Rubiaceae Morinda glaucescens
Rubiaceae Morinda kanalensis
Rubiaceae Morinda sp.
Rubiaceae Normandia neocaledonica
Rubiaceae Psychotria cf. rupicola sens. latu
Rubiaceae Psychotria douarrei
Rubiaceae Psychotria gpe. collina
Rubiaceae Psychotria oleoides
Rubiaceae Psychotria rupicola
Rubiaceae Psychotria sp.
Rubiaceae Randia pseudoterminalis
Rubiaceae Tarenna sp.
Rubiaceae Tarenna sp. nov.
Rutaceae Boronella sp.
Rutaceae Comptonella baudouinii
Rutaceae Comptonella drupacea
Rutaceae Comptonella lactea
Rutaceae Comptonella lactea var. lactea
Rutaceae Comptonella oreophila var. oreophila
Rutaceae Comptonella sessilifoliola
Rutaceae Comptonella sp.
Rutaceae Melicope glaberrima
Rutaceae Melicope vieillardii
Rutaceae Myrtopsis macrocarpa
Rutaceae Myrtopsis sp.
Rutaceae Neoschmidia pallida
Rutaceae Sarcomelicope argyrophylla
Rutaceae Sarcomelicope sp.
Rutaceae Zanthoxylum sp.
Santalaceae Amphorogyne celastroides
Santalaceae Amphorogyne sp.
Santalaceae Amphorogyne spicata
Santalaceae Daenikera corallina
Santalaceae Exocarpos clavatus
Santalaceae Exocarpos neocaledonicus
Santalaceae Exocarpos phyllanthoides
Santalaceae Exocarpos sp.
Sapindaceae Cupaniopsis myrmoctona
Sapindaceae Gongrodiscus parvifolius
Sapindaceae Guioa glauca var. vulgaris
Sapotaceae Beccariella lasiantha
Sapotaceae Beccariella longipetiolata
Sapotaceae Beccariella sp.
Sapotaceae Genus ? sp. Munz1717
Sapotaceae Ochrothallus sessilifolius
Sapotaceae Pichonia calomeris
Sapotaceae Planchonella crassinervia
Sapotaceae Planchonella laetevirens
Sapotaceae Planchonella reticulata
Sapotaceae Planchonella wakere
Sapotaceae Pycnandra carinocostata
Sapotaceae Pycnandra fastuosa
Sapotaceae Pycnandra sp.
Sapotaceae Sebertia aff. acuminata
Saxifragaceae Polyosma pancheri
Saxifragaceae Quintinia major
Saxifragaceae Quintinia oreophila
Saxifragaceae Quintinia resinosa
Saxifragaceae Quintinia sp.
Simaroubaceae Soulamea pancheri
Simaroubaceae Soulamea sp.
Simaroubaceae Soulamea trifoliata
Smilacaceae Smilax sp.
Solanaceae Duboisia myoporoides
Sphenostemonaceae Sphenostemon oppositifolius
Sphenostemonaceae Sphenostemon pachycladus
Sphenostemonaceae Sphenostemon sp.
Stemonuraceae Gastrolepis austrocaledonica
Stemonuraceae Gastrolepis alticola
Strasburgeriaceae Strasburgeria robusta
Symplocaceae Symplocos flavescens var. flavescens
Symplocaceae Symplocos montana var. munda
Symplocaceae Symplocos sp.
Taxaceae Austrotaxus spicata
Thymeleaceae Lethedon cernua
Thymeleaceae Lethedon le-ratii
Thymeleaceae Lethedon sp.
Thymeleaceae Solmsia calophylla
Thymeleaceae Wikstroemia indica
Ulmaceae Celtis hypoleuca
Violaceae Agatea longipedicellata
Winteraceae Zygogynum baillonii
Winteraceae Zygogynum crassifolium
Winteraceae Zygogynum pancheri
Winteraceae Zygogynum pomiferum balansae
Winteraceae Zygogynum sp.
Winteraceae Zygogynum tieghemii
Winteraceae Zygogynum vieillardii
Xeronemataceae Xeronema moorei
Xyridaceae Xyris neocaledonica
Xyridaceae Xyris sp.