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Notes on some pannariaceous lichens from New Caledonia

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Abstract – Two new species in the lichen family Pannariaceae have been discovered in collections from New Caledonia: *Kroswia polydactyla* and *Pannaria flabellata*. They are described. *P. flabellata* clearly belongs in a small group of species confined to the primeval tropical forests of SE Asia and East Africa. These species appear to be part of an old palaeotropic element to which also *Pannaria reflectens* (Nyl.) P.M.Jørg, *Pannaria ramosii* Vain. as well as *Parmeliella polyphyllina* P.M.Jørg. may belong – the first of which has been rediscovered in the island from where it was described, the latter two are new records. The Pacific *Pannaria exasperata* H.Magn. is also recorded as new.

***Kroswia* / *Parmeliella* / *Pannaria* / Pannariaceae / regional phytogeography**

Résumé – *Kroswia polydactyla* et *Pannaria flabellata* ont récemment été découverts dans les forêts de la Nouvelle Calédonie et sont décrits comme espéces nouvelles. *P. flabellata* fait partie d'un groupe d'espèces associées aux forêts anciennes tropicales de la Sud-Est de l'Asie et d'Afrique de l'Est. Ces espèces semblent appartenir au même ancien élément palaeotropical que *Pannaria reflectens* (Nyl.) P.M. Jørg., *Pannaria ramosii* Vain. et *Parmeliella polyphyllina* P.M.Jørg. *P. reflectens* est redécouvert dans son île d'origine alors qu'il s'agit des premières récoltes pour les deux autres, comme d'ailleurs pour *Pannaria exasperata* H. Magn., un élément de la région Pacifique.

***Kroswia* / *Parmeliella* / *Pannaria* / Pannariaceae / phytogéographie régionale**

INTRODUCTION

New Caledonia is famous for its exciting vascular plant flora dominated by endemic taxa (76 % according to Morat 1994), even on family level (see e.g. Takhtajan 1986). The mycota, however, are poorly known (Duhem & Buyck 2011, Eyssartier et al. 2010, 2009), the latest survey for lichens being that of Müller Argoviensis (1893), mainly based on collections made by B. Balansa (1825-1892), and without keys. The earliest is that of Nylander (1859) which he based on collections found in the Paris' herbarium, with a later addition (1867) on specimens mainly collected by E. Viellard (1819-1896). This is typical – the records are made on casual collections made by general collectors, not specialists. This situation has remained so until present, though some lichenologists have visited the island (e.g. the Swedish Gunnar Degelius in 1970). Some highly

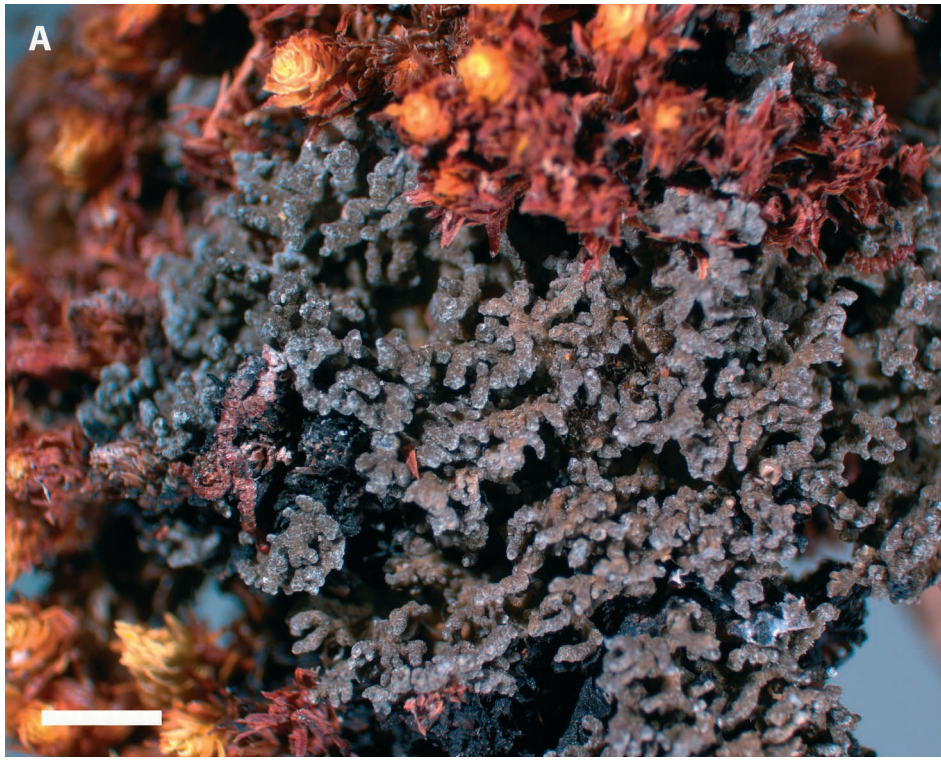

Fig. 1A. *Kroswia polydactyla*, holotype (BG).

interesting lichen species have nevertheless been discovered in the last century, see e.g. Bouly de Lesdain (1910) based on material collected by A. J. Le Rat (1872-1910), Räsänen (1944,1946) based on collections mainly made by the Australian botanist F. R. M. Wilson (1832-1903) (as well as some by Vieillard left by Nylander), and A. L. Smith (1922) based on collections made by R. H. Compton (1886-1979). In recent ecological work on the forests of the island, the second author also collected lichens which the first author has examined. Among these, there are two interesting , possibly endemic, undescribed species in the genera *Kroswia* and *Pannaria* which will be described below. Several other interesting new records are also mentioned.

MATERIAL AND METHODS

The material is that cited from Gjerde's collection which is kept at BG. Comparison with naterial on loan from O and UPS were done in light microscope. TLC was performed according to standard methods. Gjerde's collections are all kept in BG.

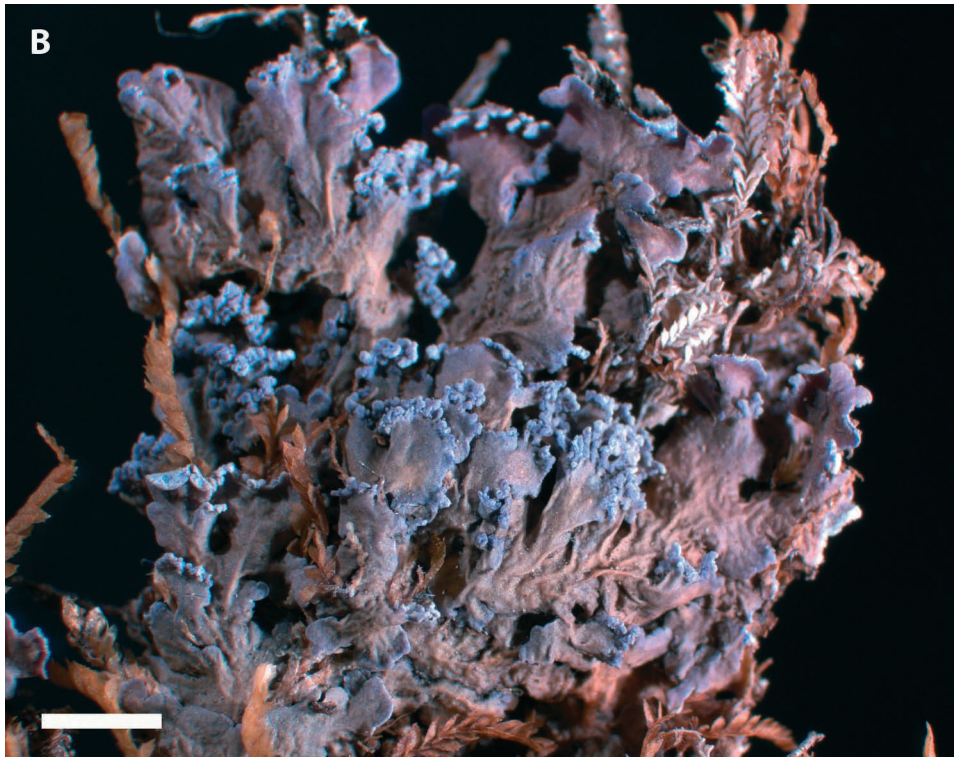

Fig. 1B. *Pannaria flabellata*, part of the holotype (BG). Photo: J. Berge.

TAXONOMY

***Kroswia polydactyla* P.M.Jørg. sp. nov.** (Fig. 1A)
Mycobank MB564664

Kroswiae crystalliferae similis sed lobis elongatis digitiformis et sine gymnidiis et terpenoideis.

Holotypus: New Caledonia, Mt. Bouo, growing on a broad-leaved, deciduous tree in an east-facing rainforest at 780 m, 12 August 2009, I. Gjerde 36 (BG, holotype)

Thallus cushion-forming to 2 cm diam., olivaceous blue, homoiomerous, gelatinous, to 400 µm thick when wet, with patchy pseudocortex covered in a necral layer, which is reflected in the mottled upper surface. *Photobiont* small-celled, 4-5 µm diam., *Nostoc* in chains with much swelling sheeths. The squamules are intricately incised with elongating lobes which are terete and finger-like. The upper surface of the squamules are olivaceous and distinctly mottled and / or wrinkled. The lower surface has blackish blue rhizohyphae. *Apothecia* and *conidiomata* are unknown.

Chemistry: All reactions negative, no substances detected by TLC.

Notes: This rather insignificant species has all the thallus characters of the genus *Kroswia*, but differs clearly from the two known species in lacking gymnidia (Jørgensen 2002). It has instead elongating terete lobes which seem to function as isidia. Like the other species, this one does not have apothecia, and appears to be dependant on vegetative reproduction. It is unlikely to be confused with other species in the family. *K. polydactyla* is only known from this collection, and may be endemic, though only further research can prove this.

Habitat & distribution: This new species was found growing on a broad-leaved, deciduous tree in an east-facing rainforest at 780 m transforming into a maquis at a mountain-ridge towards Mount Buou. The trees had a stunted appearance and a canopy height not exceeding 8 m. This new species grew closely associated with *Pannaria lurida* (Mont.) Nyl. *Pannaria exasperata* H. Magn. was also collected there as new to the island on a nearby tree.

***Pannaria flabellata* P.M.Jørg. sp. nov.** (Fig. 1B)
Mycobank MB564663

Pannariae santessonii similis sed thallo tenue, flabelliforme soraliis labratis, grosse granulosis.

Holotypus: New Caledonia, Mont Moné, in a south-facing rainforest at ca.900 m alt. growing on the stem of a treefern (Cyathaceae). 12 August 2009, I. Gjerde 24 (BG, holotype).

Thallus brownish blue, small-squamulose with radiating marginal lobes in a coalescent fan-formed pattern, the marginal lobes being enlarged to 2 mm width, apically with labriform, coarse-grained bluish soralia, resting on a thin blackish blue prothallus. In section 40-80 µm wide with an upper cortex of a single layer of cells, 15-25 µm thick, underneath packed with more or less perpendicular chains of a "violet" *Nostoc*, individual cells 3-5 µm. No lower cortex. *Apothecia* and *conidiomata* unknown.

Chemistry: PD+ orange, contaning pannarin and terpenoids (TLC).

Notes: This is a rather unusual taxon in the genus which normally has a multilayered cortex and larger-celled *Nostoc* in aggregations. It belongs in a small, little-known group with a thallus rather reminescent of the genus *Kroswia* (Jørgensen 2001), but with a true cortex and containing pannarin. The closest relative appears to be *Pannaria santessonii* Swinscow & Krog from East Africa (Swinscow & Krog 1986) which is isidiate and does not have flabellate marginal lobes. A third member is *Pannaria ramosii* Vain., described from the Philippines, but also known from many SE Asian islands (Jørgensen & Sipman 2006), and also present in Gjerde's collections from New Caledonia (from the lowland foreste at Lac de Yaté). It is thicker than *P. flabellata* with secondary lobules at the margins, lacking soralia, and does not have flabellate marginal lobes. The fertile counterpart of these is the larger *P. tjibodensis* Zahlbr., describred from Java, but with a wider distribution in Australasia (Jørgensen 2001). *P. flabellata* is, however, possibly closer related to the little known *P. tenuis* P.M.Jørg. & Sipman from Borneo which is as thin as *P. flabellata*, but more squamulose, and without soralia (Jørgensen & Sipman 2006).

Habitat and distribution: *Pannaria flabellata* was found in a south-facing rainforest at about an altitude of c.900 m growing on the stem of a treefern (in the Cyathaceae). The forest was indigenous with a canopy of approximately 15 m, rich in tree species, and with a small-scale gap dynamic. There were few signs of recent disturbance of the site, although secondary vegetation after forest fire was found in close vicinity. The new species grew with some *Parmeliella* species: *P. mariana*

(Fr.) P.M.Jørg. & D.J. Galloway and *P. philippina* (Vain.) P.M.Jørg., also an incomplete thallus of *Coccocarpia* cf. *aeruginosa* Müll. Arg. was collected from this site. As yet it is only known from this locality, and although it is likely to turn up in similar forests in the Australasian region, it may turn out to be another endemic of New Caledonia.

CONCLUSION

The above new taxa are important additions to the lichen flora of New Caledonia, particularly because the new species *Pannaria flabellata* shows such close relationship to *Pannaria santessonii* from East Africa, a rare element in the New Caledonian flora (see Thorne 1965). However, there is an Asian element among the East African lichens (Swinscow & Krog 1988), well exemplified by the genus *Kroswia* (Jørgensen 2002), the type species of which, *K. crystallifera* P.M.Jørg., was described from India and has a wide, but scattered distribution in Australasia, as well as being present in East Africa and the Mascarenes in the Indian ocean, a typical palaeotropical taxon (fig. 2), so it is not surprising that another species of this genus has turned up in New Caledonia.

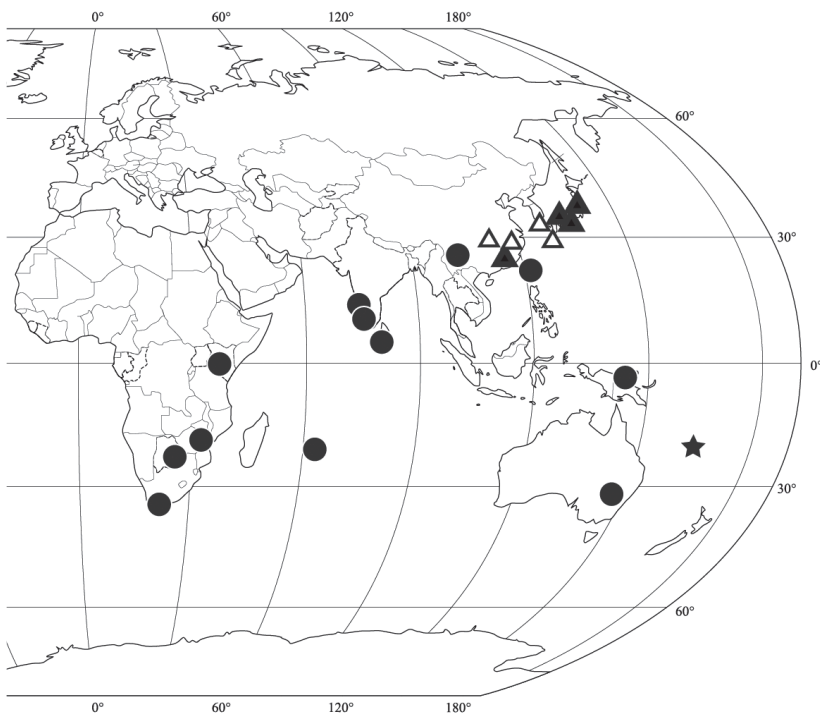

Fig. 2. World distribution of the genus *Kroswia.* Dots: *K. crystallifera.* Triangles: *K. gemmascens.* Asterisc: *K. polydactyla.*

Fig. 3 *Pannaria reflectens* (above) and *Pannaria lurida* growing together on a tree at St. Forestière, New Caledonia in 2009. Photo: Ivar Gjerde.

Kroswia polydactyla and *Pannaria flabellata* may prove to be endemic, just as some other Pannariaceae: *Pannaria subcrustacea* (Räs.) P.M. Jørg. (Jørgensen 2001) and *Ramalodium neocaledonicum* (Räs.) Henssen (Henssen 1965). The Pannariaceae otherwise show a stronger link to the forests of Queensland in Australia, approximately 1250 km to the west, most apparent in the *Pannaria lurida* complex, where particularly the rare and long misunderstood

Pannaria reflectens (Nyl.) P.M.Jørg. is a significant marker (Jørgensen 2010). Since this species was thought to be extinct in New Caledonia, it is important that Gjerde rediscovered it in 2009 (fig.3). He has also collected the poorly known *Pannaria aenea* Müll. Arg. (in the lowland forests of Lac de Yaté at 180 m alt.) a species New Caledonia shears exclusively with Queensland in Australia (Jørgensen & Galloway 1992), Another species originally described from Queensland, *Parmeliella polyphyllina* P.M.Jørg., recorded from New Guinea and Java (Jørgensen 2001), was also found for the first time on the island (in Pic Malaoui at 620 m alt.), proving that it has a wider distribution in southeast Australasia.

Pannaria exasperata H. Magn., a species with Pacific connections described from Hawaii (Magusson & Zahlbruckner 1945) but also present in several Pacific islands, was also found in Gjerde's material (both from Mt. Buou and from Mt. Koghi).

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