Cryptogamie, Mycologie, 2013, 34 (1): 15-27

Phylloporia nouraguensis, an undescribed species on Myrtaceae from French Guiana

Cony DECOCK[a], Mario AMALFI[a], Gerardo ROBLEDO[b]*
& Gabriel CASTILLO[c]

[a]*Mycothèque de l'Université catholique de Louvain (MUCL, BCCM^{TM}),*
Earth and Life Institute – Microbiology (ELIM), Université catholique de Louvain,
Croix du Sud 2 bte L7.05.06, B-1348 Louvain-la-Neuve, Belgium.

[b]*Instituto Multidisciplinario de Biología Vegetal, Universidad Nacional*
de Córdoba, C.C. 495, 5000 Córdoba, Argentina.

[c]*Département de Biologie, Ecologie et Evolution & Service Collectif*
des Enseignements de Biologie, Université de Liège, 4020 Liège, Belgique.

Abstract – *Phylloporia nouraguensis* sp. nov. is described on the basis of several collections made in French Guiana. The species was found growing on living (or occasionally dead), small apical twigs of a species of *Myrcia* (Myrtaceae), in the so-called "low forest" covering the upper slopes of the Nouragues inselberg.

Hymenochaetales / LSU / Mesoamerica / Phylogeny

INTRODUCTION

During a survey of *Phylloporia* in the Neotropical areas (Valenzuela *et al.* 2011), a species morphologically and ecologically well characterized was collected repeatedly in the so-called "low forest" (Larpin 2001) covering the upper slopes of a granitic inselberg in French Guiana. The species was found producing tiny basidiomata on the apices of twigs of a local bushy Myrtaceae (*Myrcia* sp., perhaps *M. guianensis*).

It could not be satisfactorily accommodated in any of the known species, however (Cui *et al.* 2010, Valenzuela *et al.* 2011, Zhou and Dai 2012). Phylogenetic inferences, based on partial nuc-LSU DNA sequence, also resolved this species as a monophyletic, terminal clade, distinct from all the other named or unnamed species clades known to date (Valenzuela *et al.* 2011, Zhou & Dai 2012).

On this basis, along with considering also its ecological specificities, we concluded that it represents an undescribed species. It described and illustrated below as *Phylloporia nouraguensis*.

---

[*] Corresponding author

doi/ 10.782/crym.v34.iss1.2013.15

MATERIALS AND METHODS

Collection localities.— Material from French Guiana was collected in the so-called "low forest" (Larpin 2001) covering the upper slopes of the Nouragues Inselberg (approx. 04°05′ N - 52°40.6′ W, elev. approx. 150 m), a granitic outgrowth culminating at about 400 m. The local plant community, botanically dominated by Myrtaceae, in terms of relative diversity and abundance, is described by Larpin (2001).

Material. — Herbarium specimens of the new taxon are preserved at MUCL with a duplicate deposited at NY (herbarium acronyms are according to Thiers, continuously updated).

Morphology and anatomy. — Morphological examinations were conducted using protocols outlined by Valenzuela *et al.* (2011). Colors are described according to Kornerup & Wanscher (1981). Section were carefully dissected under a stereomicroscope in warm (40°C) NaOH 3% solution, and later examined in NaOH 3% solution at room temperature. Sections were also examined in Melzer's reagent and lactic acid cotton blue. All the microscopic measurements were done in Melzer's reagent. In presenting the size range of several microscopic elements, 5% of the measurements at each end of the range are given in parentheses, when relevant. In the text, the following abbreviations are used: ave = arithmetic mean, Q = the ratio of length/width of basidiospores, and ave_R = arithmetic mean of the ratio Q.

Sequencing. — DNA extraction, amplification, and sequencing of the nuclear ribosomal 5′ end of the LSU are as described in Decock *et al.* (2007). The primers LROR and LR5 were used for PCR amplifications. Successful PCR reactions resulted in a single band observed on an 0.8% agarose gel, corresponding to approximately 900 bp. Sequencing reactions were performed using CEQ DTCS Quick Start Kit® (Beckman Coulter), according to the manufacturer's recommendations, with the primers LROR, LR3, LR3R, LR5 (http://biology.duke.edu/fungi/mycolab/primers.htm).

Phylogenetic analysis. — Sixty-five specimens and cultures representing 41 species or potential species clades were included in the phylogenetic analysis. Materials and sequences used in this study are listed in Table I.

Nucleotide sequences were automatically aligned with Clustal X 2.0.11 (Thompson *et al.* 1997). Potentially ambiguously aligned segments were detected using Gblocks v0.91b (Castresana 2000; http://molevol.cmima.csic.es/castresana/Gblocks.html) with the settings "allow smaller final blocks" and "allow gaps within blocks". The alignment was then manually adjusted as necessary with the text editor in PAUP* 4.0b10. *Inonotus micantissimus*, MUCL52413, a species of the *Inonotus* clade *sensu* Wagner and Fischer, was designated as outgroup (Larsson *et al.* 2006).

Phylogenetic analyses were performed using maximum parsimony (MP) as implemented in PAUP* 4.0b10 (Swofford 2003), Bayesian inference (BI) as implemented in MrBayes v3.1.2 (Huelsenbeck and Ronquist 2001), and Maximum likelihood (ML) searches were conducted with RAxML 7.0.4 (Stamatakis 2006). The general time reversible model (GTR), using proportion of invariant sites and distribution of rates at variable sites modeled on a discrete gamma distribution with four rate classes, was estimated as the best-fit likelihood model of evolution for Bayesian inference and Maximum likelihood, using the AIC (Akaike Information Criterion) as implemented in Modeltest 3.7 (Posada & Crandall 1998).

Table I. List of species, collections, and accession numbers of sequences used in the phylogenetic analyses

Genera / Species name	*Origin*	*Collection reference*	*Substrate*	*Accession #*
Aurificaria				
A. luteoumbrina (Romell) D.A. Reid	Puerto Rico	LF 39116	*Pinus sylvestris*	AY059033
Coltricia				
C. cf. stuckertiana (Speg.) Rajchenb. & J.E. Wright	Argentina	MUCL 47643	roots, unidentified angiosperm	HM635663
	Argentina	CORD, Robledo 219	roots, unidentified angiosperm	KC136219
	Argentina	CORD, Robledo 218	roots, unidentified angiosperm	KC136220
	Argentina	CORD, Robledo 281	roots, unidentified angiosperm	KC136221
Fomitiporella				
F. caryophylli (Racib.) T. Wagner & M. Fisch.	India	BBS 448.76	*Shorea robusta*	AY059021
F. cavicola (Kotl. & Pouzar) T. Wagner & M. Fisch.	UK	N 153	*Fagus sylvatica*	AY059052
Fulvifomes				
F. kawakamii (M.J. Larsen *et al.*) T. Wagner & M. Fisch.	USA	CBS 428.86	*Casuarina equisetifolia*	AY059028
F. robiniae (Murrill) Murrill	USA	CBS 211.36	*Robinia pseudoacacia*	AY411825
Inocutis				
I. jamaicensis (Murrill) A.M. Gottlieb *et al.*	USA	Gilb. 14740	*Quercus virginia*	AY059048
I. rheades (Pers.) Fiasson & Niemelä	Germany	TW 385	*Populus tremula*	AF311019
Inonotus				
I. micantissimus (Rick) Rajchenb.	Mexico	MUCL 52413	Unidentified angiosperm	HM635663
Phylloporia				
P. bibulosa (Lloyd) Ryvarden	Pakistan	Ahmad 27088	*Peristropha bicalyculata*	AF411824
P. chrysita (Berk.) Ryvarden	Puerto Rico	N.W. Legon	Unidentified angiosperm	AF411821
	Mexico	MUCL 52763	Unidentified angiosperm	HM635665
	Mexico	MUCL 52764	Unidentified angiosperm	HM635666
	Mexico	MUCL 52862	*Neopringle sp.*	HM635667
P. crataegi L.W. Zhou & Y.C. Dai	China	IFP, Dai 11014 (T)	*Crataegus sp.*	JF712922
	China	IFP, Dai 11016 (PT)	*Crataegus sp.*	JF712923
P. ephedrae (Woron.) Parmasto	Turkmenistan	TAA 72-2	*Ephedra sp.*	AF411826
P. fontanesiae L.W. Zhou & Y.C. Dai	China	IFP, Li 199 (T)	*Fontanesia sp.*	JF712925
	China	IFP, Li 194 (PT)	*Fontanesia sp.*	JF712924
P. cf. frutica (Berk. & M.A. Curtis) Ryvarden	Mexico	MUCL 52762	Unidentified angiosperm	HM635668
	Mexico	ENCB TR&RV858	Unidentified angiosperm	HM635669
	Mexico	MUCL 52863	Unidentified angiosperm	HM635670

T, IT, PT = type, isotype, paratype.

Table I. List of species, collections, and accession numbers of sequences used in the phylogenetic analyses *(continued)*

P. gutta L.W. Zhou & Y.C. Dai	China	IFP, Dai 4103 (PT)	Unidentified angiosperm	JF712926
	China	IFP, Dai 4197 (T)	*Abelia sp.*	JF712927
P. hainaniana Y.C. Dai & B.K. Cui	China	IFP, Dai 9640 (T)	Unidentified angiosperm	JF712928
P. minutispora Ipulet & Ryvarden	RDC	MUCL 52865	Terricolous	HM635671
	Uganda	O, Ipulet 706 (IT)	Terricolous	JF712929
P. nandinae L.W. Zhou & Y.C. Dai	China	IFP, Dai 10625 (PT)	*Nandina domestica*	JF712931
	China	IFP, Dai 10588 (T)	*Nandina domestica*	JF712930
P. nouraguensis Decock & Castillo	French Guiana	MUCL/FG-11-400 (T)	Living twig of *Myrcia* sp.	KC136222
	French Guiana	MUCL/FG-11-404 (PT)	Living twig of *Myrcia* sp.	KC136223
	French Guiana	MUCL/FG-11-409 (PT)	Living twig of *Myrcia* sp.	KC136224
P. oblongospora Y.C. Dai & H.S. Yuan	China	IFP, Zhou 179 (T)	Unidentified angiosperm	JF712932
P. oreophila L.W. Zhou & Y.C. Dai	China	IFP, Cui 2219 (PT)	Unidentified angiosperm	JF712933
	China	IFP, Cui 9503 (T)	Unidentified angiosperm	JF712934
P. pectinata (Klotzsch) Ryvarden	Australia	R. Coveny 113	*Rhodania rubescens*	AF411823
P. resupinata Douanla-Meli & Ryvarden	Cameroon	O, DMC 476 (IT)	*Entandrophragma sp.*	JF712935
P. ribis (Schumach.: Fr.) Ryvarden	Germany	MF 82-828	*Ribes uva-crispa*	AF311040
P. rzedowskii R. Valenz. & Decock	Mexico	MUCL 52868 (T)	*Hybanthus mexicanus*	HM635672
	Mexico	MUCL 52859 (PT)	*Hybanthus mexicanus*	HM635673
	Mexico	MUCL 52860 (PT)	*Hybanthus mexicanus*	HM635674
	Mexico	MUCL 52861 (PT)	*Hybanthus mexicanus*	HM635675
Phylloporia sp.	Argentina	CORD, Robledo 1220	Unidentified angiosperm	KC136225
	Argentina	CORD, Robledo 351	roots, unidentified angiosperm	KC136226
	Ecuador	MUCL 52864	roots, unidentified angiosperm	HM635676
	French Guiana	MUCL/FG-11-506	roots, unidentified angiosperm	KC136227
	French Guiana	MUCL/FG-11-462	roots, unidentified angiosperm	KC136228
	Gabon	MUCL/GA-06-166	roots, unidentified angiosperm	KC136229
	Gabon	MUCL/Yom-47	roots, unidentified angiosperm	KC136230
	Mexico	MUCL 53433	Unidentified angiosperm	KC136231
P. spathulata (Hook.) Ryvarden	Mexico	Chay 456	Roots, *Apocynaceae*	AF411822
P. ulloai R. Valenz. *et al.*	Mexico	MUCL 52866 (PT)	Unidentified liana	HM635677
	Mexico	MUCL 52867 (T)	Unidentified liana	HM635678
	Mexico	MUCL 52870 (PT)	Unidentified liana	HM635679
P. weberiana (Bres. & Henn. ex Sacc.) Ryvarden	China	IFP, Dai 9242	Unidentified angiosperm	JF712936

T, IT, PT = type, isotype, paratype.

Bayesian analyses were implemented with two independent runs, each with four simultaneous independent chains for three million generations, starting from random trees, and keeping one tree every 1000th generation. All trees sampled after convergence [average standard deviation of split frequencies < 0.01, confirmed using Tracer v1.4 (Rambaut & Drummond 2007)] were used to reconstruct a 50% majority-rule consensus tree (BC) and to estimate posterior probabilities. The posterior probability (BPP) of each node was estimated based on the frequency at which the node was resolved among the sampled trees with the consensus option of 50% majority-rule (Simmons *et al.* 2004). Clades with BPP above 0.95 were considered strongly supported by the data.

Maximum likelihood (ML) searches conducted with RAxML involved 1000 replicates under the GTRGAMMAI model, with all model parameters estimated by the program. The tree with the best likelihood value served as the starting tree for the Bayesian analyses. In addition 1000 rapid bootstrap (ML BS) replicates were run with the same GTRGAMMAI model. Clades with maximum likelihood bootstrap values of 85% or greater were considered to be significantly supported.

For MP analyses, gaps were treated as missing. The most parsimonious trees (MPT) for each data set were identified using heuristic searches with 1000 random addition sequences, further evaluated by bootstrap analysis, retaining clades compatible with the 50% majority-rule in the bootstrap consensus tree. Analysis conditions were tree bisection addition branch swapping, starting tree obtained via stepwise addition, steepest descent not in effect, MulTrees effective. Clades with bootstrap support value (BS) above 85% were considered strongly supported by the data

RESULTS

LSU analysis. — Within *Phylloporia*, the length of the LSU fragment ranged from 866 to 884 bps. Thirty four characters judged too ambiguous to be aligned were excluded from further analysis. The final DNA sequence alignment of the 65 sequences resulted in 904 positions of which 335 were variable and 256 parsimony informative. Using the Akaike information criterion of MrModeltest 2.3 (Posada and Crandall 1998), the best-fit model for the nucLSU data set was GTR+I+G with unequal base frequencies (A = 0.2337, C = 0.1974, G = 0.3281, T = 0.2409), a gamma distribution shape parameter of 0.4500, and a proportion of invariable sites of 0.3690.

The MP analysis produced 4 most parsimonious trees (1195 steps, consistency index (CI) 0.362, retention index (RI) 0.629 and rescaled consistency index (RC) 0.228). The two Bayesian runs converged to stable likelihood values after 1.795.000 generations and 8205 stationary trees from each analysis were used to compute a 50% majority rule consensus tree in PAUP* and to calculate posterior probabilities. In the ML searches with RAxML, the nuc-LSU alignment had 364 distinct patterns with a proportion of gaps and undetermined characters of 5.11%.

The strict consensus of the 4 most parsimonious trees were mostly identical to the BC tree and to the optimal ML tree (tree score of -lnL = – 6772.914435). The optimal ML tree is represented in Fig. 1.

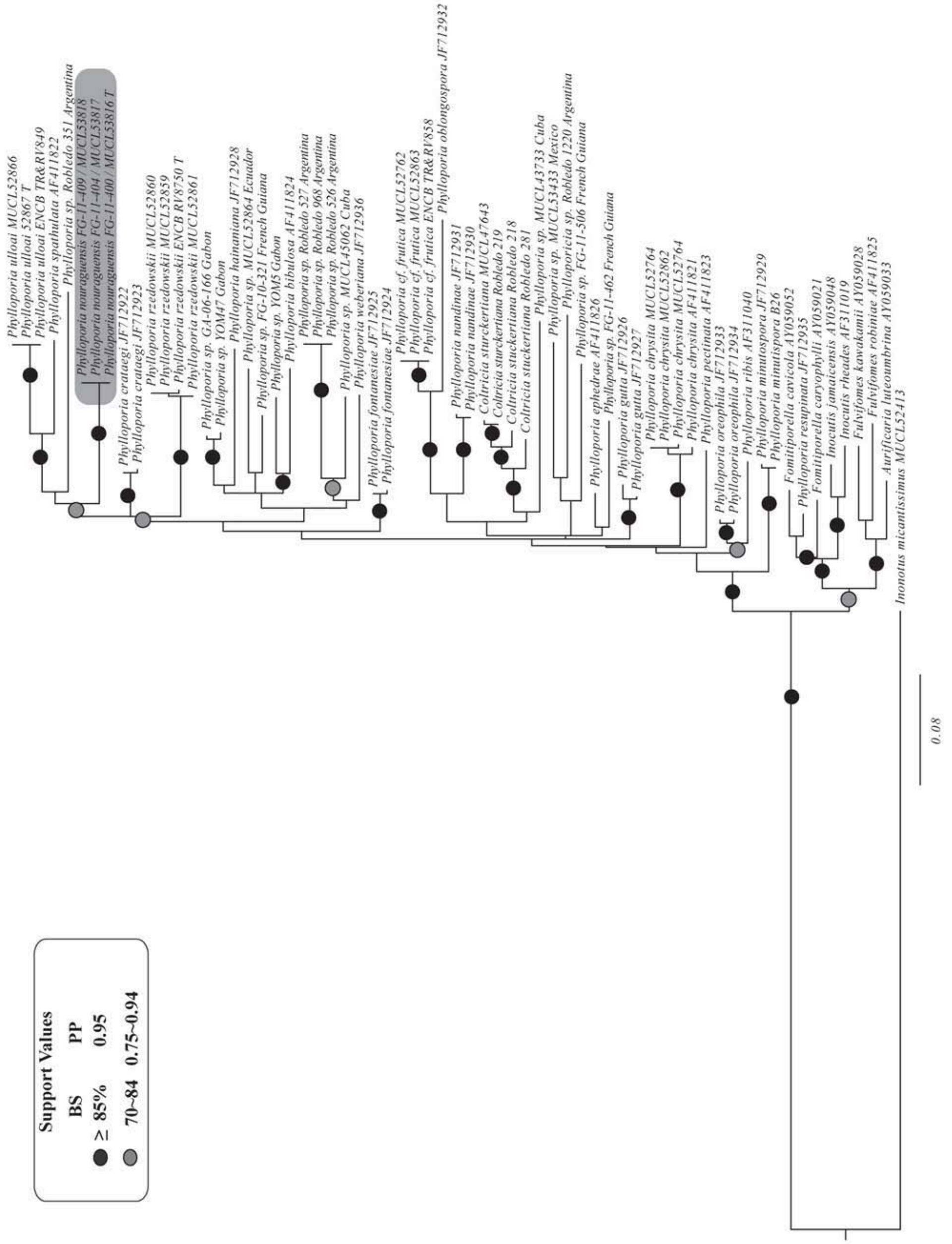

Fig. 1. Phylogenetic relationships of *Phylloporia* species inferred from nucLSU rDNA sequences. The maximum likelihood tree was rooted with *Inonotus micantissimus* MUCL52413. Black dots on branches represent BPP greater than 0.95 and ML/BS greater than 85%; grey dots on branches denote BPP greater than 75% and ML/BS grater than 65%.

The topologies of the trees regarding the recovery and the relative positions of the poroid Hymenochaetales generic entities considered were identical in all the phylogenetic inferences, in accordance with previous results (Valenzuela *et al.* 2011). The *Phylloporia* clade is very well supported (BS 98% / BPP 1.0 / ML BS 100%). However, in our analysis, *P. resupinata* nests outside the *Phylloporia* clade, and is kin to some *Fomitiporella* species, questioning its generic placement.

Our phylogenetic inferences recovered our French Guiana collections FG-11-400, FG-11-404, and FG-11-409 as a distinct, well-supported (BS 100% / BPP 1.0), monophyletic and terminal clade (Fig. 1). This clade is unequivocally placed within the *Phylloporia* lineage, in the vicinity of the *P. ulloai*, *P. rzedowskii*, *P. spathulata*, and *P. crataegi* species/clades (Zhou and Dai 2012). An unidentified collection from Argentina (*Phylloporia* sp., Robledo 351) is also related. These 5 species form a moderately supported sub-clade within the *Phylloporia* lineage (Fig. 1).

Subsequent morphological examinations of the various collections revealed combinations of morphological features which would define a morphotype. The main features that differentiate these collections from other species are the thin, tiny basidiomes, small pores, and the basidiospores shape and size. The ecological features *viz*. a growth on small living twigs of *Myrcia* sp. (Myrtaceae), the basidiomata emerging from their apices, also could characterize this species.

We therefore concluded that they represent a distinct species, described and illustrated below as *Phylloporia nouraguensis.*

TAXONOMY

Phylloporia nouraguensis Decock & Castillo **sp. nov.** **Figs 2-4**

Mycobank: MB801759

Etymology: This species is named after the locality, the Nouragues inselberg within the homonymous Nouragues Natural Reserve.

Basidiomata annua, pileata, sessilia, plerumque amplectentia, 3-8 mm longa, 3-12 mm lata, usque ad 1.2 mm crassa; pileus plerumque cinnamomeus deinde ferruginosus, leviter spongiosus, concentricus, hirsutus deinde agglutinatus et glaber in vetere; pori circulares, 8-9 per mm, linea nigra delicata inter tomentum et contextum praediti; tomentum spongiosum; contextus densus; systema hypharum dimiticum; hyphae generatoriae afibulatae, hyalinae ad pallido-luteae; hyphae skeletales flavo-brunneae, crassitunicatae, aseptatae; basidiosporae 2.8-3.5 × 2.0-3.0 µm, ellipsoideae ad obovoideas, pallido-luteae, nonamyloidae, leviter crassitunicatae; basidiomata ad ramunculos apicales viventes Myrciae sp. (Myrtaceae) crescentia.

Basidiome annual, pileate; *pileus* solitary, sessile, amplectens and broadly attached to discoid (button-like) and attached by a small vertex, semicircular to circular in outline, applanate (plane) to slightly convex in section, projecting 3-8 mm, 3-12 mm wide, up to 1.2 mm thick, with a corky consistency when fresh; *pileus surface* concentrically hirsute to slightly scrupose, with alternate zones of flattened hyphae, free or in bundles, and of hyphae abruptly bent upward, forming hirsute to slightly scrupose rows; on aging (and weathering) the hyphal bundles start agglutinating from the base and, progressively, the pileus surface becomes almost glabrous, or so when old; overall pileus surface grayish orange, cinnamon brown

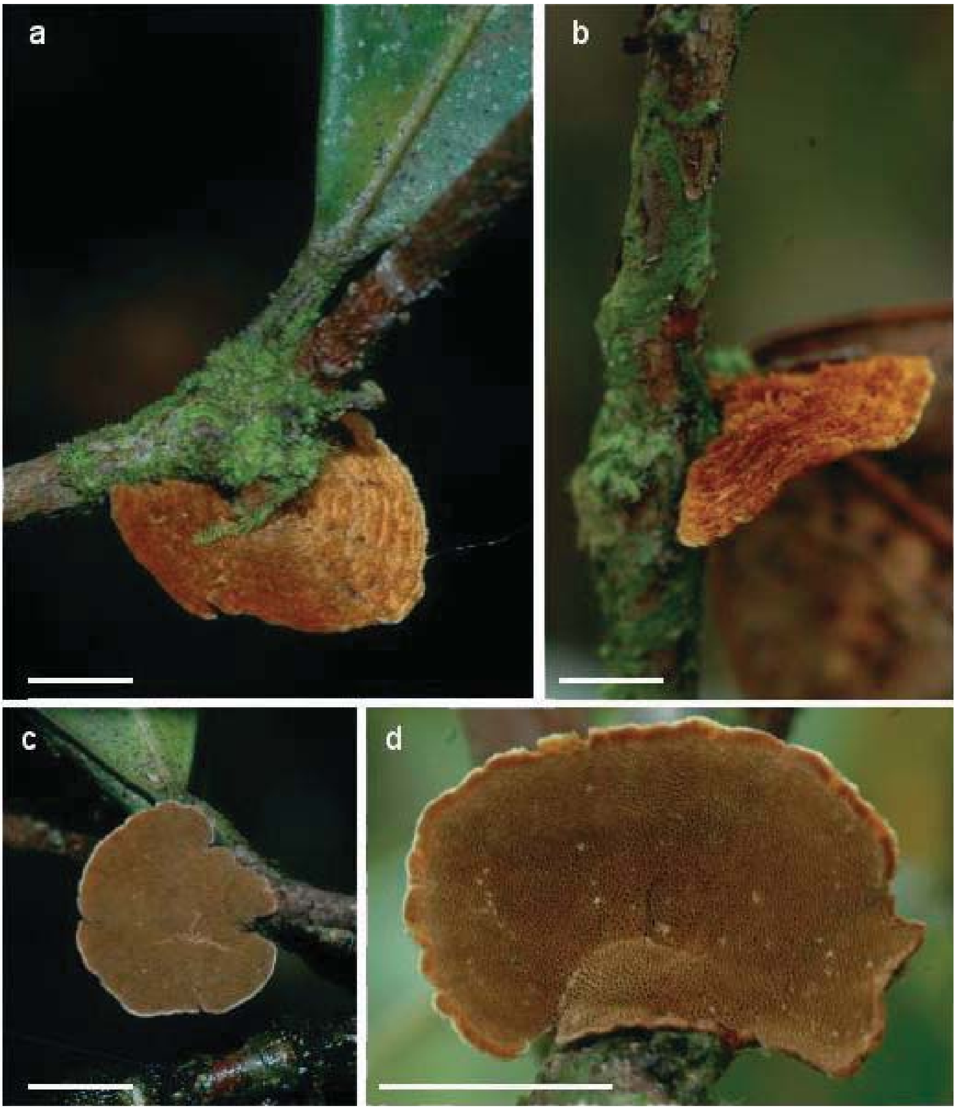

Fig. 2. **a, d**: Basidiomata *in situ* of *Phylloporia nouraguensis* MUCL 53816. **a, b**: pileus, upper surface (scale bar = 5 mm); **c, d**: pore surface. Scale bar = 5 mm.

[6D(6-7)], or rusty brown (6F7) when fresh and growing, the concentric rows occasionally darker, the marginal areas paler, grayish orange; on aging and when glabrous, the all pileus turning rusty brown (6F7); *margin* thin, sterile, white, grayish white; *pore surface* brownish orange to light brown [5C(4-5), golden blonde, topaz, 6D(5-6), cinnamon to sunburn] when fresh and growing, brown when dried [6E(7-8), rusty brown]; *pores* 8-9 / mm, (75-) 105-110 mm diam (ave = 87 µm), mostly rounded, rarely radially elongated; *dissepiments* smooth, entire, 25-50 µm thick (ave = 35 µm); *context* duplex, with a thin black line separating an

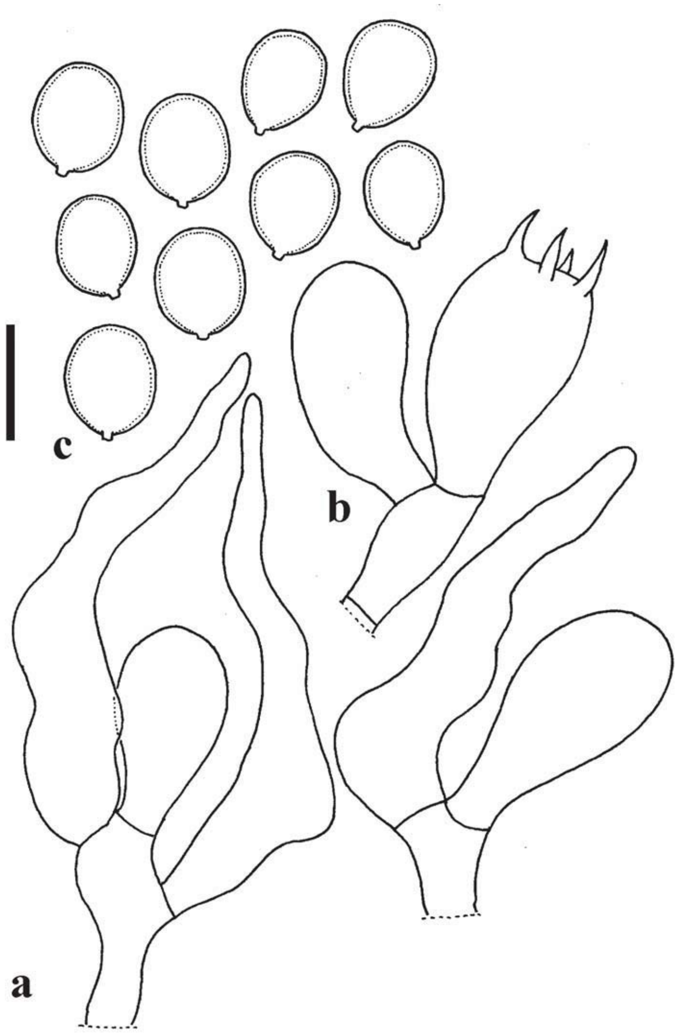

Fig. 3. **a, c**: Microscopic features of *Phylloporia nouraguensis*, from MUCL 53816. **a**: cystidioles / basidioles; **b**: basidioles / basidia; **c**: basidiospores. Scale bar = 5 µm.

upper loose tomentum and a lower denser context, more obvious near the base; *upper tomentum* soft and spongy, up to 0.4 mm thick at the base, light brown to cinnamon brown [6D(6-7), cinnamon brown], darker on aging, cocoa brown; *lower context* denser, up to 0.75 mm thick at the base, very thin (down to 0.1 mm) to the margin, concolorous with the upper layer; *tube layer* up to 0.5 mm deep, yellow brown to light brown [6D(6)].

Hyphal system, dimitic; *generative hyphae* simple septate, thin- to thick-walled (but lumen wide open), sparingly branched, hyaline to pale golden yellow, darker in KOH, 2.5-3.0 (-3.5) µm diam; *in the tomentum*, hyphae mostly parallel, unbranched, thick-walled, 3.0-5.0 µm diam, occasionally with crystals embedded; *in the lower context* skeletal hyphae sub-parallel, yellow to brownish,

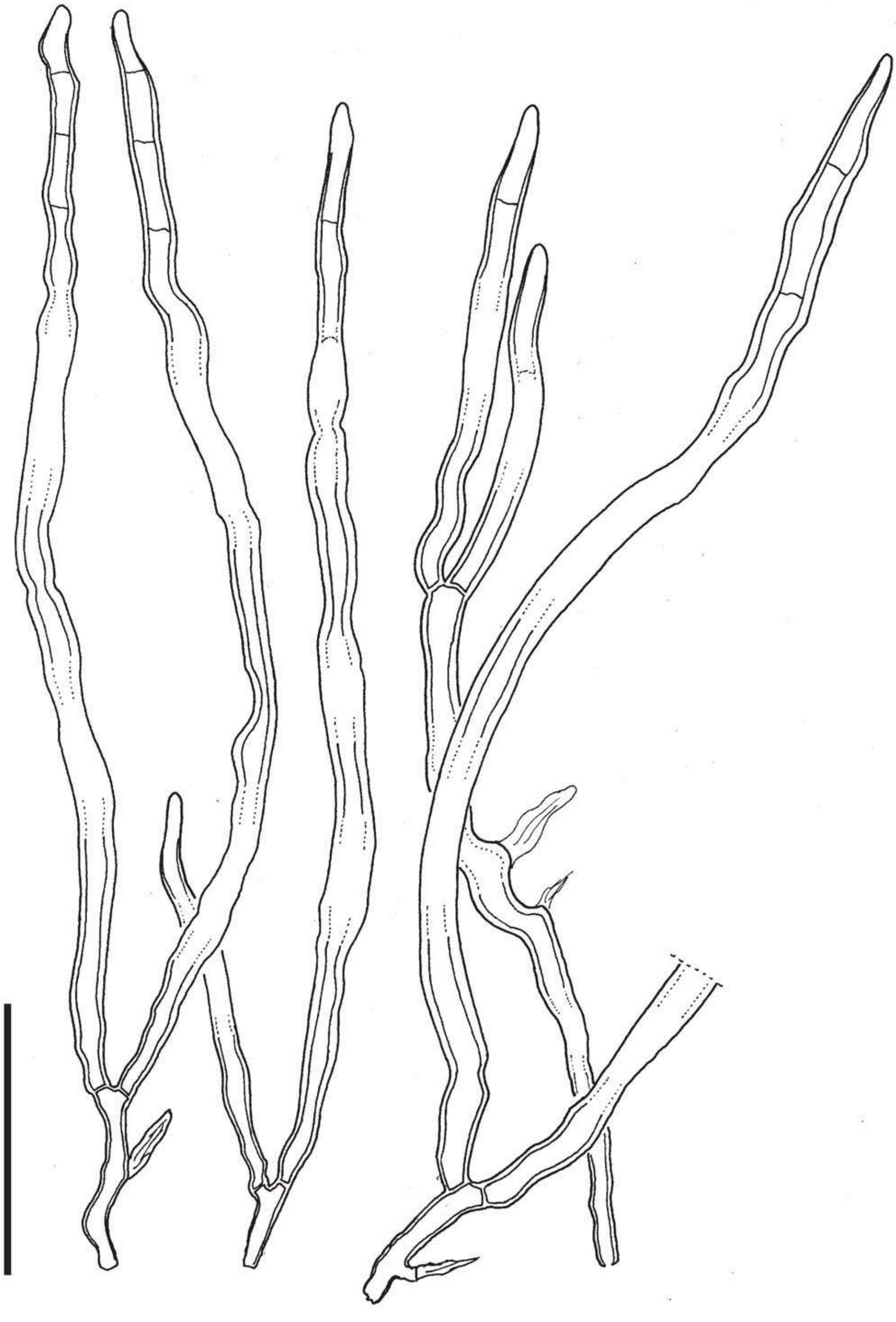

Fig. 4. Microscopic features of *Phylloporia nouraguensis*, from MUCL 53816. Vegetative hyphae from the hymenophoral trama, MUCL 53816. Scale bar = 20 µm.

darker, reddish brown in alkali, arising from a generative hyphae, with a basal septa, of limited growth, measured up to 200 µm long, 3.0-4.5 µm diam, progressively thick- to very thick-walled, ending thin-walled, mostly aseptate throughout, or with (multiple) secondary septa, especially near the tips; *in the hymenophoral trama* skeletal hyphae with sub-parallel orientation, yellow to brownish, darker brown in KOH, arising from a generative hyphae, with a basal septa, of limited growth, measured up to 80 µm long, 2.5-3.0 (-3.5) µm wide, thick- to very thick-walled, the tips thin- to slightly thick-walled, aseptate but with (multiple) secondary septa, especially near the tips, occasionally with local constrictions.

Hymenium: *cystidioles* few, fusoid to lageniform, thin-walled; *basidioles* 8.0-10.0 × 5.0-6.5 µm, hyaline in KOH, slightly pyriform; *basidia* 10.0-12.5 × 5.5-6.5 µm, barrel-shaped to slightly pyriform, with 4 sterigmata; *basidiospores* broadly ellipsoid to obovoid, subhyaline pale yellow, darkening in alkali, slightly thick-walled, smooth, without reaction in Melzer's reagent, (2.8-) 3.0-3.5 × (2.0-) 2.5-2.8 (-3.0) µm Q = (1.12)-1.17-1.4, (ave = 3.3 × 2.6 µm, ave_Q = 1.28).

Substrates: known so far only growing on small, living twigs of *Myrcia sp.* (*Myrcia cf. guianensis*, Myrtaceae), with basidiomes emerging just before or at the attachment points of the opposite leaves. Basidiomes also were observed, occasionally, on dead twigs.

Distribution: so far known from the type locality, in the Nouragues inselberg low forest ecosystem.

Holotype: FRENCH GUIANA: Municipality of Regina, Nouragues Natural Reserve, CNRS "inselberg" research station, track (*layon*) C.T.I., in the "low forest" ecosystem, at the so-called Inselberg "terrasses", approx. 04°05.5′ N, 52°40.6′ W, elev. 130-180 m, on living (and dead), apical, attached twigs, *Myrcia* sp. (*M.* cf. *guianensis*, Myrtaceae), 29 Jun 2011, *C. Decock, FG-11-400* (in herbarium MUCL 53816, Holotype; Isotype at NY).

Additional materials examined: *ibid.* 29 Jun 2011, *C. Decock, FG-11-399*, *FG-11-404*, *FG-11-409* (respectively MUCL 53815, MUCL 53817, and MUCL 53818); *ibid.*, 03 Jul 2012, *C. Decock* and *G. Castillo, FG-12-560, FG-12-561* (respectively, MUCL 54461 & MUCL 54462).

DISCUSSION

The pileate basidiomes with a duplex context, a black line separating an upper loose tomentum from a lower, denser context, a dimitic hyphal system, small, thick-walled, pale yellowish basidiospores, and the growth on living twigs point toward *Phylloporia*. In a phylogenetic perspective (Fig. 1), this species nests within the *Phylloporia* clade *sensu* Valenzuela *et al.* (2011).

Phylloporia nouraguensis is characterized by the combination of tiny, thin, mostly amplectens basidiomes, small pores (8-9/mm), and broadly ellipsoid to obovoid basidiospores averaging 3.3 × 2.6 µm. The hyphal system could be considered as dimitic, both in the lower context and the hymenophoral trama. Skeletal hyphae originate from generative hyphae, and are of a limited growth, what is especially obvious in the hymenophoral trama. They are mostly aseptate throughout, although (multiple) secondary septa occur, more frequently near their apices.

The ecological parameters may characterize also the species. *Phylloporia nouraguensis* was found growing locally (exclusively to date) on a species of *Myrcia* (possibly *M. guianensis*, Myrtaceae), developing solitary basidiomata at the attachment point of opposite leaves, near the apices of living (more rarely) dead, small (< 5 mm diam) twigs. The species might be (locally) host specific; it was not observed on other local plants but, because of its small size and habitat, it could have been overlooked on taller plants.

The pileus habit and the ecology of *P. nouraguensis* call to mind *P. rzedowskii* (Valenzuela *et al.* 2011), a related, neotropical species known to date only from Mexico. *Phylloporia nouraguensis* differs from *P. rzedowskii* in having smaller, thinner basidiomata (≅ 10 mm in diam and < 1.5 mm thick *versus* 10-40 mm diam, up to 12 mm thick), smaller pores (8-9 *versus* 2-3/mm), and smaller basidiospores (3.0-3.5 × 2.5-2.8 µm *versus* 4.2-6.0 × 2.5-3.2 µm).

Phylloporia nouraguensis also could be compared to *P. frutica*; both species have comparable (amplectens) basidiome habit. *Phylloporia frutica* has much larger pores, however (2 ×4 per mm, Ryvarden 2004, Wagner and Ryvarden 2002).

At the Nouragues Natural Reserve, *Myrcia* spp. are found in the so-called "low forest" covering the upper slopes of the Nouragues inselberg, a granitic dome-like outcrop, culminating at 430 m. This "low forest" forms a transition zone between the low land, tall-tree rainforest and the inselberg, summital, open savanna-rock botanical association. It is botanically dominated by Myrtaceae, in terms of relative diversity and abundance (Larpin 2001). The local climatic conditions are more contrasted than the surrounding lowland, tall tree rainforest, with ampler daily and seasonal fluctuations of temperature and relative humidity (Larpin 2001).

In French Guiana, *Myrcia spp.* are also widely distributed in open savannah and coastline ecosystems. In South America, *Myrcia spp.* and *M. guianensis* are widespread. *Phylloporia nouraguensis* might be searched for in these areas where *Myrcia spp.*, *M. guianensis*, or perhaps other bushy Myrtaceae occur. Because of its small basidiomata and substrate specificity (apices of narrow living twigs), it might be easily overlooked.

Our phylogenetic inferences evidenced also several clades representing unnamed "species", all characterized by having stipitate basidiomes. They originate from Argentina (*Phylloporia sp.* Robledo 351), French Guiana (*Phylloporia sp.* FG-11-462, *Phylloporia sp.* FG-11-506), Ecuador (*Phylloporia sp.* MUCL 52864), and Gabon (*Phylloporia sp.* GA-06-166/YOM-47). They are distantly related to the other species with stipitate basidiomes for which DNA is available, *viz.* *P. spathulata* (Wagner and Ryvarden 2002) and *P. minutispora* (Valenzuela *et al.* 2011). DNA data from the third described species having stipitate basidiomes, *P. verae-crucis*, is unavailable for the time being.

Several specimens from Argentina, representing a single morphospecies tentatively named *Coltricia stuckertiana* but obviously belonging to *Phylloporia*, form also a monophyletic clade representing an additional Neotropical species with stipitate basidiomes.

A handful of *Phylloporia* species with stipitate basidiomes could thus emerge, especially in South America. However, additional collections would be necessary to describe carefully these species and their ecology. Furthermore, given the list of synonyms of *P. spathulata* (http://www.indexfungorum.org/Names/Names.asp; Ryvarden 1991), of which 4 are based on type originating from the Neotropics, a name for some of these species might already exist. Type studies are still necessary. This will be dealt with in a forthcoming publication.

Acknowledgment. Cony Decock and Gabriel Castillo gratefully acknowledge the financial support received from the FNRS / FRFC (convention FRFC 2.4544.10) that allowed fieldwork in French Guiana. Cony Decock also gratefully acknowledges the financial support received from the Belgian State – Belgian Federal Science Policy (contract BCCM C3/10/003). Mario Amalfi acknowledges the financial support received from the Université catholique de Louvain through a *Fonds Special de la Recherche* scholarship. Thanks are extended also to Stéphanie Huret and Céline Bivort for their help with the sequencing program. Cony Decock and Gabriel Castillo also thank Dr. Anne Corval, Director of the CNRS French Guiana, for granting authorization and facilities for field research at the Inselberg CNRS research station, and the CNRS staff members for their invaluable help in Cayenne and during field work (namely, Mrs Dorothée Deslignes, and Mr. Philippe Gaucher, Patrick Châtelet, Gilles Peroz, and Wemo Betian).

REFERENCES

CASTRESANA J., 2000. — Selection of conserved blocks from multiple alignments for their use in phylogenetic analysis. *Molecular Biology and Evolution* 17: 540-552.

CUI B.-K., YUAN H.-S. & DAI Y.-C., 2010 — Two new species of *Phylloporia* (Basidiomycota, Hymenochaetaceae) from China. *Mycotaxon* 113: 171-178.

DECOCK C., HERRERA-FIGUEROA S., ROBLEDO G. & CASTILLO G., 2007 — *Fomitiporia punctata* (Basidiomycota, Hymenochaetales) and its presumed taxonomic synonyms in America: taxonomy and phylogeny of some species from tropical/subtropical areas. *Mycologia* 99:733-752.

HUELSENBECK J.P. & RONQUIST F., 2001 — MRBAYES: Bayesian inference of phylogeny. *Bioinformatics* 17: 754-755.

KORNERUP A.J. & WANSCHER H., 1981 — Methuen Handbook of Colour. 3^{e} Ed. Methuen. London.

LARPIN D., 2001 — The low forest (Nouragues inselberg). In BONDERS (ed.), Nouragues. Dynamics and plant-animal interactions in a neotropical rainforest, Kluwer Academic Press, The Netherlands: pp. 47-63.

LARSSON K.-H., PARMASTO E., FISCHER M., LANGER E., NAKASONE K.K. & REDHEAD S.A., 2006 — Hymenochaetales: A molecular phylogeny for the hymenochaetoid clade. *Mycologia* 98: 926-936.

POSADA D. & CRANDALL K.A., 1998 — Modeltest: testing the model of DNA substitution. *Bioinformatics* 14: 817-818

RAMBAUT A. & DRUMMOND A.J., 2007 — Tracer v1.4, [http://beast.bio.ed.ac.uk/Tracer]

RYVARDEN L., 1991 — Genera of Polypores: Nomenclature and taxonomy. Synopsis Fungorum 5: Oslo, Fungiflora.

RYVARDEN L., 2004 — *Neotropical polypores 1*. Synopsis Fungorum 19. Oslo, Fungiflora.

SIMMONS M.P., PICKETT K.M. & MIYA M., 2004 — How meaningful are Bayesian support values? *Molecular Biology and Evolution* 21: 188-199.

STAMATAKIS A., HOOVER P. & ROUGEMONT J., 2008 — A rapid bootstrap algorithm for the RAxML Web-Servers. *Systematic Biology* 75: 758-771.

SWOFFORD D.L., 2003 — PAUP*: phylogenetic analysis using parsimony (*and other methods). Version 4.0b10. Sunderland, Massachusetts: Sinauer Associates Inc.

THIERS B. [continuously updated] — Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/.

THOMPSON J.D., GIBSON T.J., PLEWNIAK F., JEANMOUGIN F. & HIGGINS D.G., 1997 — The CLUSTAL_X windows interface: flexible strategies for multiple sequence alignment aided by quality analysis tools. *Nucleic Acids Research* 25: 4876-4882.

VALENZUELA R., RAYMUNDO T., CIFUENTES J., CASTILLO G., AMALFI M. & DECOCK C., 2011 — Two undescribed species of *Phylloporia* from Mexico based on morphological and phylogenetic evidence. *Mycological Progress* 10: 341-349.

WAGNER T. & RYVARDEN L., 2002 — Phylogeny and taxonomy of the genus *Phylloporia* (Hymenochaetales). *Mycological Progress* 1: 105-116.

ZHOU L.-W. & DAI Y.-C., 2012 — Phylogeny and taxonomy of *Phylloporia* (Hymenochaetales): new species and a worldwide key to the genus. *Mycologia* 104: 211-222.