Plant Ecology and Evolution 150 (2): 160–172, 2017
https://doi.org/10.5091/plecevo.2017.1289

REGULAR PAPER

Hymenochaetaceae (Hymenochaetales) from the Guineo-Congolian phytochorion: *Phylloporia littoralis* sp. nov. from coastal vegetation in Gabon, with an identification key to the local species

Prudence Yombiyeni[1] & Cony Decock[2,*]

[1]Institut de Recherche en Ecologie Tropicale (IRET), BP-13354 Gros Bouquet, Libreville, Gabon
[2]Mycothèque de l'Université catholique de Louvain (MUCL, BCCM), Earth and Life Institute – Microbiology (ELIM), Université catholique de Louvain, Croix du Sud 2 bte L7.05.06, B-1348 Louvain-la-Neuve, Belgium
*Author for correspondence: cony.decock@uclouvain.be

Background and aims – This study is a part of an ongoing survey of Hymenochetaceae (Basidiomycota, Hymenochaetales) in the Guineo-Congolian phytogeographic region and presents a new species of *Phylloporia* from the lower Guinean sub-region in Southwestern Gabon.
Methods – The species is described using morphological methods. DNA-based, phylogenetic analysis also are used to search for affinities.
Key results – *Phylloporia littoralis* sp. nov. is described, based on specimens found growing from living shrubs of a *Nichallea* species (Rubiaceae) in a coastal, sclerophylous vegetation in Southwestern Gabon. Phylogenetic inferences using DNA sequence data from partial nuc 28S (region including the D1/D2/D3 domains) resolved this species as a distinct clade within the *Phylloporia* lineage, affine to *Phylloporia flacourtiae*, a taxon known from subtropical, eastern Asia, in China.
Conclusion – *Phylloporia littoralis* is the sixth species of the genus described and so far only known from the lower Guinean phytogeographic sub-region in Gabon since 2015. Previously, none *Phylloporia* species was reported from Gabon. An identification key to the species occurring in Gabon or reported from the Guineo-Congolian phytochorion is provided.

Key words – Africa, Basidiomycota, Hymenochaetales, polypores, *Phylloporia*, new species.

INTRODUCTION

Phylloporia (Hymenochaetaceae) has received much attention since the monographic revision of Wagner & Ryvarden (2002), who accepted twelve species. The number of accepted species has tripled since then (Ipulet & Ryvarden 2005, Cui et al. 2010, Valenzuela et al. 2011, Zhou & Dai 2012, Decock et al. 2013, 2015, Zhou 2013, 2015, 2016, Gafforov et al. 2014, Liu et al. 2015, Yombiyeni et al. 2015, Ferreira Lopes et al. 2016). In addition, a handful of species shown by phylogenetic inferences (Decock et al. 2015) remains undescribed yet in the Linnaean system, what would raise the number of known taxa to about 60. Nevertheless, still, this could represent a low figure.

In tropical Africa, twelve named *Phylloporia* species are currently reported, of which ten are recorded from Central Africa or, in biogeographical term (following White 1983), the Guineo-Congolian Regional Centre of Endemism (Ryvarden & Johansen 1980, Hjortstam et al. 1993, Núñez & Daniëls 1999, Ryvarden 2000, Wagner & Ryvarden 2002, Ipulet & Ryvarden 2005, Roberts & Ryvarden 2006, Decock et al. 2015, Yombiyeni et al. 2015). *Phylloporia afrospathulata*, *P. flabelliformis*, *P. fulva*, *P. gabonensis* and *P. inonotoides* were described and, for the time being, are only known from the western edge of the Guineo-Congolian phytochorion, in Gabon (Decock et al. 2015, Yombiyeni et al. 2015) whereas *P. minutispora* is originating and so far only known from its eastern edge, in mid-elevation forests (~1 500 m a.s.l.) of western Uganda and eastern Congo (DRC) (Ipulet & Ryvarden 2005, Valenzuela et al. 2011). Inversely, *P. chrysites*, *P. fruticum*, *P. spathulata* and *P. weberiana* were originally described from distant geographic areas, the Neotropics (Kunth 1822, Berkeley 1856, Berkeley & Curtis 1868) and the Southern Pacific Polynesia (Saccardo 1891). Their reports from Central Africa (e.g. Ryvarden & Johansen 1980, Hjortstam et al. 1993, Núñez & Daniëls 1999, Roberts & Ryvarden 2006) should be taken with caution, as emphasized previously (Decock et al. 2015, Yombiyeni et al. 2015).

ISSN: 2032-3913 (print) – 2032-3921 (online)

Phylloporia parasitica and *P. pectinata* are so far only reported from Eastern Africa (Ryvarden & Johansen 1980). They also were originally described from distant geographic areas, the Neotropics (Murrill 1904) and the Indian Peninsula (Klotzch 1833). Their occurrence in Eastern Africa also could be questioned.

Pursuing our ongoing survey of Hymenochaetaceae in the Guineo-Congolian phytochorion (Amalfi et al. 2010, Yombiyeni et al. 2010, 2015, Decock et al. 2015), additional materials of *Phylloporia* were gathered from a coastal vegetation, in the Gamba complex of protected areas, Southwestern Gabon. These specimens, overall, are reminiscent of *P. bibulosa* in both a morphological and ecological perspective. Nevertheless, they deviate from *P. bibulosa* (e.g. *sensu* Corner 1991) in some morphological features. They also form a single terminal clade, distant from the reference *P. bibulosa* branch (Wagner & Ryvarden 2002) in phylogenetic inferences based on partial 28S DNA sequence data (region including domains D1, D2, and D3).

On this basis, as well as considering its ecological specificities, *Phylloporia littoralis* sp. nov. is described. This species, its preliminary ecology and its affinities are commented. A key to the species known from Gabon and reported from the Guineo-Congolian phytochorion is presented.

MATERIALS AND METHODS

Collection localities

The specimens of the new species were collected in the Gamba complex of protected areas (approx. 1°50′ to 3°10′S – 9°15′ to 10°50′E), more specifically in coastal vegetation about 2°43′S 10°01′E, elevation approx. 10 m a.s.l. The local vegetation could be attributed to the coastal sclerophylous forest as defined by Vande weghe (2005).

Specimen's identification and description

The type specimen of the new species is deposited at NY (holotype). Isotypes are deposited at MUCL and LBV (Herbarium acronyms are according to Thiers continuously updated). Colours are described according to Kornerup & Wanscher (1981). Sections of the basidiomata were incubated for one hour at 40 °C in NaOH 3 % solution, then carefully dissected under a stereomicroscope and examined in NaOH 3 % solution at room temperature (Decock et al. 2010, 2013). To study the staining reaction of the hyphae and basidiospores, sections of the basidiomata were examined in Melzer's reagent, lactic acid Cotton blue, and KOH 4 %. All microscopic measurements were done in Melzer's reagent. In presenting the size range of microscopic elements, 5 % of the measurements at each end of the range are given in parentheses when relevant. The following abbreviations are used: ave = arithmetic mean, R = the ratio of length/width of basidiospores, and ave_R = arithmetic mean of the ratio R. As a rule, whenever possible, 30 microscopic elements of the basidiomata (pores / hyphae / basidiospores) were measured from each specimen.

Molecular study and phylogenetic analysis

DNA extraction, amplification and sequencing of the 5' end of the nuc DNA 28S gene (region including the D1/D2/D3 domains) were as described in Decock et al. (2007). Primers LR0R and LR6 (Vilgalys & Hester 1990) were used to amplify and to sequence the portion of the 28S gene.

One hundred and thirty entries representing 75 taxa or potential species clades were included in the phylogenetic analysis. Materials and sequences used in this study are listed in table 1. The dataset is deposited at TreeBASE (study accession S20338).

The methodologies and parameters for running phylogenetic analyses [Maximum Parsimony as implemented in PAUP* ver. 4.0b10 (Swofford 2003), Bayesian inference as implemented in MrBayes ver. 3.1.2 (Huelsenbeck & Ronquist 2001) and Maximum likelihood as implemented in RAxML ver. 7.0.4 (Stamatakis 2006)] are described in Decock et al. (2015) and Yombiyeni et al. (2015) and not repeated in details here. *Inonotus micantissimus*, MUCL52413, a species of the *Inonotus* clade *sensu* Wagner & Fischer (2002), was designated as outgroup (Larsson et al. 2006).

RESULTS

Phylogenetic analysis

Within *Phylloporia*, the length of the 28S fragment ranges from 866 to 884 bps. The final alignment of 130 sequences resulted in 953 positions of which 24 were excluded (ambiguous alignment), 493 were constant, and 379 were parsimony informative.

Using the Akaike Information Criterium (AIC) of MrModeltest 2.3 (Posada & Crandall 1998), the best-fit model for the 28S data set was determined as GTR+I+G with unequal base frequencies (A = 0.2513, C = 0.1817, G = 0.3268, T = 0.2402), a gamma distribution shape parameter of 0.5950 and a proportion of invariable sites of 0.3740. The nucleotide substitution rates estimated according to this model were A/C=1.14, A/G=10.62, A/T=1.62, C/G=1.0, C/T=26.55 and G/T=1.0.

The MP analysis produced 30 most parsimonious trees (2 378 steps, consistency index = 0.257, retention index = 0.652). The two Bayesian runs converged to stable likelihood values after 6 000 000 generations. The remaining stationary trees from each analysis were used to compute a 50 % majority rule consensus tree (BC) and to calculate posterior probabilities. In the ML searches, the LSU alignment had 470 distinct patterns with a proportion of gaps and undetermined characters of 7.59 %.

The consensus of the most parsimonious trees, the consensus tree of the BI and the most likelihood tree of ML were nearly congruent. One of the equally most parsimonious trees, representing the dominant topology, is presented in fig. 1.

The topologies of the trees regarding the recovery and the relative positions of the different genera of Hymenochaetaceae included were identical in all the phylogenetic inferences, in accordance with previous results (Decock et al. 2013, 2015, Valenzuela et al. 2011, Yombiyeni et al. 2015). The

Table 1 – List of species / specimens used in the phylogenetic analyses.
Country of origin, collection reference, substrate / host, and accession numbers of nuc 28S sequences. T, type; IT, isotype; PT, paratype; ME, morpho-ecological group.

Genera / Species	Country	Collection reference	Substrate / host	GenBank Accession
Coltricia				
C. cf. *stuckertiana* (Speg.) Rajchenb. & J.E.Wright	Argentina	MUCL 47643, *Robledo* 728	Root, unidentified angiosperm	HM635663
	Argentina	CORD, *Robledo* 219	Root, unidentified angiosperm	KC136219
	Argentina	CORD, *Robledo* 218	Root, unidentified angiosperm	KC136220
	Argentina	CORD, *Robledo* 281	Root, unidentified angiosperm	KC136221
	Argentina	CORD, *Robledo* 351	Root, unidentified angiosperm	KC136226
Fomitiporella				
F. caryophylli (Racib.) T.Wagner & M.Fisch.	India	BBS 448.76	*Shorea robusta* (Dipterocarpaceae)	AY059021
Fulvifomes				
F. kawakamii (M.J.Larsen et al.) T.Wagner & M.Fisch.	USA	CBS 428.86	*Casuarina equisetifolia* (Casuarinaceae)	AY059028
F. robiniae (Murrill) Murrill	USA	CBS 211.36	*Robinia pseudoacacia* (Fabaceae)	AY411825
Inocutis				
I. jamaicensis (Murrill) A.M.Gottlieb et al.	USA	*Gilb.* 14740	*Quercus Virginia* (Fagaceae)	AY059048
I. rheades (Pers.) Fiasson & Niemelä	Germany	TW 385	*Populus tremula* (Salicaceae)	AF311019
Inonotus				
I. micantissimus (Rick) Rajchenb.	Mexico	MUCL 52413	Wood, unidentified angiosperm	HM635663
Phylloporia				
P. afrospathulata Yombiyeni et al.	Gabon	MUCL 54511/ NY (T)	Root, unidentified angiosperm	KJ743248
	Gabon	MUCL 53983	Root, unidentified angiosperm	KJ743249
P. bibulosa (Lloyd) Ryvarden	Pakistan	*Ahmad* 27088	*Peristropha bicalyculata* (Acanthaceae)	AF411824
P. cf. capucina (Mont.) Ryvarden	Argentina	CORD, *Robledo* 1610	Stem, unidentified angiosperm	KJ651919
P. chrysites (Berk.) Ryvarden	Puerto Rico	*N.W. Legon*	Unidentified angiosperm	AF411821
	Mexico	MUCL 52763	Unidentified angiosperm	HM635665
	Mexico	MUCL 52764	Unidentified angiosperm	HM635666
P. clausenae L.W.Zhou	China	IFP, *Yuan* 3528	Unidentified angiosperm	KJ787795
	China	IFP, *Dai* 10831 (T)	*Clausena* sp. (Rutaceae)	KJ787796
P. crataegi L.W.Zhou & Y.C.Dai	China	IFP, *Dai* 11014 (T)	Root, *Crataegus* sp. (Rosaceae)	JF712922
	China	IFP, *Dai* 11016 (PT)	Root, *Crataegus* sp. (Rosaceae)	JF712923
P. cylindrispora L.W.Zhou	China	IFP, *Yuan* 6144 (T)	Unidentified angiosperm	KJ787797
	China	IFP *Yuan* 6148	Unidentified angiosperm	KJ787798
P. dependens Y.C.Dai	China	BJFC013379 (T)	On rotten angiosperm stump	KP698746
P. elegans Ferreira-Lopes et al.	Brazil	FLOR 51178 (T)	Living roots, unidentified angiosperm	KJ631408
	Brazil	FLOR 51179	Living roots, unidentified angiosperm	KJ631409
P. ephedrae (Woron.) Parmasto	Turkmenistan	TAA 72-2	*Ephedra* sp. (Ephedraceae)	AF411826
P. flabelliformis Decock & Yombiyeni	Gabon	MUCL 55569 (T)	Living trunk, *Dichostemma* sp. (Euphorbiaceae)	KU198349
	Gabon	MUCL 55570	Living trunk, *Dichostemma* sp. (Euphorbiaceae)	KU198351

Table 1 (continued) – List of species / specimens used in the phylogenetic analyses.
Country of origin, collection reference, substrate / host, and accession numbers of nuc 28S sequences. T, type; IT, isotype; PT, paratype; ME, morpho-ecological group.

Genera / Species	Country	Collection reference	Substrate / host	GenBank Accession
Phylloporia				
P. flacourtieae L.W.Zhou	China	IFP, *Yuan* 6362	*Flacourtia* sp. (Salicaceae)	KJ787801
	China	IFP, *Zhou* 140 (T)	*Flacourtia* sp. (Salicaceae)	KJ787802
P. fontanesiae L.W.Zhou & Y.C.Dai	China	IFP, *Li* 199 (T)	Living *Fontanesia* sp. (Oleaceae)	JF712925
	China	IFP, *Li* 194 (PT)	Living *Fontanesia* sp. (Oleaceae)	JF712924
P. cf. *fruticum* (Berk. & M.A.Curtis) Ryvarden	Mexico	MUCL 52762	Unidentified angiosperm	HM635668
	Mexico	ENCB TR&RV858	Unidentified angiosperm	HM635669
P. fulva Yombiyeni & Decock	Gabon	MUCL 54472 / NY (T)	Trunk, unidentified angiosperm	KJ743247
P. gabonensis Decock & Yombiyeni	Gabon	MUCL 55571	Living trunk, *Dichostemma* sp. (Euphorbiaceae)	KU198352
	Gabon	MUCL 55572 (T)	Living trunk, *Dichostemma* sp. (Euphorbiaceae)	KU198353
P. gutta L.W.Zhou & Y.C.Dai	China	IFP, *Dai* 4103 (PT)	Unidentified angiosperm	JF712926
	China	IFP, *Dai* 4197 (T)	*Abelia* sp. (Caprifoliaceae)	JF712927
P. hainaniana Y.C.Dai & B.K.Cui	China	IFP, *Dai* 9640 (T)	Twig, unidentified angiosperm	JF712928
P. homocarnica L.W.Zhou	China	IFP, *Yuan* 5770 (T)	Unidentified angiosperm	KJ787803
	China	IFP, *Yuan* 5776	Unidentified angiosperm	KJ787804
P. inonotoides Yombiyeni & Decock	Gabon	MUCL 54468 / NY (T)	Trunk, *Crotonogyne gabunensis* (Euphorbiaceae)	KJ743250
	Gabon	MUCL 54469 (PT)	Trunk, *Crotonogyne gabunensis* (Euphorbiaceae)	KJ743251
P. littoralis Decock & Yombiyeni	Gabon	MUCL 56144 (IT)	Living twig (Rubiaceae)	KY349140
	Gabon	MUCL 56145	Living twig (Rubiaceae)	KY349141
P. minutipora L.W.Zhou	China	IFP, *Dai* 9257(T)	Unidentified angiosperm	KU904464
	China	LWZ 20150531-13	Unidentified angiosperm	KU904465
P. minutispora Ipulet & Ryvarden	DRC	MUCL 52865	Root, unidentified angiosperm	HM635671
	Uganda	O, *Ipulet* 706 (IT)	Root, unidentified angiosperm	JF712929
P. nandinae L.W.Zhou & Y.C.Dai	China	IFP, *Dai* 10625 (PT)	Living *Nandina domestica* (Berberidaceae)	JF712931
	China	IFP, *Dai* 10588 (T)	Living *Nandina domestica* (Berberidaceae)	JF712930
P. nodostipitata Ferreira-Lopes & Dreschsler-Santos	Brazil	FLOR 51173 (T)	Living roots, unidentified angiosperm	KJ631412
P. nouraguensis Decock & Castillo	French Guiana	MUCL53816 (T)	Living twig, *Myrcia* sp. (Myrtaceae)	KC136222
	French Guiana	MUCL53817	Living twig, *Myrcia* sp. (Myrtaceae)	KC136223
	French Guiana	MUCL 53818	Living twig, *Myrcia* sp. (Myrtaceae)	KC136224
P. oblongospora Y.C.Dai & H.S.Yuan	China	IFP, *Zhou* 179 (T)	Branch, unidentified angiosperm	JF712932
P. oreophila L.W.Zhou & Y.C.Dai	China	IFP, *Cui* 2219 (PT)	Bush, unidentified angiosperm	JF712933
	China	IFP, *Cui* 9503 (T)	Fallen, unidentified angiosperm	JF712934
P. osmanthi L.W.Zhou	China	*Yuan* 5655 (T)	*Osmanthus* sp. (Oleaceae)	KF729938
P. pectinata (Klotzsch) Ryvarden	Australia	*R. Coveny* 113	Trunk, *Rhodania rubescens*	AF411823
P. ME *pectinata*	Gabon	MUCL / GA-12-813	Living trunk, Melastomataceae	KJ743253
	Gabon	MUCL / GA-12-846	Living trunk, Melastomataceae	KJ743254
	Gabon	MUCL / GA-12-816	Living trunk, Melastomataceae	KJ743255
	Gabon	MUCL / GA-12-812	Living trunk, Melastomataceae	KJ743281

Table 1 (continued) – List of species / specimens used in the phylogenetic analyses.
Country of origin, collection reference, substrate / host, and accession numbers of nuc 28S sequences. T, type; IT, isotype; PT, paratype; ME, morpho-ecological group.

Genera / Species	Country	Collection reference	Substrate / host	GenBank Accession
Phylloporia				
	Argentina	CORD, *Robledo* 1624	Stem, *Magfadyena unguis-cati* (Bignoniaceae)	KJ651920
P. ME pectinata	Argentina	CORD, *Robledo* 1134	Stem, unidentified liana	KJ651917
	Brazil	MUCL 54226		KJ743270
	Brazil	ICN / ISA 610	Living unidentified liana	KJ743273
Phylloporia pseudofruticum (Lloyd) Campos-Santana & Decock	Brazil	ICN / ISA 555	Living unidentified liana	KJ743274
	Brazil	ICN / ISA G70	Living unidentified liana	KJ743275
P. pulla	China	*Cui* 5251	Unidentified angiosperm	KU904468
	China	*Dai* 9627	Unidentified angiosperm	KU904469
Phylloporia radiata L.W.Zhou	China	LWZ 20141122-6 (IFP) (T)	Living unidentified liana	KU904471
	China	LWZ 20141122-5 (IFP)	Living trunk, unidentified angiosperm	KU904470
P. resupinata Douanla-Meli & Ryvarden	Cameroon	O, DMC 476 (IT)	Trunk, *Entandrophragma* sp. (Meliaceae)	JF712935
P. ribis (Schumach.) Ryvarden	Germany	MF 82-828	*Ribes uva-crispa* (Grossulariaceae)	AF311040
P. rzedowskii R.Valenz. & Decock	Mexico	MUCL 52868 (T)	Branch, *Hybanthus mexicanus* (Violaceae)	HM635672
	Mexico	MUCL 52860 (PT)	Branch, *Hybanthus mexicanus* (Violaceae)	HM635674
Phylloporia sp.	Argentina	CORD, *Robledo*	Living twig, *Allophyllus edulis* (Sapindaceae)	KJ651914
	Argentina	CORD, *Robledo* 527	Living twig, *Allophyllus edulis* (Sapindaceae)	KJ651915
	Argentina	CORD, *Robledo* 968	Living twig, *Allophyllus edulis* (Sapindaceae)	KJ651916
	Brazil	ICN / ISA 007	No data	KJ743265
	Brazil	ICN / ISA 553	No data	KJ743266
	Brazil	ICN / ISA 352	No data	KJ743267
	Brazil	MUCL 54288 / ICN	No data	KJ743268
	Brazil	MUCL 54295 / ICN	No data	KJ743269
	French Guiana	MUCL, FG-13-721	Trunk, unidentified angiosperm	KJ743263
	French Guiana	MUCL, FG-13-722	Trunk, unidentified angiosperm	KJ743264
	French Guiana	MUCL, FG-13-670	Trunk, unidentified angiosperm	KJ743262
	French Guiana	MUCL, FG-13-754	Root, unidentified angiosperm	KJ743261
	French Guiana	MUCL, FG-10-321	Trunk, unidentified angiosperm	KJ743277
	French Guiana	MUCL, FG-13-726	Root, unidentified angiosperm	KJ743279
	Kenya	KE-15-02	Trunk, *Rawsonia lucida* (Achariaceae)	KU358722
	Kenya	KE-15-19	Trunk, *Rawsonia lucida* (Achariaceae)	KU358723
	Kenya	KE-16-107	Living trunk, Meliaceae (cf. *Turraea* sp.)	KY349147
	Kenya	KE-16-109	Living trunk, Meliaceae (cf. *Turraea* sp.)	KY349148
	Cuba	MUCL 43733	No data	KJ743278
	Mexico	MUCL 53433	Unidentified angiosperm	KC136231
	Cuba	MUCL, CU-05-249	Branch, unidentified angiosperm	KJ743282
	Cuba	MUCL 45062	Trunk, unidentified angiosperm	KJ743284

Table 1 (continued) – List of species / specimens used in the phylogenetic analyses.
Country of origin, collection reference, substrate / host, and accession numbers of nuc 28S sequences. T, type; IT, isotype; PT, paratype; ME, morpho-ecological group.

Genera / Species	Country	Collection reference	Substrate / host	GenBank Accession
Phylloporia				
Phylloporia sp.	Gabon	MUCL, YOM 5	Unidentified living liana	KJ743283
	Mexico	*Chay* 456	Root, Apocynaceae	AF411822
P. spathulata (Hook.) Ryvarden	Ecuador	MUCL 52864	Root, unidentified angiosperm	HM635676
	Argentina	CORD, *Robledo* 1467	Root, unidentified angiosperm	KJ651918
	Argentina	CORD, *Robledo* 1790	Root, unidentified angiosperm	KJ651921
	French Guiana	MUCL, FG-11-506	Root, unidentified angiosperm	KC136227
	French Guiana	MUCL, FG-12-522	Root, unidentified angiosperm	KJ743259
	French Guiana	MUCL, FG-12-523	Root, unidentified angiosperm	KJ743260
	French Guiana	MUCL, FG-11-462	Root, unidentified angiosperm	KC136228
	French Guiana	MUCL, FG-13-749	Root, unidentified angiosperm	KJ743280
P. ME *spathulata*	French Guiana	MUCL, FG-15-959	Root, unidentified angiosperm	KY349157
	French Guiana	MUCL, FG-15-961	Root, unidentified angiosperm	KY349158
	French Guiana	MUCL, FG-15-930	Root, unidentified angiosperm	KY363574
	French Guiana	MUCL, FG-15-932	Root, unidentified angiosperm	KY363573
	Martinica	MA-15-126	Soil, among mosses	KY349151
	Martinica	MA-15-127	Soil, among mosses	KY349152
	Martinica	MA-15-96	Soil, among mosses	KY349149
	Martinica	MA-15-97	Soil, among mosses	KY349150
P. terrestris L.W.Zhou	China	IFP, *Juan* 5738 (T)	Soil	KC778784
P. tiliae L.W.Zhou	China	IFP, *Yuan* 5491 (T)	*Tilia* sp. (Tiliaceae)	KJ787805
P. ulloai R.Valenz. et al.	Mexico	MUCL 52866 (PT)	Unidentified living liana	HM635677
	Mexico	MUCL 52867 (T)	Unidentified living liana	HM635678
P. weberiana (Bres. & Henn. ex Sacc.) Ryvarden	China	IFP, *Dai* 9242	Unidentified angiosperm	JF712936
P. yuchengii	Uzbekistan	YG 033, TASM (T)	Dead unidentified angiosperm	KM264324
Yu.Sh.Gafforov, Tomšovský, Langer & L.W.Zhou	Uzbekistan	YG 051, TASM	Dead unidentified angiosperm	KM264325

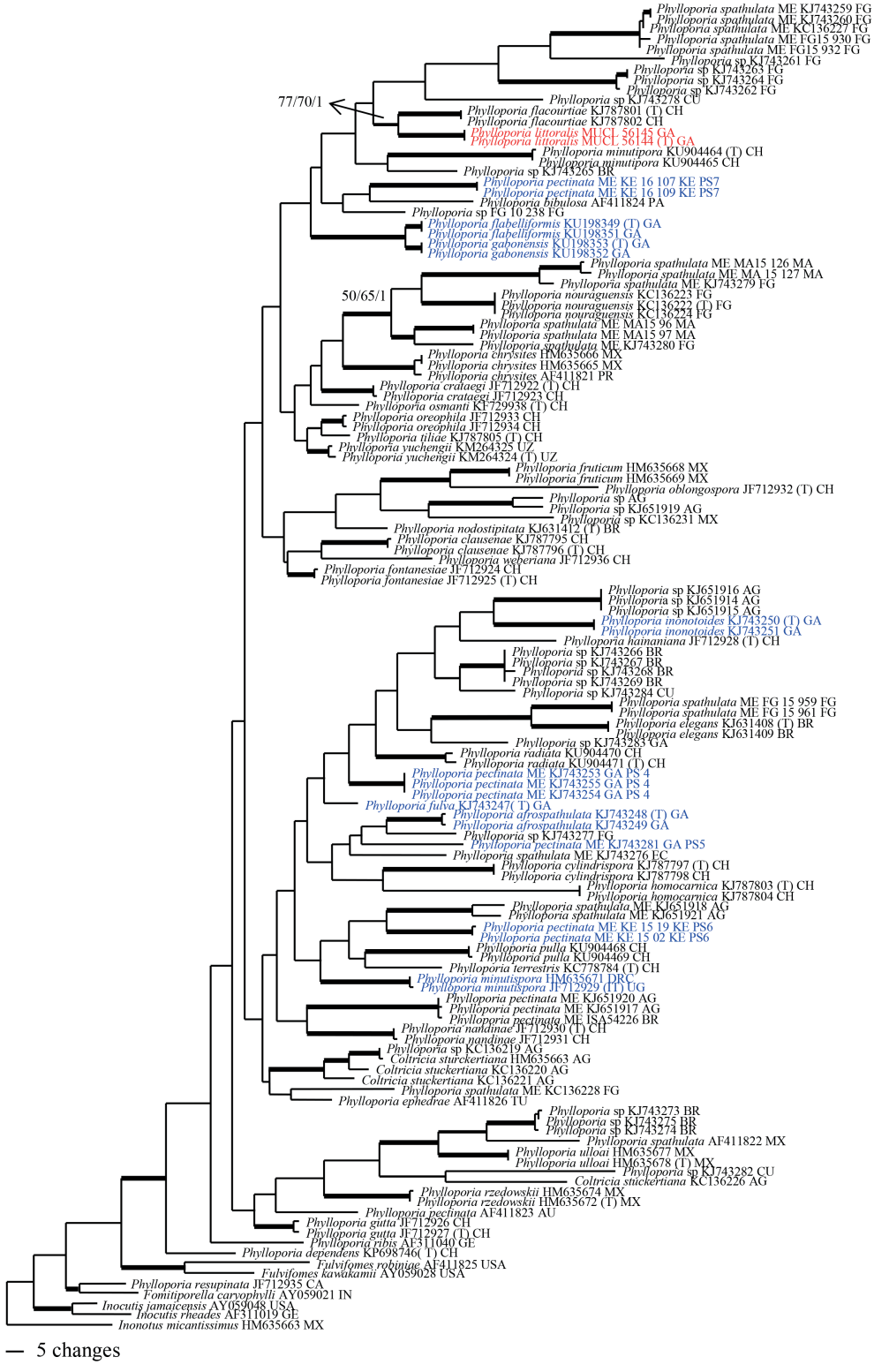

Figure 1 – Phylogenetic relationships of *Phylloporia* species inferred from *nuc 28S* rDNA sequences. The tree was rooted with *Inonotus micantissimus* MUCL52413. Thickened branches represent bootstrap value (MP, ML) and PP value greater than 90%/0.90. Names highlighted in blue represent species known from tropical Africa, in red = the new species *P. littoralis*. Abbreviations used. AG = Argentina; AU = Australia; BR = Brazil; CH = China; CA = Cameroon; CU = Cuba; DRC = Democratic Republic of Congo; EC = Ecuador; FG = French Guiana; FR = France; GA = Gabon; GE = Germany; IN = India; KE = Kenya; MA = Martinique; MX = Mexico; PA = Pakistan; PR = Puerto Rico; TU = Turkmenistan; UG = Uganda; USA = United States of America; UZ = Uzbekistan; (T) = Type specimen; ME = morpho-ecological type.

Phylloporia clade is very well supported (fig. 1). The terminal clades received significant support whereas most of the internal clades were barely supported or, for some of them, variably supported according to the analyses (fig. 1), making it difficult to infer the interspecific phylogenetic relationships within the genus.

The phylogenetic analyses recovered two specimens of a *Phylloporia* species from the costal vegetation in southwestern Gabon as a distinct terminal species clade (cf. fig. 1, clade "*P. littoralis*"). This species clade is distant from all other species clades shown to date (fig. 1, Decock et al. 2013, 2015, Yombiyeni et al. 2015, Zhou 2015, 2016, Ferreira Lopes et al. 2016).

Morphological analysis

The voucher specimens of the "*P. littoralis*" clade are characterized by mostly amplectens (bi- to pluri-lobed) basidiomata at maturity (fig. 2A–H), applanate to convex in section, and a greyish orange to light brown (on aging) spongy tomentum covering the pileus. The context (excluding the tomentum) is homogeneous, cork-coloured, not topped by a thin black line. The hyphal system is monomitic (*sensu* Corner 1991). The basidiospores are ellipsoid to broadly ellipsoid, averaging 4.2 × 3.0 µm.

As far as the reproduction strategy is concerned, the species produces seasonal, solitary basidiomata, emerging from branches and twigs, often at a ramification point, and up to near the petioles or near new foliar shoots (fig. 2A–H) of a local species of *Nichallea* (Rubiaceae).

We conclude that the specimens of the "*P. littoralis*" clade from coastal vegetation in southwestern Gabon represent a distinct species, which is described below as *Phylloporia littoralis*.

TAXONOMY

Phylloporia littoralis Decock & Yombiyeni, **sp. nov.**
MycoBank no: MB 817631

Phylloporia littoralis is characterized by mostly amplectans basidiomata, a soft tomentum over a comparatively much thinner context, absence of black line above the context, a monomitic hyphal system and pale yellowish broadly ellipsoid basidiospores, 3.8–4.5 × 2.8–3.5 µm. – Type: Gabon, Ogooué Maritime, Gamba, approx. 2°43′S 10°01′E, elevation approx. 0–10 m, small stem of living *Nichallea* sp. (Rubiaceae), Dec. 2016, *P. Yombiyeni* s.n. (holo-: NY 02686200; iso-: MUCL 56144, LBV).

Basidiomata solitary, seasonal, pileate, sessile, sub-pendant first, soon broadly attached, semi-circular to amplectens, then often bi- or occasionally multi-lobed, in section hoof-shaped first, soon convex and bent downward toward the margin, to applanate then gradually thinning toward the margin, projecting 8–20 mm long, 5–30 mm wide, from 0.5–2 mm thick at the very margin up to 5–10 mm at the thickest part located near the centre when convex or lobed, or near the base when applanate; pileus surface spongy, tomentose, first regular, faintly velutinate, then irregularly pitted due to agglutination of hyphae and local collapsing of the tomentum, dull, mostly uniformly pale corky when fresh, orange grey to greyish orange (5B[3–4]), darker with age, light brown (cinnamon), drying greyish orange to yellowish brown (5[B–C]5 to 5[C–E]6, honey yellow, mustard brown); margin thinly rounded when fresh, entire, regular in outline, forming a well-defined rim when dry, white, whitish to pale creamy when fresh, drying pale yellowish grey; pore surface concave near the margin, then plane or gradually convex, the pore field starting at about 0.5–1 mm behind the very margin, mostly pale greyish orange to greyish orange when fresh, drying pale greyish orange to yellowish brown (5D[3–4] up to 5[D–E]6, honey yellow, oak brown, mustard brown); pores variable, round to angular (especially on drying), occasionally slightly ellipsoid to irregular, lobed, mostly (3–)4(–5) / mm when fresh [(4–)5(–6) / mm on drying], 150–300(–325) µm wide (ave = 210 µm wide), occasionally radially ellipsoid to oblong, 160–250 µm long, or multi-lobed; dissepiments thin, entire, 35–75 µm thick (ave = 58 µm), agglutinated; in section, tomentum spongy, loose, slightly hollowed due to agglutination of hyphae, brownish orange to yellowish brown (5[C–D]6, honey yellow), sometimes darker brown near the context, from 1 mm thick at the margin to 8 mm thick at the thickest part; context very thin to the margin, up to 0.5–1.2 mm thick at the base, shiny, greyish orange (cork-coloured) to greyish brown, without upper black line; tube layer up to 0.5–1.5 mm deep, pale greyish and contrasting with the context; context and tube layer darkening in alkali 3 %.

Hyphal system monomitic in all parts; generative hyphae simple septate, thin- to slightly thick-walled, hyaline, yellowish to light golden brown, darker, brownish in KOH, scarcely ramified, the branches constricted at their emergence point, soon growing parallel to mother hyphae; in the tomentum, next to the context, hyphae parallel, adpressed first, soon erected, loosely packed, free or loosely agglutinated in bundles, straight to sinuous, occasionally geniculated, mostly unbranched, slightly thick-walled, sub-hyaline to pale golden brown, from 3.5 µm diam. near the base, gradually enlarging up to 4.5–9.0 µm (ave = 6.6 µm diam.), locally inflated 11–15 µm; in the context hyphae adpressed to oblique but mostly erected in the continuity of the hymenophoral trama, with a near parallel orientation, moderately thick-walled with the lumen widely open, septate, but with long aseptate segments, (2.5–)3.5–4.0 µm diam. (ave = 3.6 µm); in the hymenophoral trama hyphae with a subparallel disposition, straight, occasionally geniculated, the lumen widely open, septate, with aseptate segments or with occasional with secondary septa, (2.0–)2.5–3.5 µm diam. (ave = 2.8 µm).

Hymenium: basidioles slightly pyriform to clavate; mature basidia mostly clavate, with four sterigmata, ~ 8.5 × 5 µm; cystidioles absent; basidiospores ellipsoid to broadly ellipsoid, appearing slightly angular on drying, thick-walled, smooth, pale yellowish in KOH, without reaction in Melzer's reagent, (3.5–)3.8–4.5(–4.8) × 2.8–3.5 µm (ave = 4.2 × 3.0 µm), R = 1.2–1.6(–1.65) (ave_R = 1.4). Figs 2–3.

Phylogenetic affinities – The species is related to *Phylloporia flacourtiae* (fig. 1), which is known from Eastern, subtropical Asia, in Southern China.

Ecology (substrate, host, habitat) – *Phylloporia littoralis* was found growing from living branches, twigs, up to near petioles of an unidentified bushy species of *Nichallea* (Rubiaceae), understorey compartment, open, coastal sclerophyllous forest on sandy soil, suffering seasonal drought periods, lower Guinean subregion. It is known for the time being from a single locality.

Geographic distribution – Currently known from a coastal area of southwestern Gabon.

Phenology – The species was observed, for the time being, at only one period, in December, when basidiomata emerged simultaneously from many individuals of the host plant.

Etymology – "*littoralis*" (Latin) in reference to the coastal habitat in southwestern Gabon where the type specimen was collected.

Additional specimens examined – **Gabon**: Ogooué Maritime, Gamba, approx. 2°43′S 10°01′E, elevation approx. 10 m a.s.l., small stem of living of an unidentified *Nichallea* species (Rubiaceae),

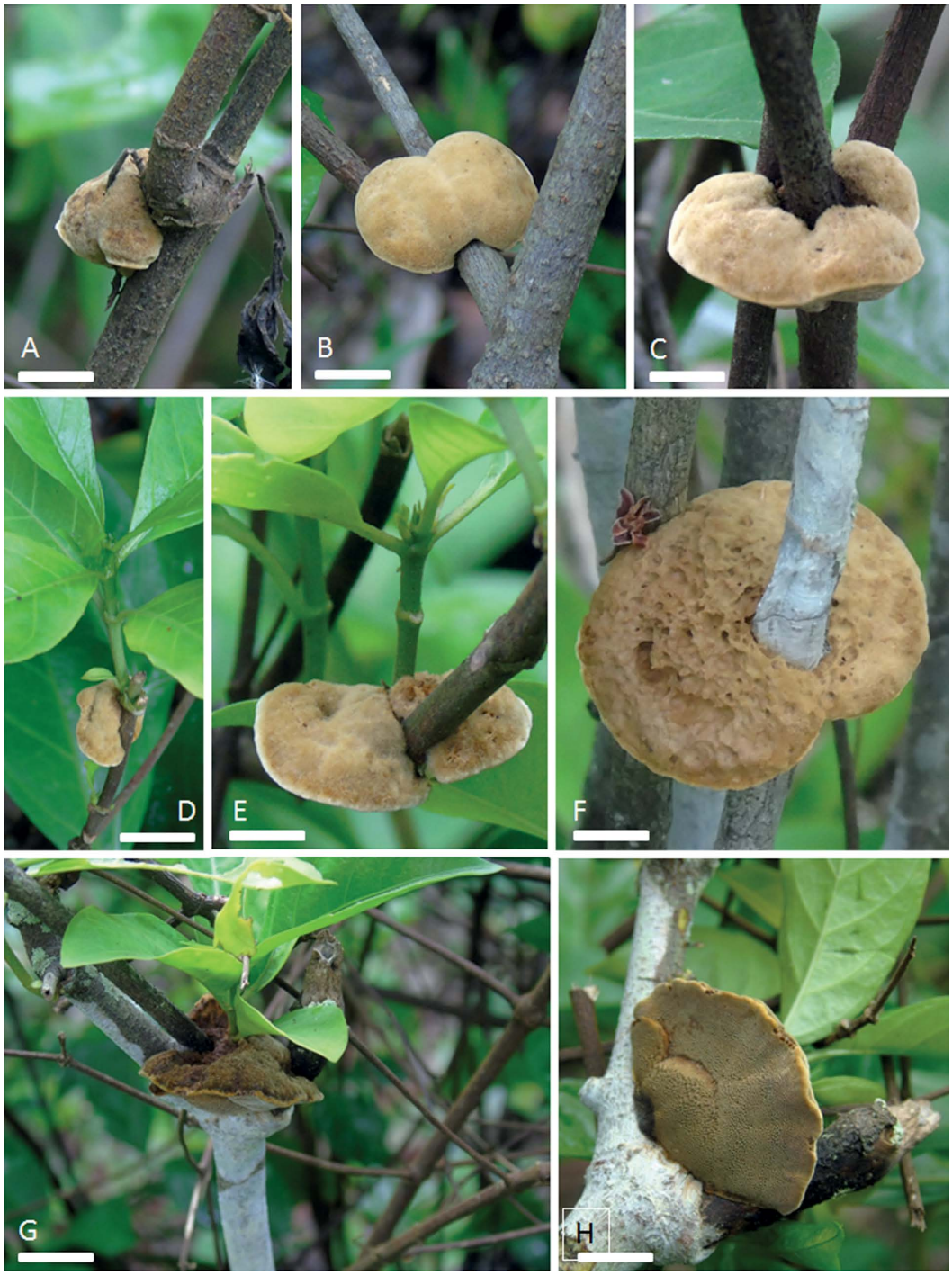

Figure 2 – Basidiomata of *Phylloporia littoralis in situ*: A, MUCL 56144; B, MUCL 56144; C, MUCL 56144; D, MUCL 56146; E, MUCL 56146; F, MUCL 56145; G, MUCL 56147; H, MUCL 56147. Scale bars: A & H = 8 mm; B, C & F = 7 mm; D & G = 10 mm; E = 5.5 mm.

Dec. 2016, *P. Yombiyeni* s.n. (MUCL 56145, LBV); ibid., *P. Yombiyeni* s.n. (MUCL 56146, LBV); ibid., *P. Yombiyeni* s.n. (MUCL 56147, LBV).

Conservation status – Data Deficient [DD]. The IUCN red list category (IUCN 2012) of *Phylloporia littoralis* is difficult to assess since it is intimately linked to the IUCN status of its host plant, a bushy *Nichallea* species (Rubiaceae), which remains to be determined at the species level. The species is known from four specimens collected in the same locality in the Gamba complex. No clear threat has been identified so far on the species, which probably follows its host and has probably a larger distribution. It should be, for the time being, classified as "data deficient" (DD) until the host species is known and its distribution assessed.

DISCUSSION

In a phylogenetic perspective, the closest relative of *Phylloporia littoralis* is, for the time being, *P. flacourtiae*. These taxa form a two-species clade with a moderate to high support (fig. 1, BS 77 %, MLBS 70 %, PP 1.0). *Phylloporia flacourtiae* shares with *P. littoralis* a pileus covered by a tomentum lying on a homogenous context lacking an upper black line. However, *P. flacourtiae* differs in having cyphelloid basidiomata, pending, attached by a small vertex, and a concentrically furrowed pileal surface. *Phylloporia flacourtiae* also differs by its autecology (hosts, habitat) and, likely, geographic distribution; it is so far only known on an unidentified species of *Flacourtia*, a small-stemmed Salicaceae, in a subtropical mountain environment, in south-eastern China.

In both a morphological and ecological perspective, however, *P. littoralis* is strongly reminiscent of *P. bibulosa* (see Corner 1991 for a detailed account of this species and of its range of variation). Both species share the same basidiome anatomy (a tomentum over a comparatively much thinner context), hyphal system (monomitic) and autecological features, including substrate and host (at botanical family level) relationships. Basidiomes of *P. bibulosa* also emerge from branches, twigs, petioles and abaxial sides of living leaves of small-stemmed understorey trees or bushes, including two species of Rubiaceae, i.e. *Ixora kingstonii* Hook.f. and *Nauclea subdita* (Korth.) Steud. (Corner 1991). *Phylloporia bibulosa* and *P. littoralis* form a morpho-ecological group in the sense of Yombiyeni et al. (2015).

Nevertheless, *P. bibulosa* and *P. littoralis* differ from each other in various morphological features, including, respectively, presence (100–200 µm thick, *fide* Corner 1991) vs. absence of a thin black line above the context and oblong to ellipsoid basidiospores, 2–2.5 µm wide (*fide* Wagner & Ryvarden 2002), ~2 µm wide in the type (*fide* Corner 1991) vs. ellipsoid to broadly ellipsoid basidiospores, 2.8–3.5 µm wide. They also have, likely, disjunct distributions. *Phylloporia bibulosa* was originally described from Singapore (Lloyd 1924) and is reported to date from tropical Asia only (Ryvarden & Johansen 1980, Corner 1991, Núñez & Ryvarden 2000, Wagner & Ryvarden 2002).

In the present phylogenetic inferences (fig. 1), the *P. littoralis* – *P. flacourtiae* clade is not related to the *P. bibulosa* clade (*sensu* Wagner & Ryvarden 2002). However, the affinities of *P. bibulosa*, as for the majority of species of the genus, are not resolved in the present inferences based on a single gene.

At a lesser degree, *P. littoralis* could be compared to *P. weberiana* and *P. chrysites*, both reported from the Guineo-Congolian phytochorion (Ryvarden & Johansen 1980, Hjortstam et al. 1993). These two species also share with *P. littoralis* the basidiome anatomy and the hyphal sys-

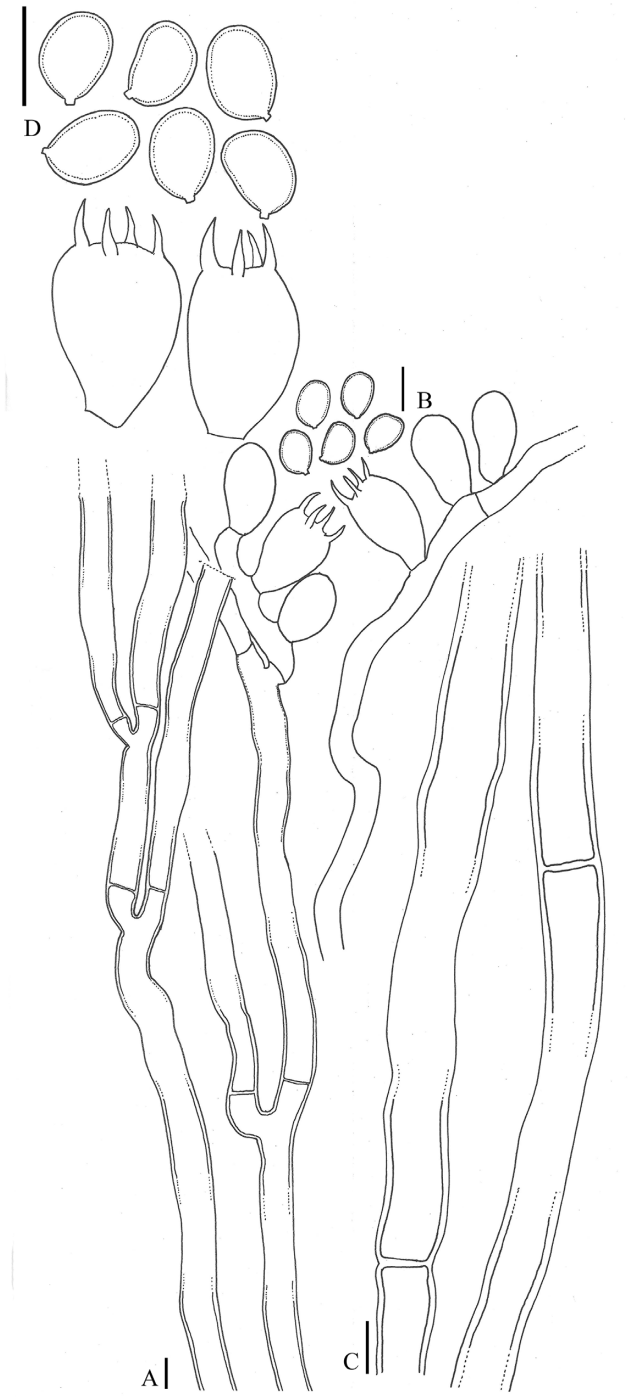

Figure 3 – *Phylloporia littoralis*, MUCL 56144 (isotype): A, hyphae from the hymenophoral trama; B, basidia, basidiole, basidiospores; C, hyphae from the tomentum; D, basidia and basidiospores. Scale bars: A = 3 µm; B–D = 5 µm.

Key to the species of *Phylloporia* found in Gabon and the Guineo-Congolian phytogeographic region

1. Basidiomata stipitate; emerging from underground organs (roots) of small trees or bushes.....2
1'. Basidiomata sessile, emerging from aboveground organs (trunk, branches, twigs, petioles) of small trees, bushes, liana.....3
2. Pileus surface homogeneous; context without thin black line; pores 7–9 / mm; basidiospores 2.0–3.0 × 2.5 µm.....*P. minutispora*
   Description in Ipulet & Ryvarden (2005); known from eastern side of the GC rainforest in medium elevation, DRC and Uganda.
2'. Pileus surface with silvery concentric lines; context with a thin black line; pores 10–11 / mm; basidiospores ellipsoid 3.4–4.0 × 2.2–2.7 µm.....*P. afrospathulata*
   Description in Yombiyeni et al. (2015). Known from Gabon. Specimens from Central Africa identified in literature as *P. spathulata* are keyed out here.
3. Pileus with a tomentum thicker than the underlying context.....4
3'. Pileus without tomentum, or with a trichoderm thinner than the underlying context.....6
4. Black line absent between the context and the tomentum; basidiomata up to 30 mm wide; pileus regular or pitted; margin thin.....*P. littoralis*
   Description in this paper. Known from Gabon.
4'. Black line present between the context and the tomentum; basidiomata up to 100–190 mm wide; pileus concentrically sulcated.....5
5. Basidiospores ellipsoid, 3–3.5 × 2–3 µm; the pileus sulcate.....*P. weberiana*
   Description in Wagner & Ryvarden (2002) and Corner (1991). In Central Africa, known from Cameroon, DRC and Uganda.
5'. Basidiospores broadly ovoid to subglobose, 2.5–3.5 µm.....*P. chrysites*
   Description in Wagner & Ryvarden (2002) and Corner (1991). In Central Africa, known from Cameroon.
6. Pileus with a thin trichoderm; context with a thin black line; hyphal system dimitic.....7
6'. Pileus without trichoderm; context without black line; hyphal system monomitic.....8
7. Basidiomata flabelliform to conical, pendant; pileus greyish orange to pale light brown.....*P. fulva*
   Description in Yombiyeni et al. (2015). Known from Gabon.
7'. Basidiomata semi-circular, triquetrous in section; pileus dark brown.....*P. pectinata* ME
   Known from Gabon.
8. Basidiospores oblong ellipsoid, 4.5–5.5 × 2.0–2.5 µm; pores 2–3 / mm.....*P. inonotoides*
   Description in Yombiyeni et al. (2015). Known from Gabon.
8'. Basidiospores ellipsoid to ovoid, shorter, on average < 4 µm long.....9
9. Basidiomata ≤ 1.5 mm thick; margin regular, entire; pileus shining.....*P. flabelliformis*
   Description in Decock et al. (2015). Known from Gabon.
9'. Basidiomata > 1.5 thick; margin irregular, incised; pileus dull.....*P. gabonensis*
   Description in Decock et al. (2015). Known from Gabon.

DRC = Democratic Republic of Congo; GC = Guineo-Congolian; ME = morpho-ecological group.

tem (cf. above). *Phylloporia weberiana* is based on *Fomes weberianus* Bres. & Henn. ex Sacc. (Saccardo 1891: 174). The original description rather points toward a species of *Phylloporia*: Saccardo emphasized a duplex context ("*strato duplice*") made of an upper tomentose layer ("*superiori tomentoso-floccoso*") and a lower corky layer ("*inferiori suberoso-lignoso*"), separated by a thin black line ("*a superiore linea nigra limitato*"), features found in many species of *Phylloporia*. However, according to Steyaert (1972), the type specimen of *F. weberianus* corresponds to a species of *Ganoderma*, *Ganoderma weberianum* (Bres. & Henn. ex Sacc.) Steyaert. The interpretation of this name here follows Ryvarden (1972) and Corner (1991).

Phylloporia weberiana and *P. littoralis* also share the basidiospores shape and size, but the former is distinguished in having commonly much larger basidiomata (up to 100 mm wide, *fide* Wagner & Ryvarden 2002; up to 190 mm wide, *fide* Corner 1991), a roughly sulcate pileus, a context with a thin black line (100–260 µm thick, *fide* Corner 1991) and smaller pores, 5–6(–7) / mm or 100–200 µm diam. (*fide* Corner 1991, Wagner & Ryvarden 2002). *Phylloporia weberiana* grows on small-stemmed trees and the basidiomes emerge preferentially from the trunks (Corner 1991). The affinities of *P. weberiana* also are not resolved in the present phylogenetic inferences.

Phylloporia chrysites differs from *P. littoralis* in having the context topped by a thin dark line, much smaller pores

(70–90 µm, *fide* Corner 1991, 6–8 / mm, *fide* Wagner & Ryvarden 2002) and broadly ellipsoid to subglobose, and smaller basidiospores (2.5–3.3 × 2.5–2.8 µm, *fide* Corner 1991; 2.5–3.5 µm diam., *fide* Ryvarden & Johansen 1980). It might differ also by substrate preference; the basidiomata of *P. chrysites* are commonly reported emerging from trunks of small-stemmed tree (Corner 1991) or liana. The affinities of *P. chrysites* also are not resolved in the present phylogenetic inferences.

In southwestern Gabon, *P. flabelliformis*, *P. gabonensis* and *P. inonotoides* are sympatric in the understorey compartment of the CTFS-ForestGEO Rabi rainforest plot, an area neighbouring the type locality of *P. littoralis*. They differ from *P. littoralis* in lacking a tomentum, inhabiting a different, humid and buffered environment and occurring on different understorey trees (*Anthostema* sp., *Dichostemma* sp. and *Crotonogyne* sp., Euphorbiaceae) (Decock et al. 2015, Yombiyeni et al. 2015). *Phylloporia inonotoides* additionally differs in having larger pores, 2–3 / mm, oblong to suballantoid and longer basidiospores (4.5–5.5(–6.5) µm long, ave = 4.9 µm) (Yombiyeni et al. 2015). *Phylloporia flabelliformis* and *P. gabonensis* also differ in having gregarious basidiomata, emerging simultaneously in very large number (> 100 basidiomata) from trunks, and much thinner compared to those of *P. littoralis*, not exceeding 2 mm thick (Decock et al. 2015).

With the addition of *P. littoralis*, eleven named *Phylloporia* species are reported from the Guineo-Congolian phytogeographic region (Ryvarden & Johansen 1980, Hjortstam et al. 1993, Núñez & Daniëls 1999, Ryvarden 2000, Wagner & Ryvarden 2002, Ipulet & Ryvarden 2005, Roberts & Ryvarden 2006). Seven species are described and, for the time being, only known from this phytochorion (Ipulet & Ryvarden 2005, Decock et al. 2015, Yombiyeni et al. 2015). Two additional unnamed species pertaining to the *P. pectinata* morpho-ecological group (fig. 1, PS 4 and PS 5) also remain to be described from this phytogeographic region.

Nonetheless, the reports of *P. chrysites*, *P. fruticum*, *P. spathulata* and *P. weberiana* in Central Africa should be taken with caution and might refer to other, distinct species; yet Yombiyeni et al. (2015) have described *P. afrospathulata* from the western edge of the Guineo-Congolian phytochorion, which is likely the correct species for the local records of *P. spathulata*. The type specimens of *Phylloporia chrysites*, *P. fruticum* and *P. weberiana* originate respectively from Venezuela (Berkeley 1856: 233), Cuba (Berkeley & Curtis 1868: 310), and the Southern Pacific Polynesian Island of Samoa (Saccardo 1891: 174). These three species are nowadays reported from the all Paleotropics (Ryvarden & Johansen 1980, Corner 1991, Hjortstam et al. 1993, Núñez & Ryvarden 2000, Wagner & Ryvarden 2002). Their occurrence in Central Africa (Ryvarden & Johansen 1980, Hjortstam et al. 1993) certainly needs re-evaluation.

Two other unnamed species pertaining to the *P. pectinata* morpho-ecological group also were found in two distinct mid-elevation forests of eastern Africa, in Kenya (fig. 1): PS 6, *P. pectinata* ME KE 15 02 and KE 15 19, known from two specimens originating from Kakamega forest (approx. 0°21′50″N 34°51′25″E, 1 500 m a.s.l.), both found growing on living *Rawsonia lucida* Harv. (Achariaceae); PS 7, *P. pectinata* ME KE 16 107 and KE 16 109, known from multiple specimens from Mount Elgon (approx. 1°2′41″N 34°47′9″E, 2 170 m a.s.l.), growing locally exclusively on an unidentified species of Meliaceae (search for identity using the blast search engine at GenBank and the ITS sequence points toward a species of *Turraea* L.). Locally, most individual trees of this unidentified Meliaceae had multiple basidiomata.

Nevertheless, to name these species of the *P. pectinata* morpho-ecological group would require a more in-depth analysis of the current species concept of *P. pectinata* and the revision of the type specimens of its taxonomic synonyms.

ACKNOWLEDGEMENTS

Prudence Yombiyeni gratefully acknowledges the financial support received from the Research Institute in Tropical Ecology (IRET). Cony Decock gratefully acknowledges the financial support received from the Belgian State – Belgian Federal Science Policy and from the FNRS through the ER-AFRICA project ASAFEM. Our gratitude is also extended to Dr L. Korte and Mr Kassa Boussamba Aimé (Gabon Biodiversity Program, a partnership between the Smithsonian Conservation Biology Institute, Shell Gabon, and the Government of Gabon) and Shell Gabon for facilitating the field work at Gamba. Thanks also are extended to Stéphanie Huret (MUCL) for her help with the sequencing program, and to Olivier Lachenaud (Botanic Garden Meise, Belgium) for the identification of the host plant.

REFERENCES

Amalfi M., Yombiyeni P., Decock C. (2010) Fomitiporia in sub-Saharan Africa: morphology and multigene phylogenetic analysis support three new species from the Guineo-Congolian rainforest. Mycologia 102: 1303–1317. https://doi.org/10.3852/09-083

Berkeley M.J. (1856) Decades of Fungi; decades LIX−LX. Rio Negro Fungi. Hooker's Journal of Botany 8: 233–239.

Berkeley M.J., Curtis M.A. (1868) Fungi Cubenses (Hymenomycetes). Journal of the Linnean Society, Botany 10: 280–341.

Corner E.J.H. (1991) Ad polyporaceas VII. The xanthochroic polypores. Beihefte zur Nova Hedwigia 101: 1–175.

Cui B.-K., Yuan H.-S., Dai Y.-C. (2010) Two new species of Phylloporia (basidiomycota, hymenochaetaceae) from china. Mycotaxon 113: 171–178. https://doi.org/10.5248/113.171

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 area. Mycologia 99: 733–752. https://doi.org/10.3852/mycologia.99.5.733

Decock C., Valenzuela R., Castillo G. (2010) Studies in Perenniporia s.l.: Perenniporiella tepeitensis comb. nov., an addition to Perenniporiella. Cryptogamie, Mycologie 31: 419–429.

Decock C., Amalfi M., Robledo G., Castillo G. (2013) Phylloporia nouraguensis (hymenochaetales, basidiomycota), an undescribed species from the Neotropics. Cryptogamie, Mycologie 34: 15–27. https://doi.org/10.7872/crym.v34.iss1.2013.15

Decock C., Yombiyeni P., Memiaghe H. (2015) Hymenochaetaceae from the Guineo-Congolian rainforest: Phylloporia flabelliforma sp. nov. and Phylloporia gabonensis sp. nov., two

undescribed species from Gabon. Cryptogamie, Mycologie 36: 449–467. https://doi.org/10.7872/crym/v36.iss4.2015.449

Ferreira Lopes V., Robledo G.L., Reck M.A., Góes Neto A., Deschler-Santos R. (2016) Phylloporia spathulata sensu stricto and two new South American stipitate species of Phylloporia (Hymenochaetaceae). Phytotaxa 257: 133–148. https://doi.org/10.11646/phytotaxa.257.2.3

Gafforov J., Tomšovský M., Langer E., Zhou L.-W. (2014) Phylloporia yuchengii sp. nov. (Hymenochaetales, Basidiomycota) from western Tien Shan mountains of Uzbekistan based on phylogeny and morphology. Cryptogamie, Mycologie 35: 313–322. https://doi.org/10.7872/crym.v35.iss4.2014.313

Hjortstam k., Ryvarden L., Watling R. (1993) Preliminary checklist of non-agaricoid macromycetes in the Korup National Park, Cameroon, and surrounding area. Edinburgh Journal of Botany 50: 105–119. https://doi.org/10.1017/S0960428600000743

Huelsenbeck J.P., Ronquist F. (2001) MrBayes: Bayesian inference of phylogeny. Bioinformatics 17: 754–755.

IUCN (2012) IUCN Red List Categories and Criteria: Version 3.1. 2nd Ed. Gland & Cambridge, IUCN.

Ipulet P., Ryvarden L. (2005) New and interesting polypores from Uganda. Synopsis Fungorum 20: 87–99.

Klotzsch J.F. (1833) Fungi exotici et collectionibus Britannorum. Linnaea 8: 478–490.

Kornerup A.J., Wanscher H. (1981) Methuen handbook of colour. 3th Ed. London, Eyre Methuen.

Kunth K.S. (1822) Synopsis plantarum quas in itinere ad plagam aequinoctialem orbis novi, collegerunt A. de Humboldt et A. Bonpland. Paris, F.G. Levrault.

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. https://doi.org/10.3852/mycologia.98.6.926

Liu J.K., Hyde K.D., Jones E.B.G., et al. (2015) Fungal diversity notes 1–110: taxonomic and phylogenetic contributions to fungal species. Fungal Diversity 72: 1–197. https://doi.org/10.1007/s13225-015-0324-y

Lloyd C.G. (1924) Mycological notes 73. Mycological writings 7: 1301–1332.

Murrill W.A. (1904) A new polyporoid genus from South America. Torreya 4: 141–142.

Núñez M., Daniëls P. (1999) Fungi from the Dja biosphere reserve (Cameroon) II. Polypores. Mycotaxon 73: 235–246.

Núñez M., Ryvarden, L. (2000) East Asian polypores, volume 1. Synopsis Fungorum 13: 1–168.

Posada D., Crandall K.A. (1998) Modeltest: testing the model of DNA substitution. Bioinformatics 14: 817–818. https://doi.org/10.1093/bioinformatics/14.9.817

Roberts P., Ryvarden L. (2006) Poroid fungi from Korup National Park, Cameroon. Kew Bulletin 61: 55–78.

Ryvarden L. (1972) A critical checklist of the Polyporaceae in tropical East Africa. Norwegian Journal of Botany 19: 229–238.

Ryvarden L., Johansen I. (1980) A preliminary polypore flora of East Africa. Oslo, Fungiflora.

Ryvarden L. (2000) A critical checklist of African polypores. In: Associazione Micologica Bresadola (ed.) Micologia 2000: 471–483. Trento, Fundacione Centro Studi Micologici.

Saccardo P.A. (1891) Sylloge fungorum vol. 9. Padua, published by the author.

Stamatakis A. (2006) Raxml-vi-hpc: maximum likelihood-based phylogenetic analyses with thousands of taxa and mixed models. Bioinformatics 22: 2688–2690. https://doi.org/10.1093/bioinformatics/btl446

Steyaert R.L. (1972) Species of Ganoderma and related genera mainly of the Bogor and Leiden Herbaria. Persoonia 7: 55–118.

Swofford D.L. (2003) PAUP*: phylogenetic analysis using parsimony (*and other methods). Version 4.0b10. Sunderland, Sinauer associates.

Thiers B. (continuously updated) Index herbariorum: a global directory of public herbaria and associated staff. Available from http://sweetgum.nybg.org/ih/ [accessed 1 May 2016].

Valenzuela R., Raymundo T., Amalfi M., Castillo G., Decock C. (2011) two undescribed species of Phylloporia are evidenced in Mexico based on morphological, phylogenetic, and ecological data. Mycological Progress 10: 341–349. https://doi.org/10.1007/s11557-010-0707-0

Vande weghe J.P. (2005) Akanda et Pongara. Plages et mangroves. Libreville, Wildlife conservation Society.

Vilgalys R., Hester M. (1990) Rapid genetic identification and mapping of enzymatically amplified ribosomal DNA from several Cryptococcus species. Journal of Bacteriology 172: 4238–4246. https://doi.org/10.1128/jb.172.8.4238-4246.1990

Wagner T., Fischer M. (2002) Proceedings toward a natural classification of the worldwide taxa Phellinus s.l. and Inonotus s.l., and phylogenetic relationships of allied genera. Mycologia 94: 998–1016. https://doi.org/10.1080/15572536.2003.11833156

Wagner T., Ryvarden L. (2002) Phylogeny and taxonomy of the genus Phylloporia (Hymenochaetales). Mycological Progress 1: 105–116. https://doi.org/10.1007/s11557-006-0009-8

White F. (1983) The vegetation of Africa, a descriptive memoir to accompany the UNESCO/AETFAT/UNSO vegetation map of Africa. Paris, Unesco.

Yombiyeni P., Douanla-Meli C., Amalfi M., Decock C. (2010) Poroid hymenochaetaceae from Guineo-Congolian rainforest: Phellinus gabonensis sp. nov. from Gabon − taxonomy and phylogenetic relationships. Mycological Progress 10: 351–362. https://doi.org/10.1007/s11557-010-0708-z

Yombiyeni P., Balezi A., Amalfi M., Decock C. (2015) Hymenochaetaceae from the Guineo-Congolian rainforest: three new species of Phylloporia based on morphological, DNA sequences, and ecological data. Mycologia 107: 996–1011. https://doi.org/10.3852/14-298

Zhou L.W., Dai Y.C. (2012) Phylogeny and taxonomy of Phylloporia (Hymenochaetales), Basidiomycota): new species and a worldwide key to the genus. Mycologia 104: 211–222. https://doi.org/10.3852/11-093

Zhou L.W. (2013) Phylloporia tiliae sp. nov. from China. Mycotaxon 124: 361–365. https://doi.org/10.5248/127.103

Zhou L.W. (2015) Four new species of Phylloporia (Hymenochaetales, Basidiomycota) from tropical China with a key to Phylloporia species worldwide. Mycologia 107: 1184–1192. https://doi.org/10.3852/14-254

Zhou L.W. (2016) Phylloporia minutopora and P. radiata spp. nov. (Hymenochaetales, Basidiomycota) from China and a key to worldwide species of Phylloporia. Mycological Progress 15: https://doi.org/10.1007/s11557-016-1200-1

Manuscript received 7 Sep. 2016; accepted in revised version 19 Apr. 2017.

Communicating Editor: Jérôme Degreef.