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Vittaliana mangrovei

Devadatha, Nikita, A.Baghela & V.V.Sarma,
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based on morphology and multigene phylogeny

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***Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov, sp. nov. (Phaeosphaeriaceae), from mangroves near Pondicherry (India), based on morphology and multigene phylogeny**

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ABSTRACT

Collection and examination of decaying wood samples of *Avicennia marina* (Forssk.) Vierh. from Pondicherry mangroves, India, resulted in the discovery of a novel monotypic genus *Vittaliana*, based on the type species *V. mangrovei*, which shares close morphological affinities with *Italica* Wanas., Camporesi & K.D.Hyde and *Phaeosphaeriopsis* M.P.S. Câmara, M.E. Palm & A.W. Ramaley. The concatenated LSU, SSU, TEF1 α and ITS multigene phylogenetic analyses revealed that the new genus clustered together with *Italica* as a sister clade but forms a separate branch. In addition, morphological variations in *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov., such as semi-immersed, globose to subglobose ascospores, 5-6 distoseptate, phragmosporous, yellow to golden-yellow ascospores lacking a mucilaginous sheath and any type of ornamentation, and which are strongly constricted at the 4th septum, clearly delineate the new genus from the other genera in Phaeosphaeriaceae. Furthermore, *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., is saprobic and occurs in marine environment. Morphological characteristics and phylogenetic relation of our new species are discussed by comparing with closely related genera in Phaeosphaeriaceae.

KEY WORDS

Pleosporales,
Phaeosphaeriaceae,
mangroves,
marine fungi,
new genus,
new species.

RÉSUMÉ

Vittaliana mangrovei Devadatha, Nikita, A.Baghela & V.V.Sarma, *gen. nov., sp. nov.* (Phaeosphaeriaceae) *issus des mangroves près de Pondicherry (Inde) sur la base de la morphologie et d'une phylogénie multigène.* La récolte et l'examen d'échantillons de bois pourri d'*Avicennia marina* (Forssk.) Vierh. dans les mangroves de Pondichéry, en Inde, a abouti à la découverte d'un nouveau genre monotypique, *Vittaliana*, typifié par *V. mangrovei*. Le genre est morphologiquement similaire aux genres *Italica* Wanas., Camporesi & K.D.Hyde et *Phaeosphaeriopsis* Câmara, M.E. Palm & A.W. Ramaley. L'analyse phylogénétique multigène concaténée, basée sur la LSU, SSU, TEF1 α et ITS, révèle que le nouveau genre est monophylétique et sœur du genre *Italica*. De plus, la morphologie de *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, *gen. nov., sp. nov.*, comprenant des ascromata globuleux ou subglobuleux demi-immergés, produisant des ascospores jaunes à dorées, qui sont des phragmospores 5-6 distoseptées, sans gaine mucilagineuse et sans ornementation, fortement rétrécies à la 4^e cloison, clairement sépare le nouveau genre des autres Phaeosphaeriaceae, sans oublier que *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma, *gen. nov.*, est un organisme marin saprotrophe. La morphologie et les relations phylogénétiques de notre nouvelle espèce sont comparées avec celles des genres proches dans les Phaeosphaeriaceae.

MOTS CLÉS
Pleosporales,
Phaeosphaeriaceae,
mangroves,
champignons marins,
genre nouveau,
espèce nouvelle.

INTRODUCTION

The class Dothideomycetes is the largest class of Ascomycota having an estimated number of 19 000 species (Kirk *et al.* 2008; Hyde *et al.* 2013). The members of this class are mostly characterized by ascolocular ascromata and bitunicate asci that are fissitunicate (Luttrell 1955; Eriksson 1981; Barr & Huhndorf 2001). Within this class, Pleosporales is the largest order with 41 families (Hyde *et al.* 2013). Luttrell (1955) proposed the name Pleosporales to accommodate members of Dothideomycetes having perithecoïd ascromata with pseudoparaphyses amongst the asci and accepted seven families in the order, which was later validly circumscribed by Barr (1987). Barr (1983) gave much importance to pseudoparaphyses at the ordinal level and introduced Melanomatales to accommodate taxa with trabeculate pseudoparaphyses as compared to cellular pseudoparaphyses in Pleosporales. Recent DNA sequence based phylogenetic analyses, however, indicated that the type of pseudoparaphyses (trabeculate vs. cellular) do not result in natural groupings as taxa with these centrum types are dispersed over phylogenetic trees (Liew *et al.* 2000; Lumbsch & Lindemuth 2001). Hence Melanomatales was treated as a synonym of Pleosporales (Eriksson 2006). The order Pleosporales contains 41 families (Hyde *et al.* 2013) with several new families added in recent times (Zhang *et al.* 2011; Hyde *et al.* 2013). Among the different families, Phaeosphaeriaceae is a large and important family having over 300 species in 35 genera (18 sexual and 17 asexual) (Kirk *et al.* 2008; Zhang *et al.* 2009; Hyde *et al.* 2013; Phookamsak *et al.* 2014). Barr (1979) introduced the family Phaeosphaeriaceae and typified *Phaeosphaeria* I.Miyake as the type genus and *P. oryzae* I.Miyake as the type species. The familial characters are saprobic, pathogenic or hyper-

parasitic fungi growing typically on herbaceous stems or monocotyledonous leaves, culms, or flowers, but also on woody substrates. Ascromata are immersed to erumpent or superficial, globose or conical, short papillate, small to medium, asci bitunicate, and ascospores hyaline, yellowish or brown, narrowly or widely obovoid, aseptate or septate (Barr 1979; Phookamsak *et al.* 2014). The family and its circumscription were accepted by several recent papers (Zhang *et al.* 2012; Hyde *et al.* 2013; Phookamsak *et al.* 2014).

Phaeosphaeriaceae is one of the largest families in Pleosporales, established by Barr (1979). It includes 45 genera and more than 400 species including various plant pathogens, endophytes, saprobes on plant hosts, predominantly on monocotyledons, and few occurring on dicotyledons (Quaedvlieg *et al.* 2013; Phookamsak *et al.* 2014; Wanasinghe *et al.* 2014, 2018; Li *et al.* 2015; Liu *et al.* 2015; Hyde *et al.* 2016; Karunarathna *et al.* 2017; Phookamsak *et al.* 2017). Various studies on Phaeosphaeriaceae increased the number of genera and species in this family, indicating that there is a hidden diversity yet to be explored in this family. There is a considerable taxonomic confusion to delineate the sexual genera of Phaeosphaeriaceae based on morphological characters or single gene DNA sequence analysis alone (Hyde *et al.* 2013; Phookamsak *et al.* 2014). However, they can be segregated by their asexual morph connections and multigene phylogenetic analyses (Phookamsak *et al.* 2014).

Genera in Phaeosphaeriaceae have diverse morphological characteristics including small to medium-sized, setose or glabrous ascromata with papilla; cylindrical to clavate asci, and variously shaped ascospores. For example, genera producing dictyosporous ascospores comprise *Allophaeosphaeria* (Appendix 1 for taxon authorship), *Dematiopleospora*, *Gallicola*, *Muriphaeosphaeria* and *Populocrescentia*; genera producing phragmosporous ascospores comprise *Equiseticola*,

Juncaceicola, *Loratospora*, *Neosetophoma*, *Parastagonospora*, *Phaeosphaeria*, *Phaeosphaeriopsis*, *Poaceicola*, *Premilcurensis*, *Pseudophaeosphaeria*, *Septoriella*, *Setomelanomma*, *Setophoma*, *Sulcispora* and *Vagicola*; while genera producing scolecosporous ascospores comprise *Entodesmium*, *Leptospora*, *Nodulosphaeria*, *Ophiobolus*, *Ophiosphaerella* and *Ophiosimulans* (Phookamsak *et al.* 2014; Wanasinghe *et al.* 2014; Jayasiri *et al.* 2015a; Li *et al.* 2015; Liu *et al.* 2015; Phukhamsakda *et al.* 2015; Tibpromma *et al.* 2015, 2016, 2017; Hyde *et al.* 2016; Mapook *et al.* 2016; Thambugala *et al.* 2017). Several genera have been introduced only for asexual morph taxa such as *Camarosporioides* (Hyde *et al.* 2016), *Chaetosphaeronema* (de Gruyter *et al.* 2010; Hyde *et al.* 2016), *Didymocytis* (Ertz *et al.* 2015), *Melnikia* (Wijayawardene *et al.* 2016) and *Neosulcatispora* (Crous *et al.* 2016). At present, only three genera (*Loratospora*, *Phaeosphaeria* and *Stagonospora*) in Phaeosphaeriaceae were listed from marine environment and some others were transferred to other families based on molecular data (Jones *et al.* 2015).

We have been investigating the biodiversity of marine fungi colonizing mangrove substrata in Pondicherry district of Puducherry, India. Puducherry has four different districts spread over different geographic locations including Pondicherry, Karaikal, Mahe and Yanam. Within the Pondicherry district the mangroves are found in Ariyankuppam, Thengaithittu and Veerampattinam. Recent studies on *Rhizophora apiculata* Blume, Rhizophoraceae for marine fungi from Ariyankuppam mangroves, Pondicherry resulted in the retrieval of 26 marine fungi (Sarma 2016). As an extension of this work we have collected samples from Veerampattinam mangroves in Pondicherry, which has hitherto remained unexplored for marine fungi. Veerampattinam mangroves are mainly composed of *Avicennia marina* (Forssk.) Vierh., Acanthaceae mixed with some *Rhizophora* sp. The examination of the dead mangrove samples has resulted in the discovery of a new marine fungal taxon sharing morphological features with *Italica* Wanas., Camporesi & K.D.Hyde and *Phaeosphaeriopsis* Câmara, M.E. Palm & A.W. Ramaley. Further, multigene phylogenetic analyses revealed that our novel taxon forms a monophyletic clade in the Phaeosphaeriaceae, which is here introduced as *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov.

MATERIAL AND METHODS

SAMPLE COLLECTION, SPECIMEN EXAMINATION AND ISOLATION

Dead and decomposing wood samples of *Avicennia marina* were collected from Veerampattinam mangroves (11.59°N, 79.5°E), Puducherry (= Pondicherry), southeast coast of India. Samples were processed and examined as described in Devadatha *et al.* (2017). Briefly, samples were examined with an Optika stereo zoom SZM-LED1 microscope. Hand sections of ascomata were taken and the spore mass was mounted in sterile sea water or Lacto phenol for micromor-

phological studies. The taxon was examined using Nikon ECLIPSE TiU upright microscope and photographed with Nikon DS-Fi2 digital camera (Tokyo, Japan) fitted to the microscope. Measurements were taken with Nikon NIS-Elements-Imaging Software (v. 4.4) program and images were processed with Adobe Photoshop CS6 updated v. 13.0.1 software (Adobe Systems inc., United States).

Single spore isolates were obtained as described in Chomnunti *et al.* (2014) with few modifications. Germinated ascospores within 24 hours were transferred individually to Sea Water Malt extract agar (MEA) prepared with 1:1 ratio of sea water and distilled water and incubated at room temperature. The living culture and herbarium specimen were deposited at National Fungal Culture Collection of India (NFCCI), Ajrekar Mycological Herbarium (AMH), Agharkar Research Institute (ARI), Pune, India. Facesoffungi and Index Fungorum numbers were provided as described in Jayasiri *et al.* (2015b) and Index Fungorum (2018).

DNA ISOLATION, AMPLIFICATION AND SEQUENCING

Genomic DNA was isolated from fungal colonies grown on Malt Extract Agar for a week, following a simple and rapid DNA extraction protocol (Aamir *et al.* 2015) using Fast Prep 24 tissue homogenizer (MP Biomedicals GmbH, Eschwege, Germany). The DNA was resuspended in 50 µL TE buffer and checked for quantity and quality by 1% agarose gel electrophoresis. The following four genes were chosen for the phylogenetic analysis: The Internal transcribed spacer (ITS), small (18S) and large subunit (28S) of the nuclear ribosomal DNA (ITS, SSU, and LSU) plus the translation elongation factor 1-alpha (TEF1) gene and these were amplified using primer pairs ITS-rDNA: ITS4 & ITS5 (White *et al.* 1990); SSU: NS1 & NS4 (White *et al.* 1990); LSU: LROR & LR7 (Bunyard *et al.* 1994); and TEF1 α : 983F & 2218R (Rehner 2001). Each gene region was amplified individually by PCR in a 50 µL reaction volume containing 32 µL PCR grade water (Sigma, St. Louis, MO, United States), 5 µL PCR buffer (10 \times), 4 µL of 10 mM dNTPs mix (Sigma-Aldrich), 1 µL of each primer (20 pmol/µL), 1 µL (5U/µL) of Taq polymerase (Sigma-Aldrich) along with 20-50 ng of template DNA. Amplification was done using an Applied Biosystems ProFlex PCR System (Applied Biosystems, Waltham, MA, United States) following standard cycling conditions: 5 min step at 95°C, followed by 30 cycles of 1 min at 95°C, 30 s at 55°C and 1 min at 72°C and a final 7 min extension step at 72°C. The amplified products were analyzed on 1.2% agarose gel. The PCR products were purified using an Axygen PCR cleanup kit (Axygen Scientific Inc, CA, United States). Sequencing reactions were performed with a Big Dye terminator cycle sequencing kit, ver. 3.1/1.1 (Applied Biosystems). All the sequencing reactions were purified and analyzed on an ABI Avant 3100 automated DNA sequencer (Applied Biosystems).

PHYLOGENETIC ANALYSES

The LSU, SSU, ITS and TEF1 α sequences generated in this study were subjected to BLAST similarity search in the

nucleotide database of GenBank to find out the most closely related taxa. In addition, based on the recently published data from Phookamsak *et al.* (2017) and Wanasinghe *et al.* (2018) also, the sequences from closely related taxa were retrieved from GenBank (Table 1). The multiple sequence alignments were performed online with the MAFFT server (<http://mafft.cbrc.jp/alignment/server/>) (Katoh & Standley 2013) and manually improved using Bio Edit v. 7.0.5.2 (Hall 1999), wherever necessary.

Phylogenetic analyses were conducted using maximum likelihood (ML), maximum parsimony (MP) and Bayesian inference (BI) methods. A Maximum likelihood analysis was performed using the RAxML-HPC2 on XSEDE (8.2.8) (Stamatakis *et al.* 2008; Stamatakis 2014) in the CIPRES (Miller *et al.* 2010). Analyses were carried out using general time reversible model (GTR) using proportion of invariable sites applied with a gamma distribution and four discrete implementation rates.

Maximum parsimony (MP) analysis was performed using PAUP (Phylogenetic Analysis Using Parsimony) v. 4.0b10 with the heuristic search option 1000 random-addition sequences with a tree bisection and reconnection (TBR) branch swapping algorithm (Swofford 2002). Parsimony scores such as Tree length [TL], consistency index [CI], retention index [RI], rescaled consistency index [RC], homoplasy index [HI] values were calculated. The Kishino-Hasegawa tests (Kishino & Hasegawa 1989) were performed to determine whether the trees inferred under different optimality criteria were significantly different.

Bayesian analysis was conducted using MrBayes v. 3.1.2 (Huelsenbeck & Ronquist 2001). The nucleotide substitution models selected for individual and combined datasets were GTR+I+G. Bayesian posterior probabilities (BYPP) were determined (Rannala & Yang 1996; Zhaxybayeva & Gogarten 2002) by Markov Chain Monte Carlo sampling (BMCMC). The Bayesian analysis was carried out with two parallel runs with six Markov Chain Monte Carlo (MCMC) chains and allowed to run for 5 000 000 generations and trees were sampled every 100 generations resulting in 50 000 total trees. The distribution of log-likelihood scores was examined to determine stationary phase for each search and to decide if extra runs were required to achieve convergence, using the program Tracer 1.5 (Rambaut & Drummond 2007). The first 10 000 trees, representing the burn in phase of the analyses were discarded, while the remaining were used to calculate posterior probabilities (PP) in the majority rule consensus tree. The best fit evolutionary models for ML, MP analysis and Bayesian inference were selected independently for each locus using MrModeltest v. 2.3 (Nylander 2004) under the Akaike Information Criterion (AIC). The Phylograms were drawn using FigTree v. 1.4.0 program (Rambaut 2012) and edited in Microsoft power point (2016) and Adobe Illustrator® CS5 (v. 15.0.0, Adobe®, San Jose, CA). The sequences of novel taxon in the present study were deposited in Genbank (Table 1) and alignments in TreeBASE, submission ID: 22525 (<http://www.treebase.org/>).

RESULTS

PHYLOGENETIC ANALYSES

The combined four loci (nuc 28S, nuc18S, ITS and TEF1 α) matrix consisted of 116 taxa from Phaeosphaeriaceae (including our new taxon) with 3476 nucleotide characters (including gaps). Two taxa from Leptosphaeriaceae (*Leptosphaeria doliolum* (Pers.) Cesati & De Notaris CBS 505.75, *Paraleptosphaeria dryadis* (Johanson) Gruyter, Aveskamp & Verkley CBS 643.86) were used as outgroups (Table 1). The individual LSU, SSU, TEF1 α and ITS alignments corresponding to each gene and a combined alignment of four genes were analyzed. Phylogenetic analyses of individual datasets from LSU and SSU genes resulted in poor phylogenetic resolution at the species level and segregated taxa at the genus level. Phylogenetic trees generated from ML, MP and BI analyses were similar in topologies and congruent with earlier studies (Phookamsak *et al.* 2017; Wanasinghe *et al.* 2018). RAxML analysis of the combined dataset yielded a best scoring tree (Fig. 1) with a final ML optimization likelihood value of -28742.598594 . The matrix had 1265 distinct alignment patterns, with 20.72% of undetermined characters or gaps. Estimated base frequencies were as follows; A = 0.245892, C = 0.235789, G = 0.264964, T = 0.253356; substitution rates AC = 1.139891, AG = 2.948396, AT = 2.246096, CG = 0.780973, CT = 6.577801, GT = 1.000000; proportion of invariable sites I = 0.657756; gamma distribution shape parameter α = 0.559988. The maximum parsimonious dataset consists of 116 taxa with 3476 characters, of which 2562 were constant, 648 (18.64%) parsimony-informative and 266 parsimony-uninformative. The parsimony analysis of the data matrix resulted in one thousand equally parsimonious trees with a length of 4959 steps (CI = 0.286, RI = 0.625, RC = 0.179, HI = 0.714) in the first tree. Bayesian posterior probabilities from MCMC were evaluated with final average standard deviation of split frequencies less than 0.01.

Vittaliana mangrovei Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov., grouped within the Phaeosphaeriaceae as a distinct lineage sharing an unsupported sister relation to a fully supported clade comprising both included species of *Italica* (Fig. 1).

Genus *Vittaliana*

Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov.

TYPE SPECIES. — *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, sp. nov.

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DESCRIPTION

Saprobic on mangrove wood.

TABLE 1. — GenBank accession numbers of the isolates used in this study. The newly generated sequences are indicated in bold.

Taxon	Strain	GenBank accession numbers			
		ITS	LSU	SSU	TEF1 α
<i>Acericola italica</i>	MFLUCC 13-0609	MF167428	MF167429	MF167430	–
<i>Allophaeosphaeria muriformia</i>	MFLUCC 13-0349	KP765680	KP765681	KP765682	–
<i>Amarenographium ammophilae</i>	MFLUCC 16-0296	KU848196	KU848197	KU848198	MG520894
<i>Amaeronomyces dactylidis</i>	MFLUCC 14-0207	KY775577	KY775575	–	–
<i>Bhatiellae rosae</i>	MFLUCC 17-0664	MG828873	MG828989	MG829101	–
<i>Camarosporoides phragmitis</i>	KUMCC 15-0599	KX572340	KX572345	KX572350	KX572354
<i>Chaetosphaeronema achilleae</i>	MFLU 15-1922	KX765265	KX765266	–	–
<i>Chaetosphaeronema hispidulum</i>	CBS 21675	KF251148	EU754144	EU754045	–
<i>Dactylidina dactylidis</i>	MFLU 13-0618	KP744432	KP744473	KP753946	–
<i>Dactylidina dactylidis</i>	MFLU 14-0966	MG828886	MG829002	MG829113	MG829199
<i>Dactylidina shoemakeri</i>	MFLU 14-0963	MG828887	MG829003	MG829114	MG829200
<i>Dematiopleospora cirsii</i>	MFLUCC 15-0615	KX274243	KX274250	–	KX284708
<i>Dematiopleospora fusiformis</i>	MFLUCC 15-2133	NR157463	KY239030	NG065662	–
<i>Dematiopleospora mariae</i>	MFLUCC 13-0612	KX274244	KJ749653	KJ749652	KJ749655
<i>Didymocrytis xanthomendozae</i>	CBS 129666	KP170651	JQ238634	–	–
<i>Didyerichomyces fiucuzzae</i>	CBS 128019	KP170647	JQ238616	–	–
<i>Embarria clematidis</i>	MFLUCC 14-0976	MG828871	MG828987	MG829099	MG829194
<i>Embarria clematidis</i>	MFLUCC 14-0652	KT306949	KT306953	KT306956	–
<i>Entodesmium artemisiae</i>	MFLUCC 14-1156	KT315508	KT315509	MG520979	MG520905
<i>Equiseticola fusispora</i>	MFLUCC14-0522	KU987668	KU987669	KU987670	MG520895
<i>Gallicola pseudophaeosphaeria</i>	MFLUCC 14-0524	KT326692	KT326693	–	MG520896
<i>Hawksworthiana alliariae</i>	MFLUCC 13-0070	KX494876	KX494877	KX494878	–
<i>Hawksworthiana clematidicola</i>	MFLUCC 14-0910	MG828901	MG829011	MG829120	MG829202
<i>Hawksworthiana lonicera</i>	MFLUCC 14-0955	MG828902	MG829012	MG829121	MG829203
<i>Hydeomyces desertipleosporoides</i>	SQUCC 15259	MK290841	MK290839	MK290843	–
<i>Hydeomyces desertipleosporoides</i>	SQUCC 15260	MK290842	MK290840	MK290844	–
<i>Italica achilleae</i>	MFLUCC 14-0959	MG828903	MG829013	MG829122	MG829204
<i>Italica luzulae</i>	MFLUCC 14-0932	NG060796	KT306951	–	–
<i>Juncaceicola italica</i>	MFLUCC 13-0750	KX500110	KX500107	KX500108	MG520897
<i>Juncaceicola luzulae</i>	MFLUCC 16-0780	KX449529	KX449530	KX449531	MG520898
<i>Juncaceicola typharum</i>	CBS29654	KF251192	KF251695	–	GU456287
<i>Leptosphaeria doliolum</i>	CBS50575	JF740205	GU301827	GU296159	GU349069
<i>Leptospora galii</i>	KUMCC 15-0521	KX599547	KX599548	KX599549	MG520899
<i>Leptospora rubella</i>	CPC 11006	DQ195780	DQ195792	DQ195803	–
<i>Leptospora thailandica</i>	MFLUCC 16-0385	NR154133	NG059717	KX655554	KX655564
<i>Loratospora aestuarii</i>	JK 5535B	–	GU301838	GU296168	–
<i>Loratospora luzulae</i>	MFLUCC 14-0826	KT328497	KT328496	KT328495	–
<i>Melnikia anthoxanthii</i>	MFLUCC 14-1010	–	KU848204	KU848205	–
<i>Muriphaeosphaeria ambrosiae</i>	MFLU 15-1971	KX765267	KX765264	–	–
<i>Muriphaeosphaeria galatellae</i>	MFLUCC 14-0614	KT438333	KT438329	KT438331	MG520900
<i>Muriphaeosphaeria galatellae</i>	MFLUCC 15-0769	–	KT438330	KT438332	–
<i>Neosetophoma garethjonesii</i>	MFLUCC 16-0528	KY496758	KY496738	KY501126	KY514402
<i>Neosetophoma rosae</i>	MFLUCC 17-0844	MG828925	MG829034	MG829141	MG829219
<i>Neosetophoma rosae</i>	MFLUCC 15-1073	MG828926	MG829035	MG829140	MG829218
<i>Neosetophoma rosigena</i>	MFLUCC 17-0768	MG828928	MG829037	NG063687	–
<i>Neostagonospora arrhenatheri</i>	MFLUCC 15-0464	–	–	–	MG520901
<i>Neostagonospora artemisiae</i>	MFLUCC 17-0693	MG828929	MG829038	MG829144	–
<i>Neostagonospora caricis</i>	CBS135092	KF251163	KF251667	–	–
<i>Neosulcatispora agaves</i>	CPC26407	KT950853	KT950867	–	–
<i>Nodosphaeria guttulatum</i>	MFLUCC 15-0069	KY496746	KY496726	KY501115	KY514394
<i>Nodosphaeria multiseptata</i>	MFLUCC 15-0078	KY496748	KY496728	–	KY514396
<i>Nodosphaeria scabiosae</i>	MFLUCC 14-1111	KU708850	KU708846	KU708842	KU708854
<i>Ophiobolopsis italica</i>	MFLUCC 17-1791	MG520939	MG520959	MG520977	MG520903
<i>Ophiobolus artemisiae</i>	MFLU 15-1966	MG520940	MG520960	MG520978	MG520904
<i>Ophiobolus artemisiicola</i>	MFLUCC 152137	MG828930	MG829039	MG829145	MG829220
<i>Ophiobolus artemisiicola</i>	MFLUCC 152140	MG828931	MG829040	MG829146	MG829221
<i>Ophiobolus disseminans</i>	MFLUCC17-1787	MG520941	MG520961	MG520980	MG520906
<i>Ophiobolus rossicus</i>	MFLUCC17-1639	NG059857	MG520964	MG520983	MG520909
<i>Ophiosimulans plantaginis</i>	MFLUCC17-0245	KY090650	GU301812	AF164356	GU349012
<i>Ophiosphaerella agrostidis</i>	MFLUCC 11-0152	KM434271	KM434281	KM434290	KM434299
<i>Ophiosphaerella agrostidis</i>	MFLUCC 12-0007	KM434272	KM434282	KM434291	KM434300
<i>Ophiosphaerella aquaticus</i>	MFLUCC 14-0033	KX767088	KX767089	KX767090	MG520911
<i>Paraleptosphaeria dryadis</i>	CBS643.86	JF740213	GU301828	KC584632	GU349009
<i>Paraophiobolus arundinis</i>	MFLUCC 17-1789	MG520945	MG520965	MG520984	MG520912
<i>Paraphoma chrysanthemicola</i>	CBS 522.66	MH85887	MH870519	GQ387521	KF253124
<i>Paraphoma radicina</i>	CBS 111.79	KF251172	KF251676	EU754092	–
<i>Parastagonospora italica</i>	MFLUCC 13-0751	KP197667	KP197668	KP197666	KP197669
<i>Parastagonospora minima</i>	CBS27359	AY817686	JX681115	–	MG520915
<i>Parastagonospora uniseptata</i>	MFLUCC 13-0387	KU058715	KU058725	MG520987	MG520917

TABLE 1. — Continuation.

Taxon	Strain	GenBank accession numbers			
		ITS	LSU	SSU	TEF1 α
<i>Parastagonospora sichuanensis</i>	SAUFP201604001	MH368073	MH368079	MH368088	–
<i>Parastagonospora sichuanensis</i>	SAUFP201704001	–	MH368080	–	–
<i>Parastagonospora sichuanensis</i>	SAUFP201704002	MH394690	MH394687	–	–
<i>Phaeopoacea festucae</i>	MFLUCC 17-0056	KY824766	KY824767	KY824769	–
<i>Phaeopoacea phragmiticola</i>	CBS459.84	KY090640	KF251691	KY090700	KF253144
<i>Phaeosphaeria chiangraina</i>	MFLUCC 13-0231	NR155643	KM434270	KM434289	KM434298
<i>Phaeosphaeria musae</i>	MFLUCC 11-0151	KM434268	KM434278	KM434288	KM434297
<i>Phaeosphaeria thysanolaenicola</i>	MFLUCC 10-0563	NR_155642	KM434276	KM434286	KM434295
<i>Phaeosphaeria vagans</i>	CBS604.86	KF251193	AY849953	–	KF253149
<i>Phaeosphaeriopsis dracaenicola</i>	MFLUCC 11-0157	KM434273	KM434283	KM434292	KM434301
<i>Phaeosphaeriopsis glaucopunctata</i>	MFLUCC 13-CY165	KJ522473	KJ522477	KJ522481	MG520918
<i>Phaeosphaeriopsis triseptata</i>	MFLUCC 13-0271	KJ522475	KJ522479	KJ522484	MG520919
<i>Phoma aloes</i>	CPC21549	KF777183	KF777235	–	–
<i>Poaceicola arundinis</i>	MFLUCC 15-0701	KU058716	KU058726	MG520988	MG520921
<i>Poaceicola forlicenesica</i>	MFLUCC 15-0470	KX926422	KX910095	KX950406	MG520922
<i>Poaceicola garethjonesii</i>	MFLUCC 15-0469	KX926425	KX954390	KY205717	MG520923
<i>Populocrescentia ammophilae</i>	MFLUCC 17-0665	MG828949	MG829059	MG829164	MG829231
<i>Populocrescentia forlicenesensis</i>	MFLUCC 14-0651	KT306948	KT306952	KT306955	MG520925
<i>Populocrescentia rosae</i>	MFLUCC 17-0128	MG062440	MG829060	MG829165	MG829232
<i>Pseudoophiobolus achilleae</i>	MFLU 17-0925	MG520946	MG520966	–	–
<i>Pseudoophiobolus galii</i>	MFLU 17-2257	NR156682	MG520967	MG520989	MG520926
<i>Pseudoophiobolus italicus</i>	MFLUCC 17-2255	MG520948	MG520968	MG520990	MG520927
<i>Pseudophaeosphaeria rubi</i>	MFLUCC14-0259	NR154351	KX765299	KX765300	–
<i>Sclerostagonospora lathyri</i>	MFLUCC14-0958	NR158956	MG829170	MG829066	MG829235
<i>Sclerostagonospora rosae</i>	MFLUCC 18-0115	NR157541	MG829067	MG829171	MG829236
<i>Sclerostagonospora rosicola</i>	MFLUCC 15-0129	MG828957	MG829068	MG829172	MG829237
<i>Scolicosporium minkeviciusii</i>	MFLUCC 12-0089	–	KF366382	KF366383	–
<i>Septoriella allojunci</i>	MFLU 15-0701	KU058718	KU058728	NG065141	MG520935
<i>Septoriella phragmitis</i>	CPC 24118	KR873251	KR873279	–	–
<i>Septoriella tridentina</i>	MFLUCC 15-0474	KX926423	KX910096	KX950407	–
<i>Setomelanomma holmii</i>	CBS 110217	KT389542	KT389542	GQ387572	GU349028
<i>Setophoma sacchari</i>	MFLUCC 11-0154	KJ476144	KJ476146	KJ476148	KJ461319
<i>Setophoma terrestris</i>	CBS 335.29	KF251246	KF251749	GQ387526	–
<i>Stagonospora foliicola</i>	CBS110111	KF251256	KF251759	EU754217	KF253206
<i>Stagonospora neglecta</i>	CBS 343.86	AJ496630	EU754218	EU754119	–
<i>Tintelotia destructans</i>	CBS 1T1737	KY090652	KY090664	KY090698	–
<i>Tintelotia opuntiae</i>	CBS 376.91	KY090651	GU238123	GU238226	–
<i>Vagicola chlamydospora</i>	MFLUCC 15-0177	NR154508	KU163655	KU163654	–
<i>Vrystaatia aloicola</i>	CBS 135107	KF251278	KF251781	–	–
<i>Vittaliana mangrovei</i> Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov.	NFCCI-4251	MG767311	MG767312	MG767313	MG767314
<i>Wojnowica spartii</i>	MFLUCC 13-0402	KU058719	KU058729	MG520998	MG520937
<i>Wojnowiella dactylidis</i>	MFLUCC 13-0735	KP744470	KP684149	KP684150	–
<i>Wojnowiella viburni</i>	MFLUCC 12-0733a	NR120266	NR120266	KC594287	KC594288
<i>Xenoseptoria neosaccardoii</i>	CBS 128665	KF251281	KF251784	–	–
<i>Xenoseptoria neosaccardoii</i>	CBS 12043	KF251280	KF251783	–	–
<i>Yunnanensis phragmitis</i>	MFLUCC 17-1361	MF684869	MF684865	MF684864	MF683625
<i>Yunnanensis phragmitis</i>	MFLUCC 17-0315	MF684862	MF684863	MF684867	MF683624

Sexual morph

Ascomata. semi-immersed to erumpent, globose to subglobose, gregarious to solitary, pyriform, coriaceous, dark brown to black, short-ostiolate.

Peridium. thick-walled of equal thickness, composed of several layers having an inner stratum of hyaline to light brown, thick-walled cells of textura angularis and an outer stratum of light-brown to dark-brown cells of textura angularis fusing with the host tissues.

Hamathecium. comprising of unbranched, cellular, hyaline, septate pseudoparaphyses resembling hyphae, anastomosing above the asci and embedded in a gelatinous matrix.

Asci. 8-spored, bitunicate, fissitunicate, cylindrical to clavate, short pedicellate, apically rounded and thickened, lacking an ocular chamber.

Ascospores. phragmosporous, distoseptate, uni- to biseriolate, partially overlapping, constricted at the 4th septum, lower most cells usually longer than other cells, hyaline when young becoming yellow to golden yellow at maturity, smooth-walled, cylindrical, rounded at the apices, tapering to a more narrowly rounded base, lacking mucilaginous sheaths or any ornamentation.

Asexual morph
Undetermined.

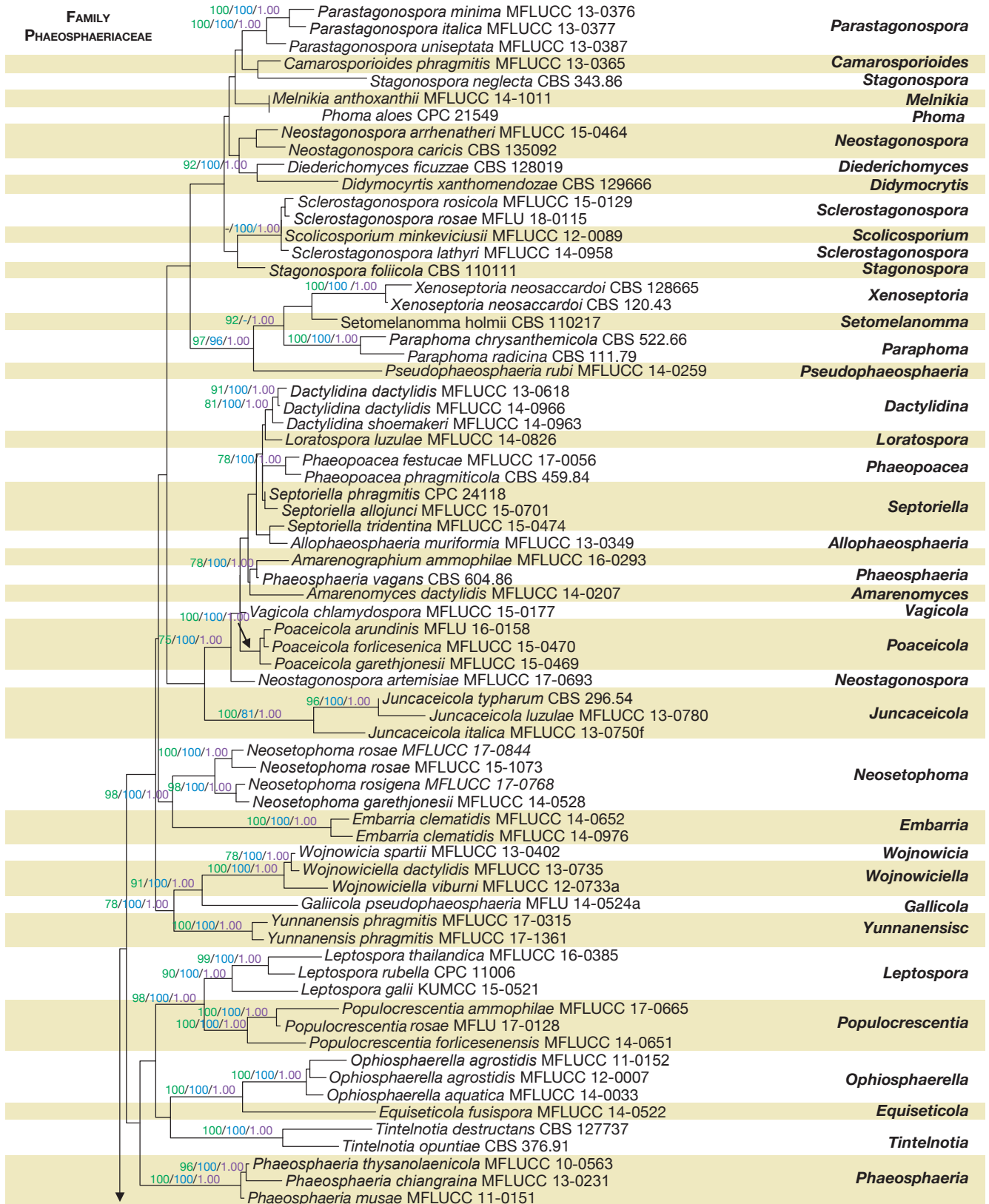


Fig. 1. — Phylogenetic tree generated from Bayesian analysis of concatenated LSU, SSU, TEF1 α and ITS sequence data of Phaeosphaeriaceae. Values above the branches indicate maximum parsimony and maximum likelihood bootstrap \geq 70%, (MP/ML). Values at the third positions, respectively, above or below the branches represent posterior probabilities (PP \geq 0.95) from Bayesian inference analysis. The new isolate is in blue. The tree is rooted with *Leptosphaeria doliolum* (Pers.) Cesati & De Notaris and *Paraleptosphaeria dryadis* (Johanson) Gruyter, Aveskamp & Verkley.

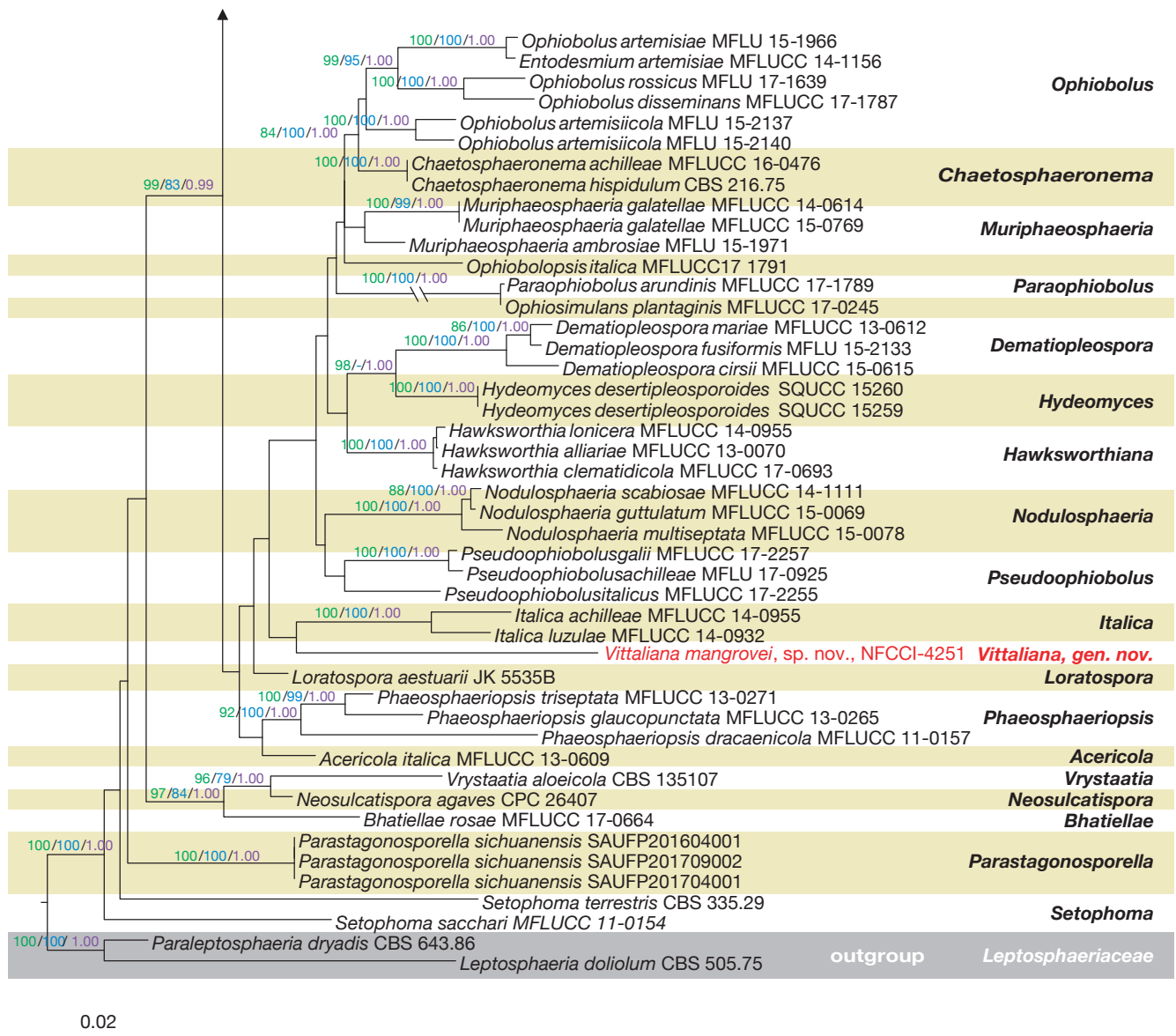


FIG. 1. — Continuation.

NOTES

Combined multi-locus phylogenetic analysis indicated that *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., belongs to Phaeosphaeriaceae and closely related to *Italica*. This new genus shares with *Italica* similar ascomata and asci characters but is also distinctly different in having ascospores that are phragmosporous, distoseptate, golden yellow at maturity and by their occurrence in a marine habitat. Whereas *Italica* is markedly different from it in having a thin-walled peridium, muriform, yellowish-brown ascospores and occurs in terrestrial habitats (Wanasinghe *et al.* 2018). Hence, we introduce *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma as a new genus typified by *V. mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov., in the family Phaeosphaeriaceae based on morphology and molecular sequence analyses.

Vittaliana mangrovei

Devadatha, Nikita, A.Baghela & V.V.Sarma, sp. nov.

TYPUS. — **India**. Pondicherry, Veerampattinam mangroves, on decaying wood of *Avicennia marina* (Forsk.) Vierh., (Avicenniaceae), 20. I.2017, *B. Devadatha* (holo-, AMH[AMH-9953]), ex-type living culture = NFCCI-4251.

INDEX FUNGORUM NUMBER. — IF556888.

FACESOFFUNGI NUMBER. — FoF 04669.

ETYMOLOGY. — Referring to the habitat where the fungus thrives.

CULTURE CHARACTERISTICS. — Ascospores germinating on seawater agar within 24 hours, germ tubes arising from terminal ends of the ascospore. Colonies on malt extract agar were slow growing, reaching 2 cm diameter after 25 days of incubation at room temperature;

white becoming light brown at maturity; surface convex, undulate, irregular, reverse pale orange in the center and hyaline at margins. Mycelium hyaline 1-4 µm diameter, hyaline, branched, septate, not producing asexual or sexual propagules even after incubation for 3 months at room temperature.

DESCRIPTION

Saprobic on decaying wood of *Avicennia marina*.

Sexual morph

Ascomata. 125-250 µm high, 150-300 µm diam. (\bar{x} = 166 × 195 µm, n = 10), semi-immersed to erumpent, globose to subglobose, gregarious to solitary, coriaceous, black.

Ostiole. 25-60 µm long, 10-20 µm diam. (\bar{x} = 42.5 × 15 µm, n = 10).

Peridium. equal in thickness, 25-50 µm (\bar{x} = 37 µm, n = 10) wide, comprising several layers, an inner stratum with hyaline to light brown cells of *textura angularis* and an outer stratum with light brown to dark brown cells of *textura angularis* fusing with the host tissues.

Hamathecium. composed of 1-3 µm (\bar{x} = 1.75 µm, n = 10) wide, septate, unbranched, cellular pseudoparaphyses resembling hyphae embedded in a gelatinous matrix.

Asci. 100-160 × 7-15 µm (\bar{x} = 125 × 10 µm, n = 40), 8-spored, bitunicate, fissitunicate, cylindrical to clavate, short pedicellate, apically rounded and lacking an ocular chamber.

Ascospores. 17-25 × 4-7 µm (\bar{x} = 20 × 6 µm, n = 50), uni-to biserially arranged, partially overlapping, phragmosporous, 5-6 distoseptate, constricted at the 4th septum, lower most cells longer than other cells, hyaline to light-brown when young, becoming yellow to golden-yellow at maturity, smooth-walled, cylindrical, rounded at the apices, tapering to a more narrowly rounded base, lacking any ornamentation or mucilaginous sheaths.

Asexual morph

Undetermined.

NOTES

Vittaliana mangrovei Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov., resembles *Phaeosphaeriopsis*, particularly *P. glaucopunctata* (Greville) M.P.S. Câmara, M.E. Palm & A.W. Ramaley, in having globose to subglobose, gregarious ascomata; fissitunicate, cylindrical to clavate, short pedicellate asci; oblong to cylindrical, phragmosporous ascospores. However, the new species is distinct in having a thick-walled peridium in the ascomata, longer asci; ascospores that are distoseptate, distinctly constricted at the 4th septum, lower most cells longer than other cells and lacking any ornamentation or mucilaginous sheaths. Whereas the genus *Phaeosphaeriopsis* is characterized by immersed to erumpent ascomata that are often surrounded by septate, brown hyphae

extending into the host tissues; ascospores that are usually without constriction, apical cells often longer than others, ornamented as echinulate, punctate or verruculose and are surrounded by thin mucilaginous sheaths. The phylogenetic analysis in the present study showed that *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., is close to the genus *Italica* (Fig. 1). However, *Italica* differs from it in having eccentric ascomata, thin peridium, branched pseudoparaphyses in hamathecium, short pedicellate asci that apically have a minute ocular chamber; ascospores that are muriform, widest at the middle, with or without a mucilaginous sheath (Wanasinghe *et al.* 2018). The new species shares some similarities with *Vagicola arundinis* Phukhamsakda, Camporesi & K.D. Hyde in having yellowish distoseptate ascospores constricted at the fourth cell (Thambugala *et al.* 2017). However, *Vagicola arundinis* is different from it in having narrowly fusiform ascospores tapering towards the ends with (5-) 8-9-septate ascospores while the new species has 5-6 distoseptate, somewhat cylindrical ascospores and lack mucilaginous sheaths. Our phylogenetic analysis also showed that *Vagicola* is distantly placed from *Vittaliana* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov. (Fig. 1). The combined LSU, SSU, TEF1a and ITS phylogeny also showed that *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov., grouped within the Phaeosphaeriaceae as a monotypic genus (Fig. 1).

DISCUSSION

Most of the genera and species in Phaeosphaeriaceae share morphologically similarities of ascomata/conidiomata, peridium, asci and ascospores, conidia. Therefore, multigene phylogenetic analyses became a vital tool to delineate phaeosphaeriaceous taxa. *Ophiobolus* is the largest genus in Phaeosphaeriaceae sharing scolecospore ascospores, a character that is found in several genera in Phaeosphaeriaceae: *Leptospora*, *Nodulosphaeria*, *Ophiobolopsis*, *Ophiosimulans*, *Ophiosphaerella*, *Paraophiobolus* and *Pseudoophiobolus* (Phookamsak *et al.* 2017). Nonetheless, these genera are markedly identified based on both morphological and molecular data (Phookamsak *et al.* 2017).

Though the asexual state of our new taxon is unknown, based on the pseudoparenchymatous peridial wall in ascomata with thin walled cells and the multigene analyses, we found that it fits well in the family Phaeosphaeriaceae (Figs 1; 2). The new genus is characterized by papillate ascomata with pseudoparenchymatous peridial wall, bitunicate, fissitunicate, cylindrical-clavate asci, that are short-pedicellate, ascospores that are predominantly 5-septate, uniform without any enlarged cells, with a constriction at the sub-median septum in the mature spores, distoseptate, without any ornamentation or sheaths.

Vittaliana Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., shares distoseptate ascospores with the genera *Acericola* and *Vagicola* but seems only distantly related. The new genus clustered together with *Italica*, although with insufficient statistical support from ML 49%, MP 27%, 0.94 BYPP (Fig. 1). However, both share different morphological characters.

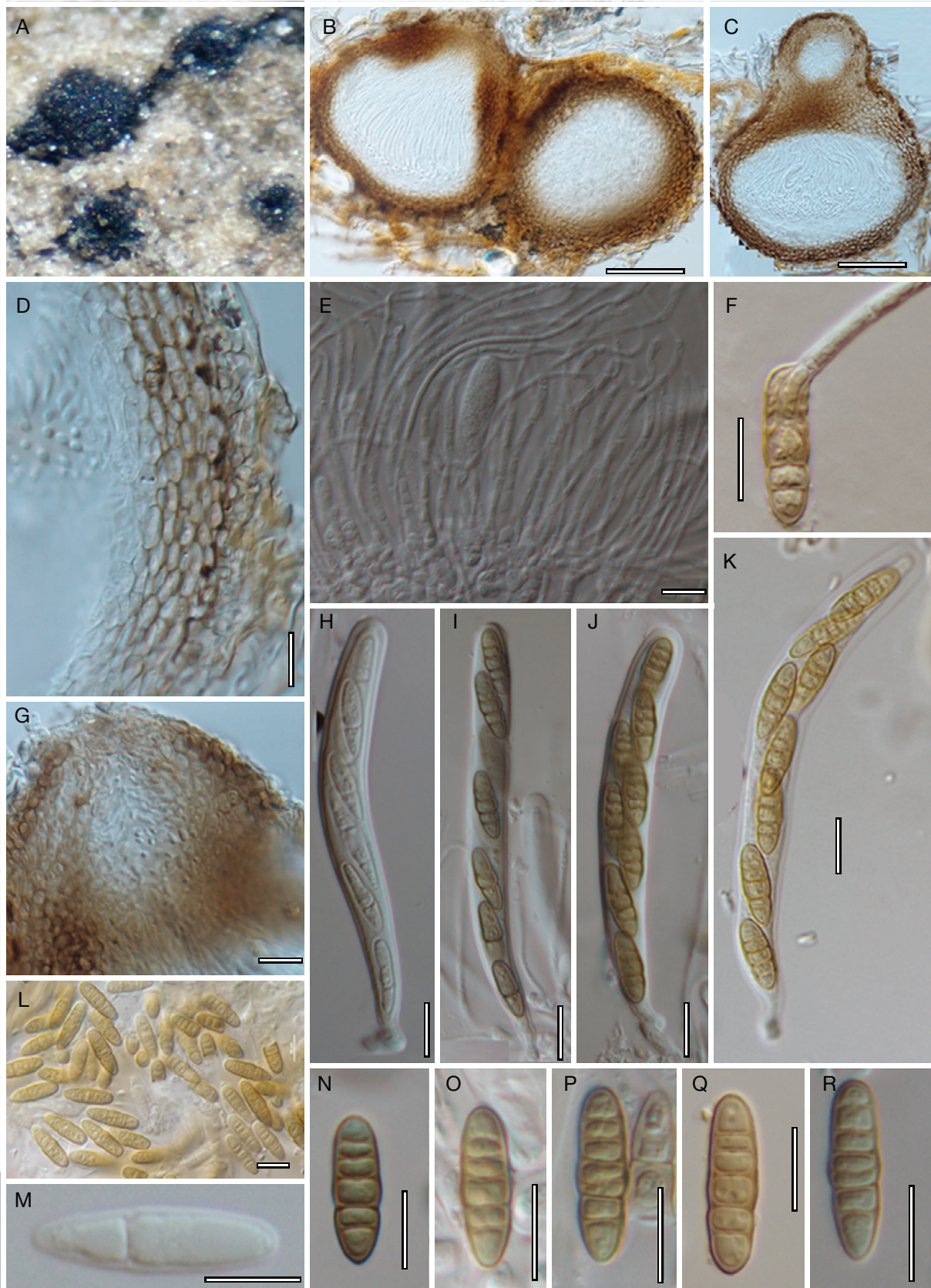


FIG. 2. — *Vittaliana mangrovei* Devadatha, Nikita, A.Baghela & V.V.Sarma, gen. nov., sp. nov. (AMH-9953, holotype): **A**, ascomata on host substrate; **B, C**, vertical section through ascomata; **D**, peridium magnified; **E**, pseudoparaphyses; **F**, germinating ascospore; **G**, ostiole showing periphyses; **H-K**, asci; **L-R**, ascospores. Scale bars: B, C, 50 µm; D-R, 10 µm.

Italica is characterized by immersed to erumpent, globose or subglobose ascomata, filamentous pseudoparaphyses, muriform, oval, ellipsoidal or sub-cylindrical, hyaline to yellowish-brown ascospores with 4–6-transverse and 1–2 vertical septa. Whereas the new genus is characterized by semi-immersed to erumpent, globose or subglobose ascomata, filamentous pseudoparaphyses, phragmosporous, distoseptate, cylindrical, hyaline to yellowish-brown ascospores constricted at 4 septum, in contrast to *Italica*. Other genera with marine species such as *Loratospora* and *Phaeosphaeria* are phylogenetically distinct from *Vittaliana mangrovei* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov., sp. nov. (Jones *et al.* 2015).

The new genus should be compared with other phragmospore-producing genera within Phaeosphaeriaceae. In *Nodulosphaeria* the ascospores are cylindrical or elongate fusiform, with typically one cell in upper part swollen (supra-median) or enlarged near the apex, ascomata have papilla with numerous long, large setae. In contrast the ascospores in *Vittaliana mangrovei* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov., sp. nov., have a constriction in the sub-median septum and ascomata without setae.

The genus *Paraphaeosphaeria* established by Eriksson (1967) produces brown, punctate ascospores with a submedian primary septum and rounded ends, and a *Coniothyrium sensu lato* anamorph (Camara *et al.* 2002). *Vittaliana* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov., produces ascospores with a constriction at the submedian primary septum, but these are not punctate and the septa are not true septa but distosepta. In the case of *Phaeosphaeriopsis*, another genus in Phaeosphaeriaceae, the ascospores have typically enlarged cell near the base (sub-median), which are echinulate or verruculose and surrounded by a mucilaginous sheath, ascomata ostiolate, but lacking a papilla. This combination of characters is not found in *Vittaliana* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov. In the genus *Entodesmium* the ascospores break into partial spores unlike those of the new genus.

Relying upon the distinct morphological and phylogenetic relation of *Vittaliana* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov., with other genera we introduce it as a novel genus typified by *V. mangrovei* Devadatha, Nikita, A. Baghela & V.V. Sarma, gen. nov., sp. nov., within Phaeosphaeriaceae. Further the LSU sequence of this new species differs from that of *Italica luzulae* (GenBank NG060796) by 42 bp and *Italica achilleae* (GenBank NG059862) by 21 bp, which strongly recommends the new genus establishment.

Acknowledgements

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APPENDIX

APPENDIX 1. — Complementary authorship for cited taxa

Acericola italica Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Allophaeosphaeria Ariyaw., Camporesi & K.D. Hyde
Allophaeosphaeria muriformia Ariyaw., Camporesi & K.D. Hyde
Amarenomyces ammophilae Wanas., Camporesi, Wijayaw. & K.D. Hyde
Amarenomyces dactylidis Mapook, Camporesi & K.D. Hyde
Bhatiellae rosae Wanasinghe, Camporesi, E.B.G. Jones & K.D. Hyde
Camarosporioides W.J. Li & K.D. Hyde
Camarosporioides phragmitis W.J. Li & K.D. Hyde
Chaetosphaeronema Moesz
Chaetosphaeronema achilleae S.K. Huang & K.D. Hyde
Chaetosphaeronema hispidulum (Corda) Moesz
Dactylidina dactylidis (Wanas., Camporesi, E.B.G. Jones & K.D. Hyde) Wanas. & K.D. Hyde
Dactylidina shoemakeri Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Dematiopleospora Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Dematiopleospora cirsii Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Dematiopleospora fusiformis S.K. Huang & K.D. Hyde
Dematiopleospora mariae Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Didymocyrtis Vain
Didymocyrtis xanthomendozae (Diederich & Freebury) Diederich & Freebury
Diederichomyces ficuzzae (Brackel) Crous & Trakun
Embarria clematidis (Wanasinghe, Camporesi, E.B.G. Jones & K.D. Hyde) Wanasinghe & K.D. Hyde
Entodesmium Riess
Entodesmium artemisiae S. Konta, Bulgakov & K.D. Hyde
Equiseticola Abdelsalam, Tibpromma, Wanas. & K.D. Hyde
Equiseticola fusispora Abdelsalam, Tibpromma, Wanas. & K.D. Hyde
Galiicola Tibpromma, Camporesi & K.D. Hyde
Galiicola pseudophaeosphaeria Tibpromma, Camporesi & K.D. Hyde
Hawksworthiana alliariae (Thambug., Camporesi & K.D. Hyde) Wanas. & K.D. Hyde
Hawksworthiana clematidicola Wanas., Bulgakov, E.B.G. Jones & K.D. Hyde
Hawksworthiana loniceriae Wanas., Camporesi, E.B.G. Jones & K.D. Hyde
Hydeomyces desertipleosporoides Maharachch., H.A. Ariyaw., Wanas. & Al-Sadi
Italica Wanas., Camporesi & K.D. Hyde
Italica achilleae Wanasinghe, Camporesi, E.B.G. Jones & K.D. Hyde
Juncaceicola Tennakoon, Camporesi, Phook. & K.D. Hyde
Juncaceicola italica Tibpromma, Camporesi & K.D. Hyde
Juncaceicola luzulae Tennakoon, Camporesi, Phook. & K.D. Hyde
Juncaceicola typharum (Desm.) Tennakoon, Phook. & K.D. Hyde
Leptosphaeria doliolum (Pers.) Ces. & De Not.
Leptospora Rabenh.
Leptospora galii de Silva & K.D. Hyde
Leptospora rubella (Pers.) Rabenh.
Leptospora thailandica Phukhams. & K.D. Hyde
Loratospora Kohlm. & Volkm.-Kohlm.
Loratospora aestuarii Kohlm. & Volkm.-Kohlm.
Loratospora luzulae Jayasiri, Camporesi & K.D. Hyde
Melnikia Wijayaw., Goonas., Bhat & K.D. Hyde
Melnikia anthoxanthii Wijayaw., Goonas., Camporesi, Bhat & K.D. Hyde
Muriphaeosphaeria Phukhams., Bulgakov & K.D. Hyde
Muriphaeosphaeria ambrosiae S.K. Huang & K.D. Hyde
Muriphaeosphaeria galatellae Phukhams., Bulgakov & K.D. Hyde
Neosetophoma Gruyter, Aveskamp & Verkley
Neosetophoma garethjonesii Tibpromma, E.B.G. Jones & K.D. Hyde
Neosetophoma rosae Jayasiri, Camporesi, Gafforov & K.D. Hyde
Neostagonospora Quaedvlieg, Verkley & Crous
Neostagonospora artemisiae Wanasinghe, Bulgakov, E.B.G. Jones & K.D. Hyde
Neostagonospora caricis Quaedvlieg, Verkley & Crous
Neostagonospora sichuanensis C.L. Yang, X.L. Xu & K.D. Hyde
Neosulcatispora Crous & M.J. Wingf.
Neosulcatispora agaves Crous & M.J. Wingf.
Nodulosphaeria Rabenh.
Nodulosphaeria guttulatum Tibpromma, Camporesi & K.D. Hyde
Nodulosphaeria multiseptata Tibpromma, Camporesi & K.D. Hyde
Nodulosphaeria scabiosae Mapook, Camporesi & K.D. Hyde
Ophiobolopsis italica Phookamsak, Wanasinghe, Camporesi & K.D. Hyde
Ophiobolus Riess
Ophiobolus artemisiae (S. Konta, Bulgakov & K.D. Hyde) Wanas., Phookamsak & K.D. Hyde
Ophiobolus artemisiicola Wanasinghe, Bulgakov, E.B.G. Jones & K.D. Hyde
Ophiobolus disseminans Riess
Ophiobolus rossicus Wanas., Bulgakov., E.B.G. Jones & K.D. Hyde

Ophiosimulans plantaginis Qing Tian, Camporesi & K.D. Hyde
Ophiosphaerella agrostidis Dern., M.P.S.Câmara, N.R.O'Neill, Berkum & M.E.Palm
Ophiosphaerella aquaticus Z.L.Luo, H.Y.Su & K.D.Hyde
Paraleptosphaeria dryadis (Johanson) Gruyter, Aveskamp & Verkley
Paraophiobolus arundinis Phookamsak, Wanas., Camporesi & K.D. Hyde
Paraphoma chrysanthemicola (Hollós) Gruyter, Aveskamp & Verkley
Paraphoma radicina (McAlpine) Morgan-Jones & J.F.White
Parastagonospora Quaedvlieg, Verkley & Crous
Parastagonospora italica W.J.Li, Camporesi, Bhat & K.D.Hyde
Parastagonospora minima W.J.Li, Camporesi, Bhat & K.D.Hyde
Parastagonospora uniseptata W.J.Li, Camporesi, Bhat & K.D.Hyde
Phaeopoacea festucae Dissan. & K.D.Hyde
Phaeopoacea phragmiticola (Leuchtman) Thambug. & K.D.Hyde
Phaeosphaeria I.Miyake
Phaeosphaeria chiangraina Phook. & K.D.Hyde
Phaeosphaeria musae Sawada
Phaeosphaeria thysanolaenicola Phook. & K.D.Hyde
Phaeosphaeria vagans (Niessl) O.E.Erikss.
Phaeosphaeriopsis M.P.S.Câmara, M.E.Palm & A.W.Ramaley
Phaeosphaeriopsis dracaenicola Phook. & K.D.Hyde
Phaeosphaeriopsis glaucopunctata (Grev.) M.P.S. Câmara, M.E. Palm & A.W. Ramaley
Phaeosphaeriopsis triseptata Thambug. & K.D.Hyde
Phoma aloes Crous & M.J.Wingf.
Poaceicola W.J. Li, Camporesi, Bhat & K.D. Hyde
Poaceicola arundinis W.J.Li, Camporesi, Bhat & K.D.Hyde
Poaceicola forlicesenica Thambug., Camporesi & K.D.Hyde
Poaceicola Garethjonesii Thambug., Camporesi & K.D.Hyde
Populocrescentia Wanasinghe, E.B.G.Jones & K.D.Hyde
Populocrescentia ammophilae Wanasinghe, Camporesi, E.B.G.Jones & K.D.Hyde
Populocrescentia forlicesenensis Wanas., Camporesi, E.B.G.Jones & K.D.Hyde
Premilcurensis Tibpromma, Camporesi & K.D.Hyde
Pseudoophiobolus Phookamsak, Wanas. & K.D.Hyde
Pseudophaeosphaeria Jayasiri, Camporesi & K.D. Hyde
Pseudophaeosphaeria rubi Jayasiri, Camporesi & K.D.Hyde
Sclerostagonospora Höhn.
Sclerostagonospora lathyri Wanasinghe, Camporesi, E.B.G.Jones & K.D.Hyde
Scolicosporium minkeviciusii Treigienė
Septoriella Oudem.
Septoriella allojunci W.J.Li, Camporesi, Bhat & K.D.Hyde
Septoriella phragmitis Oudem.
Septoriella tridentina Thambug., Camporesi & K.D.Hyde
Setomelanomma M.Morelet
Setomelanomma holmii M.Morelet
Setophoma Gruyter, Aveskamp & Verkley
Setophoma sacchari (Bitanc.) Gruyter, Aveskamp & Verkley
Setophoma terrestris (H.N.Hansen) Gruyter, Aveskamp & Verkley
Stagonospora (Sacc.) Sacc.
Stagonospora foliicola Bubák
Stagonospora neglecta (Westend.) Sacc.
Sulcispora Shoemaker & C.E. Babc.
Tintelnotia destructans S.A.Ahmed, Hofmüller, Seibold & de Hoog
Tintelnotia opuntiae (Boerema, de Gruyter & Noordeloos) S.A.Ahmed & de Hoog
Vagicola K.W.T.Chethana & K.D.Hyde
Vagicola chlamydospora Jayasiri, Camporesi & K.D.Hyde
Vittaliana Devadatha, Nikita, A. Baghela. & V.V. Sarma, gen. nov.
Vittaliana mangrovei Devadatha, Nikita, A. Baghela. & V.V. Sarma, gen. nov., sp. nov.
Vrystaatia aloecicola Quaedvlieg, Verkley, W.J.Swart & Crous
Wojnowicia spartii W.J.Li, Camporesi & K.D.Hyde
Wojnowiciella viburni (Wijayaw., Yong Wang bis & K.D. Hyde) Crous, Hern.-Restr. & M.J. Wingf.
Wojnowiciella dactylidis (Wijayaw., Camporesi & K.D. Hyde) Hern.-Restr. & Crous
Xenoseptoria neosaccardoi Quaedvlieg, H.D.Shin, Verkley & Crous
Yunnanensis phragmitis Karun., Phook. & K.D. Hyde