Revising the *Schizoparmaceae*: *Coniella* and its synonyms *Pilidiella* and *Schizoparme*

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Abstract: The asexual genera *Coniella* (1918) and *Pilidiella* (1927), including their sexual morphs in *Schizoparme* (1923), have a cosmopolitan distribution and are associated with foliar, fruit, leaf, stem and root diseases on a wide variety of hosts. Species of these genera sometimes occur as secondary invaders of plant tissues infected by other organisms or that are injured by other causes. Several studies published over the last few decades had conflicting ideas as to whether *Coniella*, *Pilidiella* and *Schizoparme* should be regarded as synonymous or as separate genera. The present study aims to resolve the generic classification of these genera through phylogenetic analyses of the concatenated alignment of partial LSU nrDNA, *rpb2*, ITS nrDNA and *tef1* sequence data of 117 isolates, combined with their morphology. Results revealed that all strains cluster in a single well-supported clade. Conidial colour, traditionally the distinguishing character between *Coniella* and *Pilidiella*, evolved multiple times throughout the clade, and is not a good character at generic level in *Schizoparmaceae*. The three genera should therefore be regarded as synonymous, with the older name *Coniella* having priority. Furthermore, this study delineated 13 new species, and new combinations were proposed for a further 15 species.

Key words: *Diaporthales*, DNA phylogeny, phytopathogenic fungi, *Sordariomycetes*, systematics.

Taxonomic novelties: New species: *Coniella africana* L.V. Alvarez & Crous, *C. erumpens* L.V. Alvarez & Crous, *C. fusiformis* L.V. Alvarez & Crous, *C. javanica* L.V. Alvarez & Crous, *C. koreana* L.V. Alvarez & Crous, *C. lanneae* L.V. Alvarez & Crous, *C. limoniformis* L.V. Alvarez & Crous, *C. malaysiana* L.V. Alvarez & Crous, *C. nicotianae* L.V. Alvarez & Crous, *C. obovata* L.V. Alvarez & Crous, *C. paracastaneicola* L.V. Alvarez & Crous, *C. pseudostraminea* L.V. Alvarez & Crous, *C. solicola* L.V. Alvarez & Crous; **New combinations:** *C. angustispora* (Samuels *et al.*) L.V. Alvarez & Crous, *C. calamicola* (J. Fröhl. & K.D. Hyde) L.V. Alvarez & Crous, *C. crousii* (Rajeshk. *et al.*) L.V. Alvarez & Crous, *C. destruens* (M.E. Barr & Hodges) L.V. Alvarez & Crous, *C. diplodiopsis* (Crous & van Niekerk) L.V. Alvarez & Crous, *C. eucalyptigena* (Crous & M.J. Wingf.) L.V. Alvarez & Crous, *C. eucalyptorum* (Crous & M. J. Wingf.) L.V. Alvarez & Crous, *C. nigra* (P.N. Mathur *et al.*) L.V. Alvarez & Crous, *C. pseudogranati* (Crous) L.V. Alvarez & Crous, *C. quercicola* (Oudem.) L.V. Alvarez & Crous, *C. straminea* (Shear) L.V. Alvarez & Crous, *C. stromatica* (Samuels *et al.*) L.V. Alvarez & Crous, *C. tibouchinae* (B.E.C. Miranda *et al.*) L.V. Alvarez & Crous, *C. wangiensis* (Crous & Summerell) L.V. Alvarez & Crous; **New name:** *C. terminaliicola* L.V. Alvarez & Crous (basionym: *Schizoparme terminaliae* Samuels *et al.*).

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INTRODUCTION

The asexual genera *Coniella* (1918) and *Pilidiella* (1927) and their sexual morph *Schizoparme* (1923), are fungal pathogens associated with foliar, fruit, stem and root diseases on a wide variety of hosts (Van Niekerk *et al.* 2004). These genera occur as parasites on unrelated dicotyledonous hosts (Samuels *et al.* 1993) or sometimes as secondary invaders of plant tissues infected by other organisms or injured by other causes (Ferreira *et al.* 1997) (Fig. 1).

The genus *Coniella* was established by Von Höhnel (1918), typified by *C. pulchella* (= *C. fragariae*; Crous *et al.* 2014a). *Coniella* was divided into two subgenera by Petrak & Sydow (1927), namely *Euconiella* (dark conidia), typified by *C. pulchella*, and *Pseudoconiella* (hyaline to pale conidia), typified by *C. granati* (Sutton 1969). Other genera in this complex include *Anthasthoopa*, typified by *A. samba*, and *Cyclodomella*, typified by *C. nigra* (Subramanian & Ramakrishnan 1956, Mathur & Thirumalachar 1959). Sutton (1969) considered the latter genera synonyms of *Coniella*.

The genus *Pilidiella*, typified by *P. quercicola*, was established by Petrak & Sydow (1927). *Schizoparme*, typified by *S. straminea*, was described as a species occurring on a wide variety of woody and herbaceous hosts (Shear 1923). Maas *et al.* (1979) linked *S. straminea* to the asexual morph, *P. quercicola*. Because of the change to one scientific name for fungi based on the International Code of Nomenclature for algae, fungi and plants (McNeill *et al.* 2012, Wingfield *et al.* 2012, Crous *et al.* 2015a), Rossman *et al.* (2015) recommended that the generic name *Pilidiella* (1927) should be protected over that of *Schizoparme* (1923), as *Pilidiella* had been more widely used in literature than *Schizoparme*, and also has more species.

Van der Aa (in Von Arx 1973) and Von Arx (1981) treated *Coniella* and *Pilidiella* as separate genera, the former characterised by dark brown conidia and *Pilidiella* by hyaline conidia that become pale brown with age. However, conidial pigmentation was rejected as a distinguishing characteristic by Sutton (1980) and Nag Raj (1993) who used the older name, *Coniella*. Based on phylogenetic analyses of ITS and LSU sequence data, Castlebury *et al.* (2002) and Van Niekerk *et al.* (2004) showed that these two genera clustered apart in their analyses, leading to the suggestion that they would be best retained as separate. Van Niekerk *et al.* (2004) regarded *Pilidiella* as having species with hyaline to pale brown conidia (l:w >1.5), in contrast to the dark brown conidia of *Coniella* (l:w $\leq$1.5). Furthermore, Castlebury *et al.* (2002) also showed that the

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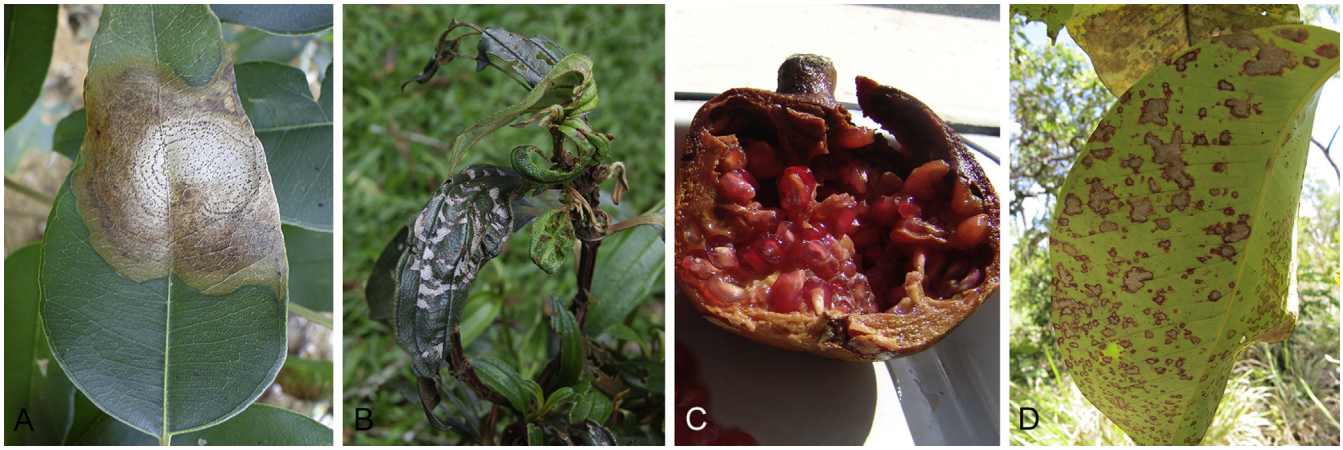

Fig. 1. Disease symptoms associated with *Coniella* spp. **A**. *C. eucalyptorum* on *Eucalptus* sp. (A.C. Alfenas). **B**. *C. tibouchinae* on *Tibouchina granulosa* (Miranda *et al.* 2012). **C**. *C. granati* on *Punica granatum* (M. Mirabolfathy). **D**. *C. wangiensis* on *Eucalyptus* sp.

Schizoparme complex represented a distinct clade in the *Diaporthales*, which led Rossman *et al.* (2007) to introduce the *Schizoparmaceae* to accommodate these genera. Since the paper of Van Niekerk *et al.* (2004), several additional species have been added to this complex (Rajeshkumar *et al.* 2011, Crous *et al.* 2012, 2015b, 2015c, Miranda *et al.* 2012), which revealed intermediate clades between *Coniella* and *Pilidiella s.str*.

The aims of the present study were to (i) resolve the classification of these genera through phylogenetic analyses of partial LSU nrDNA, partial DNA-directed RNA polymerase II second largest subunit (*rpb2*), ITS nrDNA and partial translation elongation factor 1-alpha (*tef1*) DNA data, combined with morphological observations, and (ii) confirm the identities of *Coniella*, *Pilidiella* and *Schizoparme* species known from culture.

MATERIALS AND METHODS

Isolates

One hundred and seventeen isolates (Table 1) excluding the outgroup species *Melanconiella hyperoptica* (culture CBS 131696) and *Melanconiella* sp. (CBS 110385) were analysed for this study. The isolates were obtained from the CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands (CBS) and from the working collection of P.W. Crous (CPC) housed at CBS. In addition, fresh collections were made from conidiomata and ascomata. Colonies were established from sporulating conidiomata and ascomata using the methods in Crous *et al.* (1991). Cultures were grown on Petri dishes containing 2 % malt extract agar (MEA), potato dextrose agar (PDA), and oatmeal agar (OA) (Crous *et al.* 2009), and incubated at 25 °C under continuous near-ultraviolet light to promote sporulation.

DNA isolation, amplification and phylogenetic analysis

Genomic DNA was extracted from fungal mycelium grown on malt extract agar (MEA) plates using the Wizard® Genomic DNA Purification Kit (Promega, USA) according to manufacturer's instructions. The isolated gDNA was used for PCR amplification and subsequent sequencing. These regions included partial ITS nrDNA, *tef1*, LSU nrDNA and *rpb2* (Table 2). The primers ITS1, ITS4 and ITS5 (White *et al.* 1990) or V9G (De Hoog & Gerrits van den Ende 1998) were used to amplify the ITS nrDNA, spanning the 3′ end of the 18S nrRNA gene, the first internal transcribed spacer (ITS1), the 5.8S nrRNA gene, the second ITS region and the 5′ end of the 28S nrRNA gene; primers EF1Fd and EF2Fd (Groenewald *et al.* 2013) or EF1-728F and EF1-986R (Carbone & Kohn 1999) or EF-2 (O'Donnell *et al.* 1998) were used to amplify a portion of *tef1*; primer pair LR0R (Rehner & Samuels 1994) and LR7 (Vilgalys & Hester 1990) to amplify the first approximately 1 200 nucleotides of the LSU nrDNA region; and primers fRPB2-5F or fRPB2-6F or fRPB2-7cR (Liu *et al.* 1999), fRPB2-5F2 (Sung *et al.* 2007) were used to amplify part of the *rpb2* gene.

Amplification reactions had a total reaction volume of 12.5 µL. For both ITS nrDNA and *tef1*, the solution mixture was composed of 1× PCR buffer (Bioline GmbH, Luckenwalde, Germany), 2 mM $MgCl_2$, 5.6 % DMSO (v/v), 40 µM dNTPs, 0.2 µM of each forward and reverse primer, 0.5 U of BioTaq *Taq* DNA polymerase (Bioline GmbH, Luckenwalde, Germany), and 10 ng of genomic DNA. PCR conditions were the same for LSU and *rpb2*, except for the $MgCl_2$ concentration: 5.04 mM $MgCl_2$ for the LSU and 2.52 mM $MgCl_2$ for the *rpb2* with the same concentration of 60 µM dNTPs and 5.03 % DMSO (v/v). The PCR conditions for ITS, *tef1* and LSU were: start step of 5 min at 94 °C, followed by 35 cycles of 30 s at 94 °C, 1 min at 54 °C annealing temperature, and 1 min 30 s at 72 °C, followed by a final step of 5 min at 72 °C. A touch-down PCR was used for *rpb2*: start step of 5 min at 94 °C, followed by 5 cycles of 45 s at 94 °C, 45 s at 60 °C annealing temperature, and 2 min at 72 °C; 5 cycles of 45 s at 94 °C, 45 s at 58 °C annealing temperature, and 2 min at 72 °C; 30 cycles of 45 s at 94 °C, 45 s at 54 °C annealing temperature, and 2 min at 72 °C followed by a final step of 8 min at 72 °C. However, some of the primer pairs failed to amplify with some isolates included in this study, hence, several combinations of the above-mentioned primer pairs were tested.

Following PCR amplification, amplicons mixed with GelRed™ (Biotium, Hayward, CA, USA) were visualised on 1 % agarose gels viewed under ultra-violet light. Sizes of amplicons were determined against a HyperLadder™ I molecular marker (Bioline, London, UK). PCR amplicons of the four gene regions targeted in this study served as templates for DNA sequencing reactions with the BigDye® Terminator Cycle Sequencing Kit v. 3.1 (Applied Biosystems Life Technologies, Carlsbad, CA, USA)

Table 1. Details of the strains included for molecular and/or morphological study. Names of taxonomic novelties are printed in **bold**.

Species name		Strain accession number[1,2]	Susbtrate of isolation	Origin	Collector(s)	GenBank accession number[3]			
New name	Original name					LSU	*rpb2*	ITS	*tef1*
Coniella africana	*Schizoparme straminea*	CBS 114133^{T} = CPC 405	*Eucalyptus nitens* leaf litter	South Africa	P.W. Crous	AY339293	KX833421	AY339344	KX833600
Coniella crousii	*Pilidiella crousii*	NFCCI 2213	*Terminalia chebula* fallen fruits	India	K.C. Rajeshkumar	–	–	HQ264189	–
Coniella diplodiella	*Pilidiella diplodiella*	CBS 111022 = CPC 3736 = L-143S-W (2)	*Vitis vinifera*	South Africa	F. Halleen	KX833334	–	KX833512	KX833601
	P. diplodiella	CBS 111857 = CPC 3735	*Vitis vinifera*	South Africa	F. Halleen & P. Fourie	AY339285	KX833422	AY339325	KX833602
	P. diplodiella	CBS 111858^{ET} = CPC 3708	*Vitis vinifera* stems	France	P.W. Crous	KX833335	KX833423	AY339323	KX833603
	Coniella sp.	CBS 112333 = CPC 3775	*Vitis vinifera* var. Cabernet Sauvignon	France	Quarantine - Imports	KX833336	KX833424	AY339329	KX833604
	Coniella sp.	CBS 112335 = CPC 3771	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833337	KX833425	KX833513	KX833605
	Coniella sp.	CBS 112336 = CPC 3770	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833338	KX833426	KX833514	KX833606
	Coniella petrakii	CBS 112338 = CPC 3792	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833339	KX833427	KX833515	KX833607
	C. petrakii	CBS 112346 = CPC 3831	*Vitis vinifera*	France	Quarantine - Imports	KX833340	KX833428	KX833516	KX833608
	C. petrakii	CBS 112362 = CPC 3830	*Vitis vinifera*	France	Quarantine - Imports	KX833341	KX833429	KX833517	KX833609
	P. diplodiella	CBS 112505 = CPC 3778	*Vitis vinifera* var. Merlot	France	Quarantine - Imports	KX833342	KX833430	AY339330	KX833610
	C. petrakii	CBS 112704 = CPC 3863	*Vitis vinifera*	France	Quarantine - Imports	KX833343	KX833431	KX833518	KX833611
	C. petrakii	CBS 112718 = CPC 3928	*Vitis vinifera*	South Africa	Quarantine - Imports	KX833344	KX833432	KX833519	KX833612
	C. petrakii	CBS 112729 = CPC 3927	*Vitis vinifera*	South Africa	Quarantine - Imports	KX833345	KX833433	KX833520	KX833613
	C. petrakii	CBS 112732 = CPC 3925	*Vitis vinifera*	South Africa	Quarantine - Imports	KX833346	KX833434	KX833521	KX833614
	C. petrakii	CBS 112735 = CPC 3926 = I 4923.3	*Vitis vinifera*	South Africa	Quarantine - Imports	–	–	KX833522	KX833615
	P. diplodiella	CBS 114008 = CPC 3769	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833347	KX833435	AY339328	KX833616
	C. petrakii	CBS 115427 = CPC 3868	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833348	–	KX833523	–
	C. petrakii	CBS 115431 = CPC 3860	*Vitis vinifera*	France	Quarantine - Imports	KX833349	KX833436	KX833524	KX833617
	C. petrakii	CBS 115433 = CPC 3832	*Vitis vinifera*	France	Quarantine - Imports	KX833350	KX833437	KX833525	KX833618
	C. petrakii	CBS 115434 = CPC 3861	*Vitis* sp.	France	Quarantine - Imports	KX833351	–	KX833526	KX833619
	C. petrakii	CBS 115514 = CPC 3929 = I 4923.1	*Vitis vinifera*	South Africa	Quarantine - Imports	KX833352	–	KX833527	KX833620
	C. diplodiella	CBS 116312 = CPC 3707	*Vitis vinifera*	France	–	KX833353	KX833438	KX833528	KX833621
	Coniella sp.	CBS 165.84	*Vitis berlandieri* × *V. riparia* twig	Germany	–	KX833354	KX833439	KX833529	KX833622
	C. diplodiella	CBS 166.84 = CPC 3931	*Vitis berlandieri* × *V. riparia* twig	Germany	–	AY339286	–	AY339331	KX833623
Coniella diplodiopsis	*Pilidiella diplodiopsis*	CBS 109.23 = CPC 3933	*Vitis vinifera*	Switzerland	H. Faes	AY339287	KX833440	AY339332	KX833624

(*continued on next page*)

Table 1. (Continued).

Species name		Strain accession number[1,2]	Susbtrate of isolation	Origin	Collector(s)	GenBank accession number[3]			
New name	Original name					LSU	*rpb2*	ITS	*tef1*
	C. petrakii	CBS 112637 = CPC 4228	*Vitis vinifera*	South Africa	G. van Coller	KX833355	KX833441	KX833530	KX833625
	C. petrakii	CBS 112702 = CPC 3866	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833356	KX833442	KX833531	KX833626
	C. petrakii	CBS 116310 = CPC 3793	*Vitis vinifera* var. Petite Verdot	France	Quarantine - Imports	KX833357	KX833443	KX833532	KX833627
	Coniella sp.	CBS 164.84	*Vitis berlandieri* × *V. riparia* twig	Germany	–	KX833358	–	KX833533	–
	P. diplodiopsis	CBS 169.55 = CPC 3938	*Vitis vinifera*	Switzerland	–	KX833359	KX833444	AY339333	KX833628
	C. diplodiella	CBS 170.55 = LCP 55.1928	*Vitis vinifera*	Switzerland	–	KX833360	KX833445	KX833534	KX833629
	P. diplodiopsis	CBS 590.84^{T} = CPC 3940	*Vitis vinifera* canes	Italy	P.W. Crous	AY339288	–	AY339334	–
Coniella erumpens	*C. diplodiella*	CBS 523.78^{T}	Rotten wood	Chile	A.E. Gonzales	KX833361	KX833446	KX833535	KX833630
Coniella eucalyptigena	*Pilidiella eucalyptigena*	CBS 139893^{T} = CPC 24793	*Eucalyptus brassiana* leaves	Malaysia	M.J. Wingfield	KR476760	–	KR476725	–
Coniella eucalyptorum	*Coniella fragariae*	CBS 110674 = CPC 610	*Eucalyptus* sp. bark	Brazil	M.J. Wingfield	KX833362	KX833447	KX833536	KX833631
	Pilidiella eucalyptorum	CBS 111023 = CPC 3843	*Eucalyptus phylla*	Mexico	–	KX833363	KX833448	KX833537	KX833632
	C. fragariae	CBS 111024 = CPC 3906 = DFR 100190	–	Australia	P.Q. Thu & R.J. Gibbs	KX833364	–	KX833538	KX833633
	Coniella sp.	CBS 111202 = CPC 1333	–	Indonesia	M.J. Wingfield	KX833365	KX833449	KX833539	KX833634
	P. eucalyptorum	CBS 111204 = CPC 1334	–	Indonesia	M.J. Wingfield	KX833366	KX833450	KX833540	KX833635
	C. fragariae	CBS 112341 = CPC 3845	*Eucalyptus phylla*	Mexico	–	KX833367	KX833451	KX833541	KX833636
	P. eucalyptorum	CBS 112640^{T} = CPC 3904 = DFR 100185	*Eucalyptus grandis* × *E. tereticornis* hydrid leaves	Australia	P.Q. Thu & R.J. Gibbs	AY339290	KX833452	AY339338	KX833637
	C. fragariae	CBS 112651 = CPC 3913 = UFV 2	*Eucalyptus* sp.	Brazil	A.C. Alfenas	–	–	KX833542	KX833638
	P. eucalyptorum	CBS 112716 = CPC 3912 = UFV 1	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833368	KX833453	AY339341	KX833639
	C. fragariae	CBS 112719 = CPC 3921 = UFV 10	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833369	KX833454	KX833543	KX833640
	C. fragariae	CBS 112720 = CPC 3922 = UFV 11	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833370	KX833455	KX833544	KX833641
	C. fragariae	CBS 112721 = CPC 3923 = UFV 12	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833371	KX833456	KX833545	KX833642
	C. fragariae	CBS 112726 = CPC 3914 = UFV 3	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833372	–	KX833546	KX833643
	C. fragariae	CBS 112731 = CPC 3918 = UFV 7	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833373	KX833457	KX833547	KX833644
	C. fragariae	CBS 112733 = CPC 3920 = UFV 9	*Eucalyptus* sp.	Brazil	A.C. Alfenas	–	–	KX833548	–

Table 1. (Continued).

Species name		Strain accession number[1,2]	Susbtrate of isolation	Origin	Collector(s)	GenBank accession number[3]			
New name	Original name					LSU	*rpb2*	ITS	*tef1*
	P. eucalyptorum	CBS 114134 = CPC 3905	*Eucalyptus camaldulensis* ssp. *simulata*	Vietnam	M.J. Dudzinski & P.Q. Thu	AY339289	KX833458	AY339339	KX833645
	P. eucalyptorum	CBS 114841	*Eucalyptus grandis* × *E. tereticornis*	Australia	T. Burgess & G. Pegg	KX833374	KX833459	KX833549	KX833646
	P. eucalyptorum	CBS 114842	*Corymbia nesophila*	Australia	T. Burgess & G. Pegg	–	–	KX833550	–
	P. eucalyptorum	CBS 114843	*Eucalyptus microcorys*	Australia	T. Burgess & G. Pegg	KX833375	KX833460	KX833551	KX833647
	P. eucalyptorum	CBS 114844	*Eucalyptus microcorys*	Australia	T. Burgess & G. Pegg	KX833376	–	KX833552	KX833648
	P. eucalyptorum	CBS 114845	*Eucalyptus grandis*	Australia	T. Burgess & G. Pegg	KX833377	KX833461	KX833553	KX833649
	P. eucalyptorum	CBS 114846	*Eucalyptus grandis*	Australia	T. Burgess & G. Pegg	KX833378	KX833462	KX833554	KX833650
	P. eucalyptorum	CBS 114847	*Eucalyptus pellita*	Australia	T. Burgess & G. Pegg	KX833379	KX833463	KX833555	KX833651
	P. eucalyptorum	CBS 114852	*Eucalyptus* sp.	Australia	T. Burgess & G. Pegg	KX833380	KX833464	KX833556	KX833652
	P. eucalyptorum	CBS 114853	*Eucalyptus grandis* × *E. urophylla*	Chile	G. Hardy	KX833381	KX833465	KX833557	KX833653
	P. eucalyptorum	CBS 115531 = CPC 3917 = UFV 6	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833382	–	KX833558	KX833654
	P. eucalyptorum	CBS 115532 = CPC 3915 = UFV 4	*Eucalyptus* sp.	Brazil	A.C. Alfenas	KX833383	KX833466	KX833559	KX833655
	Coniella sp.	CPC 13347	*Eucalyptus urophylla*	Venezuela	M.J. Wingfield	KX833384	KX833467	KX833560	KX833656
	Pilidiella sp.	CPC 13809	*Eucalyptus grandis*	China	M.J. Wingfield	KX833385	KX833468	KX833561	KX833657
	Coniella sp.	CPC 16693	*Eucalyptus pellita*	Malaysia	S.S. Lee	KX833386	KX833469	KX833562	KX833658
	Coniella sp.	CPC 16703	*Corymbia torelliana*	Malaysia	S.S. Lee	KX833387	KX833470	KX833563	KX833659
	Coniella sp.	CPC 19802	*Eucalyptus* sp.	Indonesia	M.J. Wingfield	–	–	KX833564	KX833660
Coniella fragariae	*Coniella* sp.	CBS 164.37	*Ulmus campestris*	Italy	Van Gescher	KX833388	KX833471	KX833565	KX833661
	C. fragariae	CBS 167.84 = CPC 3934	*Vitis berlandieri* × *V. riparia* twig	Germany	–	EU754149	–	AY339318	KX833662
	C. fragariae	CBS 172.49^{NT} = CPC 3930	*Fragaria* sp. stem base	Belgium	A. Jaarsveld	AY339282	KX833472	AY339317	KX833663
	C. diplodiella	CBS 180.48	*Linum usitatissimum*	Canada	T.C. Vanterpool	KX833389	–	KX833566	KX833664
	C. fragariae	CBS 183.52	*Tamarix* sp.	–	S. de Boer	KJ710442	KX833473	KX833567	KX833665
	C. fragariae	CBS 198.82	Soil sample, vine orchard	France	G.J. Bollen	EU754150	–	KJ710465	KX833666
	C. diplodiella	CBS 294.75 = LCP 70.3001	*Malus sylvestris* stem	France	M. Morelet	KX833390	KX833474	KX833568	KX833667
	C. diplodiella	CBS 295.75 = DAOM 146648	*Vicia faba* root	Canada	–	KX833391	KX833475	KX833569	KX833668

(*continued on next page*)

Table 1. (Continued).

Species name		Strain accession number[1,2]	Susbtrate of isolation	Origin	Collector(s)	GenBank accession number[3]			
New name	**Original name**					**LSU**	***rpb2***	**ITS**	***tef1***
	C. diplodiella	CBS 296.74	*Fragaria* × *ananassa* var. Cambridge Favourite crown	UK: Scotland	W.R. Jarvis	KX833392	KX833476	KX833570	KX833669
	Coniella sp.	CBS 454.68	*Malus sylvestris* root	Denmark	–	KX833393	KX833477	KX833571	KX833670
	Pilidiella sp.	CPC 23625	*Poa* sp.	The Netherlands	W. Quaedvlieg	KX833394	KX833478	KX833572	KX833671
	Pilidiella sp.	CPC 23652	*Poa* sp.	The Netherlands	W. Quaedvlieg	–	–	KX833573	–
Coniella fusiformis	*Pilidiella* sp.	CBS 114850	*Eucalyptus pellita*	Australia	T. Burgess & G. Pegg	KX833395	KX833479	KX833574	KX833672
	Pilidiella sp.	CBS 114851	–	Australia	–	KX833396	KX833480	KX833575	KX833673
	Coniella sp.	CBS 141596^{T} = CPC 19722	*Eucalyptus* sp. leaves	Indonesia	M.J. Wingfield	KX833397	KX833481	KX833576	KX833674
Coniella granati	*Pilidiella granati*	CBS 130974 = CPC 19625	*Punica granatum*	Iran	–	KX833398	KX833482	JN815312	KX833675
	P. granati	CBS 130975 = CPC 19626	*Punica granatum*	Iran	–	KX833399	KX833483	JN815313	KX833676
	Coniella granati	CBS 132860	*Punica granatum*	Turkey	N. Mükerrem Çeliker	KX833400	KX833484	KX833577	KX833677
	P. granati	CBS 152.33	*Punica granatum* mummified fruit	Cyprus	–	AF408379	KX833485	KX833578	KX833678
	P. granati	CBS 155.71	*Citrus* sp. root	Turkey	–	KX833401	KX833486	KX833579	KX833679
	P. granati	CBS 208.56	*Punica granatum* decaying fruit	Turkey	–	KX833402	KX833487	KX833580	KX833680
	P. granati	CBS 252.38 = ATCC 12685 = CPC 3714	*Vitis vinifera*	Italy	G. Goidànich	AY339291	KX833488	KX833581	KX833681
	P. granati	CBS 814.71	*Punica granatum* fruit	Turkey	N. Kaskalöglu	AF408380	–	KX833582	KX833682
Coniella javanica	*P. granati*	CBS 455.68^{T}	*Hibiscus sabdariffai* leaf spot	Indonesia	J.H. van Emden	KX833403	KX833489	KX833583	KX833683
Coniella koreana	*Pilidiella castaneicola*	CBS 143.97^{T}	–	South Korea	Kyung S. Bae	AF408378	KX833490	KX833584	KX833684
Coniella lanneae	*Coniella* sp.	CBS 141597^{T} = CPC 22200	*Lannea* sp. leaves	Zambia	M. van der Bank	KX833404	KX833491	KX833585	KX833685
Coniella limoniformis	*Pilidiella* sp.	CBS 111021^{T} = PPRI 3870 = CPC 3828 = ARC-MYC J 13102	*Fragaria* sp.	South Africa	C. Roux	KX833405	KX833492	KX833586	KX833686
Coniella macrospora	*Coniella macrospora*	CBS 524.73^{T} = CPC 3935	*Terminalia ivoriensis*stem	Ivory Coast	F. Brunck	AY339292	KX833493	KX833587	KX833687
Coniella malaysiana	*Coniella* sp.	CBS 141598^{T} = CPC 16659	*Corymbia torelliana* leaves	Malaysia	S.S. Lee	KX833406	KX833494	KX833588	KX833688
Coniella musaiaensis var. *hibisci*	*Coniella musaiaensis* var. *hibisci*	CBS 109757 = AR 3534	*Hibiscus* sp.	Africa	A. Rossman	AF408337	–	KX833589	KX833689
Coniella nicotianae	*Pilidiella quercicola*	CBS 875.72^{T} = PD 72/793	*Nicotiana tabacum*	Jamaica	–	KX833407	KX833495	KX833590	KX833690
Coniella nigra	*C. fragariae*	CBS 165.60^{T} = IMI 181519 = IMI 181599 = CPC 4198	Soil	India	V.V. Bhatt	KX833408	KX833496	AY339319	KX833691
Coniella obovata	*Coniella australiensis*	CBS 111025 = CPC 4196 = IMI 261318	Leaf litter	South Africa	K.T. van Warmelo	KX833409	KX833497	AY339313	KX833692
Coniella paracastaneicola	*P. castaneicola*	CBS 141292^{T} = CPC 20146	*Eucalyptus* sp. leaves	Australia	P.W. Crous, J. Edwards & P.W.J. Taylor	KX833410	KX833498	KX833591	KX833693

Table 1. (Continued).

Species name		Strain accession number[1,2]	Susbtrate of isolation	Origin	Collector(s)	GenBank accession number[3]			
New name	**Original name**					**LSU**	***rpb2***	**ITS**	***tef1***
	P. castaneicola	CPC 25498	*Eucalyptus* sp.	Australia	P.W. Crous, J. Edwards & P.W.J. Taylor	KX833411	–	KX833592	KX833694
Coniella peruensis	*C. fragariae*	CBS 110394^{T} = RMF 74.01	Soil of rain forest	Peru	M. Christensen	KJ710441	KX833499	KJ710463	KX833695
Coniella pseudogranati	*Schizoparme pseudogranati*	CBS 137980^{T} = CPC 22545	*Terminalia stuhlmannii*	Zambia	M. van der Bank	KJ869189	–	KJ869132	–
Coniella pseudostraminea	*P. granati*	CBS 112624^{T} = IMI 233050	*Fragaria* sp.	South Africa	P.W. Crous	KX833412	KX833500	KX833593	KX833696
Coniella quercicola	*P. quercicola*	CBS 283.76	Excrements of *Glomerus*, which had eaten forest soil	The Netherlands	H. Schoot	KX833413	KX833501	KX833594	KX833697
	P. quercicola	CBS 904.69^{NT}	*Quercus robur* leaf litter	The Netherlands	E. Jansen	KX833414	KX833502	KX833595	KX833698
	P. castaneicola	CPC 12133	*Eucalyptus* sp.	Indonesia	M.J. Wingfield	–	KX833503	KX833596	KX833699
Coniella solicola	*C. fragariae*	CBS 114007 = IMI 253210 = CPC 4199	–	USA	B.C. Sutton	KX833415	KX833504	AY339320	KX833700
	C. fragariae	CBS 766.71^{T}	Soil	South Africa	M.C. Papendorf	KX833416	KX833505	KX833597	KX833701
	C. fragariae	CPC 17308	*Euphorbia* sp.	Canada	K.A. Seifert	KX833417	–	KX833598	KX833702
Coniella sp.	*Pilidiella* sp.	CBS 114006 = CPC 4200 = IMI 100482	*Vitis vinifera*	India	–	AY339295	–	AY339347	KX833703
Coniella straminea	*S. straminea*	CBS 149.22 = CPC 3932	*Fragaria* sp.	USA	C.L. Shear	AY339296	KX833506	AY339348	KX833704
Coniella tibouchinae	*Pilidiella tibouchinae*	CBS 131594^{T} = CPC 18511	*Tibouchina granulosa* leaves	Brazil	B.E.C. Miranda	KX833418	KX833507	JQ281774	JQ281778
	P. tibouchinae	CBS 131595^{T} = CPC 18512	*Tibouchina granulosa* leaves	Brazil	B.E.C. Miranda	KX833419	KX833508	JQ281775	JQ281779
Coniella wangiensis	*Pilidiella wangiensis*	CBS 132530^{T} = CPC 19397	*Eucalyptus* sp. leaves	Australia	P.W Crous & B.A Summerell	JX069857	KX833509	JX069873	KX833705
Melanconiella hyperopta	*Melanconiella hyperopta*	CBS 131696	*Carpinus betulus* corticated twig	Austria	H. Voglmayr	JQ926281	KX833510	JQ926281	KX833706
Melanconiella sp.	*C. australiensis*	CBS 110385	Soil rain forest	Peru	M. Christensen	KX833420	KX833511	KX833599	KX833707

[1] ATCC: American Type Culture Collection, Virginia, USA; CBS: CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands; CPC: Culture collection of Pedro Crous; DAOM: Plant Research Institute, Department of Agriculture (Mycology), Ottawa, Canada; IMI: International Mycological Institute, CABI-Bioscience, Egham, Bakeham Lane, United Kingdom; LCP: Laboratory of Cryptogamy, National Museum of Natural History, Paris, France; PD: Plant Protection Service, nVWA, Division Plant, Wageningen, The Netherlands; PPRI: Plant Protection Research Institute, Pretoria, South Africa; RMF: Martha Christensen Soil Fungus Collection; UFV: Univeridade Federal de Viçosa, Brazil.

[2] ET: ex-epitype culture; NT: ex-neotype culture; T: ex-type culture.

[3] ITS: internal transcribed spacers and intervening 5.8S nrDNA; LSU: 28S nrDNA; *rpb2*: DNA-directed RNA polymerase II second largest subunit; *tef1*: translation elongation factor 1-alpha.

Table 2. Details of the primers used in the molecular study.

Locus[1]	Primer	Primer sequence (5′–3′)	Orientation	Reference
ITS	ITS5	GGAAGTAAAAGTCGTAACAAGG	Forward	White *et al.* (1990)
	ITS1	TCCGTAGGTGAACCTGCGG	Forward	White *et al.* (1990)
	V9G	TTACGTCCCTGCCCTTTGTA	Forward	De Hoog & Gerrits van den Ende (1998)
	ITS4	TCCTCCGCTTATTGATATGC	Reverse	White *et al.* (1990)
LSU	LR0R	ACCCGCTGAACTTAAGC	Forward	Rehner & Samuels (1994)
	LR7	TACTACCACCAAGATCT	Reverse	Vilgalys & Hester (1990)
rpb2	fRPB2-5F	GAYGAYMGWGATCAYTTYGG	Forward	Liu *et al.* (1999)
	fRPB2-5F2	GGGGWGAYCAGAAGAAGGC	Forward	Sung *et al.* (2007)
	RPB2-6F	TGGGGKWTGGTYTGYCCTGC	Forward	Liu *et al.* (1999)
	bRPB2-6F	TGGGGYATGGTNTGYCCYGC	Forward	Matheny (2005)
	fRPB2-7cR	CCCATRGCT TGYTTR CCCAT	Reverse	Liu *et al.* (1999)
tef1	EF1Fd	GTCGTTATCGGCCACGTCG	Forward	Groenewald *et al.* (2013)
	EF1-728F	CATCGAGAAGTTCGAGAAGG	Forward	Carbone & Kohn (1999)
	EF2Fd	GATCTACCAGTGCGGTGG	Forward	Groenewald *et al.* (2013)
	EF-2	GGARGTACCAGTSATCATGTT	Reverse	O'Donnell *et al.* (1998)
	EF1-986R	TACTTGAAGGAACCCTTACC	Reverse	Carbone & Kohn (1999)

[1] ITS: internal transcribed spacers and intervening 5.8S nrDNA; LSU: 28S nrDNA; *rpb2*: DNA-directed RNA polymerase II second largest subunit; *tef1*: translation elongation factor 1-alpha.

following the protocol of the manufacturer. DNA sequencing reactions used the same primers as those for the PCR amplifications. DNA sequencing amplicons were purified through Sephadex® G-50 Superfine columns (Sigma Aldrich, St. Louis, MO) in MultiScreen® HV plates (Millipore, Billerica, MA). Purified sequence reactions were run on an ABI Prism 3730xl Genetic Analyser (Life Technologies, Carlsbad, CA, USA). Generated DNA sequence electropherograms were analysed using MEGA v. 6 (Tamura *et al.* 2013) and SeqMan v. 8.0.2. from the DNASTAR Lasergene® software package. Consensus sequences were generated and imported into MEGA for initial alignment and the construction of sequence datasets. Individual sequence datasets for the four genomic loci were aligned in MAFFT v. 7.0 (Katoh & Standley 2013, http://mafft.cbrc.jp/alignment/software/) using the Auto alignment strategy with the 200PAM/K = 2 scoring matrix and a gap opening penalty of 1.53 with an offset value of 0.0. Resulting sequence alignments were manually evaluated and adjusted in MEGA. Aligned sequences of the four genomic loci were concatenated using the Fasta alignment joiner utility of FaBox v. 1.41 (Villesen 2007).

For this study, the analysis was based on both the aligned individual loci and the aligned concatenated LSU nrDNA, *rpb2*, ITS nrDNA and *tef1* data set, to determine the species boundaries and their generic relationships. The phylogenetic re-construction was conducted using MrBayes v. 3.1.2 (Ronquist & Huelsenbeck 2003) and PAUP v. 4.0b10 (Swofford 2003). For the Bayesian analyses (BI) of the individual loci and concatenated LSU nrDNA, *rpb2*, ITS nrDNA and *tef1* alignment, MrModeltest v. 2.2 (Nylander 2004) was used to determine the best nucleotide substitution model settings for MrBayes. The heating parameter was set to 0.3 and the search was stopped when convergence was reached (stopval = 0.01). Trees were saved every 1 000 generations. The Markov Chain Monte Carlo (MCMC) analysis of 4 chains started in parallel from a random tree topology.

For the maximum parsimony (MP) analyses of the individual loci and concatenated LSU nrDNA, *rpb2*, ITS nrDNA and *tef1* alignment, alignment gaps were treated as a fifth character state and all characters were unordered and of equal weight. The MP analyses were performed in PAUP v. 4.0b10 (Swofford 2003) using the heuristic search option with 100 random taxon additions and tree bisection and reconnection (TBR) as the branch swapping algorithm. Branches of zero length were collapsed and all multiple, equally most parsimonious trees were saved. The robustness of the trees was evaluated by 1 000 bootstrap replicates (Hillis & Bull 1993). Tree length (TL), consistency index (CI), retention index (RI) and rescaled consistency index (RC) were calculated. The resulting trees were printed with FigTree v. 1.4.2 (http://tree.bio.ed.ac.uk/software/figtree/). For each clade in the concatenated analysis, the position of the members of that clade was determined in the phylogenetic tree obtained from each of the individual loci to confirm that these members still represent a single clade in the individual gene trees. In this way the robustness of a given clade could be evaluated together with the posterior probability value of that clade. A species was only counted if it was distinct from its closest relatives and the species clade contained all the associated strains (see Gomes *et al.* 2013). Sequences derived in this study were deposited in GenBank (Table 1), the alignments and trees in TreeBASE (www.treebase.org/treebase/index.html), and taxonomic novelties in MycoBank (www.MycoBank.org; Crous *et al.* 2004).

Morphology

Cultures were grown on MEA, OA and PDA and placed under mixed cool white fluorescent and near-UV light at 25 °C to enhance sporulation. Morphological observations were made from structures on PDA or OA mounted in Shear's solution and/or clear lactic acid. The 95 % confidence intervals of conidial measurements were derived from at least 30 observations (when possible) at ×1 000 magnification. As certain species show overlapping conidial dimensions, but differ regarding spore volume, the average conidial length: width (l: w) is provided to further distinguish these taxa (Nag Raj 1993). The colours of cultures were described from isolates incubated at 25 °C in the dark for 2 wk using the colour charts of Rayner (1970).

RESULTS

DNA sequencing and phylogenetic analyses

Amplicons of approximately 1 200 bp for partial LSU nrDNA, 760 bp for *rpb2*, 600 bp for partial ITS nrDNA and 675 for *tef1* of the isolates were obtained from this study. The final concatenated alignment consisted of 90 sequences (including the outgroup sequences) and the four loci were represented by 1 130, 552, 409, and 691 alignment positions, including alignment gaps (LSU nrDNA, ITS nrDNA, *tef1* and *rpb2*, respectively).

Based on the results of MrModeltest, a phylogenetic analysis was performed with MrBayes v. 3.1.2 applying the GTR+I+G substitution model with inverse gamma rates and fixed (equal) base frequencies for LSU nrDNA sequences; the GTR+I+G substitution model with gamma rates and dirichlet base frequencies for *rpb2* sequences; the SYM+I+G substitution model with inverse gamma rates and dirichlet base frequencies for ITS nrDNA sequences; and the SYM+I+G substitution model with inverse gamma rates for *tef1* sequences. The Bayesian analysis lasted 1 840 000 generations and the consensus trees and posterior possibilities were calculated from the 3 682 trees in two files (sampling 2 762 of them), each file contained 1 841 trees of which 1 381 were sampled (in the first 25 % of generations) for burn-in. Twenty-five clades, excluding the outgroup, are recognised and discussed here. All *Coniella-Pilidiella-Schizoparme* strains clustered in a well-supported clade (Parsimony bootstrap (PB) of 100, Bayesian Posterior Probability (BPP) of 1.00) indicated in Fig. 2.

Maximum parsimony analyses were also performed both on the individual loci and on the concatenated LSU nrDNA, ITS nrDNA, *tef1* and *rpb2* alignment. The concatenated alignment contained 90 sequences (including the outgroup sequence) and 2 782 characters including alignment gaps; 745 characters were parsimony-informative, 280 were variable and parsimony-uninformative and 1 757 were constant. The parsimony analysis yielded the maximum of 1 000 equally most parsimonious trees (TL = 3 751 steps; CI = 0.505; RI = 0.889; RC = 0.449; HI = 0.495). The same twenty-five clades excluding the outgroup were deduced from the analysis, although some bootstrap support had lower values than BPP, and therefore the parsimony bootstrap support values were mapped unto the phylogeny obtained with the Bayesian analysis (Fig. 2).

Based on the LSU nrDNA it was possible to recognise 21 of the 25 species (84 % success). However, *C. fusiformis*, *C. javanica* and *C. lanneae* in clades 3, 4, 5, and *C. eucalyptorum* from *C. malaysiana* in clades 17 and 18 could not be separated using this locus. The individual loci ITS nrDNA, *tef1* and *rpb2* successfully separated all (100 %) 25 clades in the combined phylogeny. Using the phylogeny produced by the combined ITS nrDNA, *tef1* and *rpb2*, all of the 25 clades could be recognised species. Moreover, the concatenated LSU nrDNA, ITS nrDNA, *tef1* and *rpb2* tree demonstrated a well-supported separation of the clades resulting in 25 species. Phylogenetic analyses demonstrated that all clades could be regarded as species belonging to only one genus, represented by the fully supported most basal node (PB 100/BPP 1.0).

Morphology

The multigene analysis resulted in 25 well-supported clades correlating to 25 species, some of which were formerly placed in *Coniella*, *Pilidiella* or *Schizoparme* (Table 1, Fig. 2). As mentioned above, all clades should be regarded as species belonging to a single genus, to which the older name *Coniella* is applied based on priority. The taxa (not all included in the phylogenetic analysis) represent 13 new species, 14 new combinations and one new name, which are treated below.

Schizoparmaceae Rossman '*Schizoparmeaceae*', Mycoscience 48: 137. 2007.

Pathogens, saprobes, in soil. *Ascomata* brown to black, collapsed collabent, erumpent, becoming superficial, globose, papillate, with central periphysate ostiole. *Asci* clavate to subcylindrical, with distinct apical ring, floating free at maturity. *Paraphyses* lacking. *Ascospores* ellipsoid, aseptate, hyaline, at times becoming pale brown at maturity, smooth, with or without mucoid caps. *Conidiomata* pycnidial, immersed to semi-immersed, unilocular, glabrous, ostiolate, brown to dark brown or black; wall irregularly thickened, with plate-like ornamentation. *Conidiophores* hyaline, smooth, occasionally septate and branched at base, invested in mucus, developing from basal pad. *Conidiogenous cells* discrete, subcylindrical, obclavate or lageniform, hyaline, smooth, proliferating percurrently, or with visible periclinal thickening. *Conidia* ellipsoid, globose, napiform, fusiform or naviculate with a truncate base and an obtuse to apiculate apex, unicellular, thin- or thick-walled, smooth, hyaline or olivaceous brown to brown, sometimes with a longitudinal germslit, with or without a mucoid appendage.

Type genus: *Coniella* Höhn. 1918 (syn. *Schizoparme* Shear 1923).

Coniella Höhn., Ber. dt. bot. Ges. 36: 316. 1918.

Synomyms: *Schizoparme* Shear, Mycologia 15: 120. 1923.
Baeumleria Petr. & Syd., Beih. Reprium nov. Spec. Regni veg. 42: 268. 1927.
Pilidiella Petr. & Syd., Beih. Reprium nov. Spec. Regni veg. 42: 462. 1927.
Anthasthoopa Subram. & K. Ramakr., Proc. Indian Acad. Sci., Sect. B 43: 173. 1956.
Cyclodomella Mathur *et al.*, Sydowia 13: 144. 1959.
Embolidium Bat., Brotéria, N.S. 33(3–4): 194. 1964 non Sacc. 1978.

Pathogens, saprobes. *Ascomata* brown to black, collapsed collabent, erumpent, becoming superficial, globose, papillate, with central periphysate ostiole. *Asci* clavate to subcylindrical, with distinct apical ring, floating free at maturity. *Paraphyses* lacking. *Ascospores* ellipsoid, aseptate, hyaline, at times becoming pale brown at maturity, smooth, with or without mucoid caps. *Conidiomata* pycnidial, immersed to semi-immersed, unilocular, glabrous, ostiolate. Ostiole central, circular or oval, often situated in a conical or rostrate neck. *Conidiomata wall* brown to dark brown or black wall of thin, pale brown *textura angularis* on exterior, and hyaline, thin-walled, *textura prismatica* in the inner layers except at base, which has a convex, pulvinate tissue of hyaline *textura angularis* giving rise to conidiophores or conidiogenous cells. *Conidiophores* mostly reduced to conidiogenous cells, occasionally septate and branched at base, invested in mucus. *Conidiogenous cells* discrete, cylindrical, subcylindrical, obclavate or lageniform, hyaline, smooth-walled,

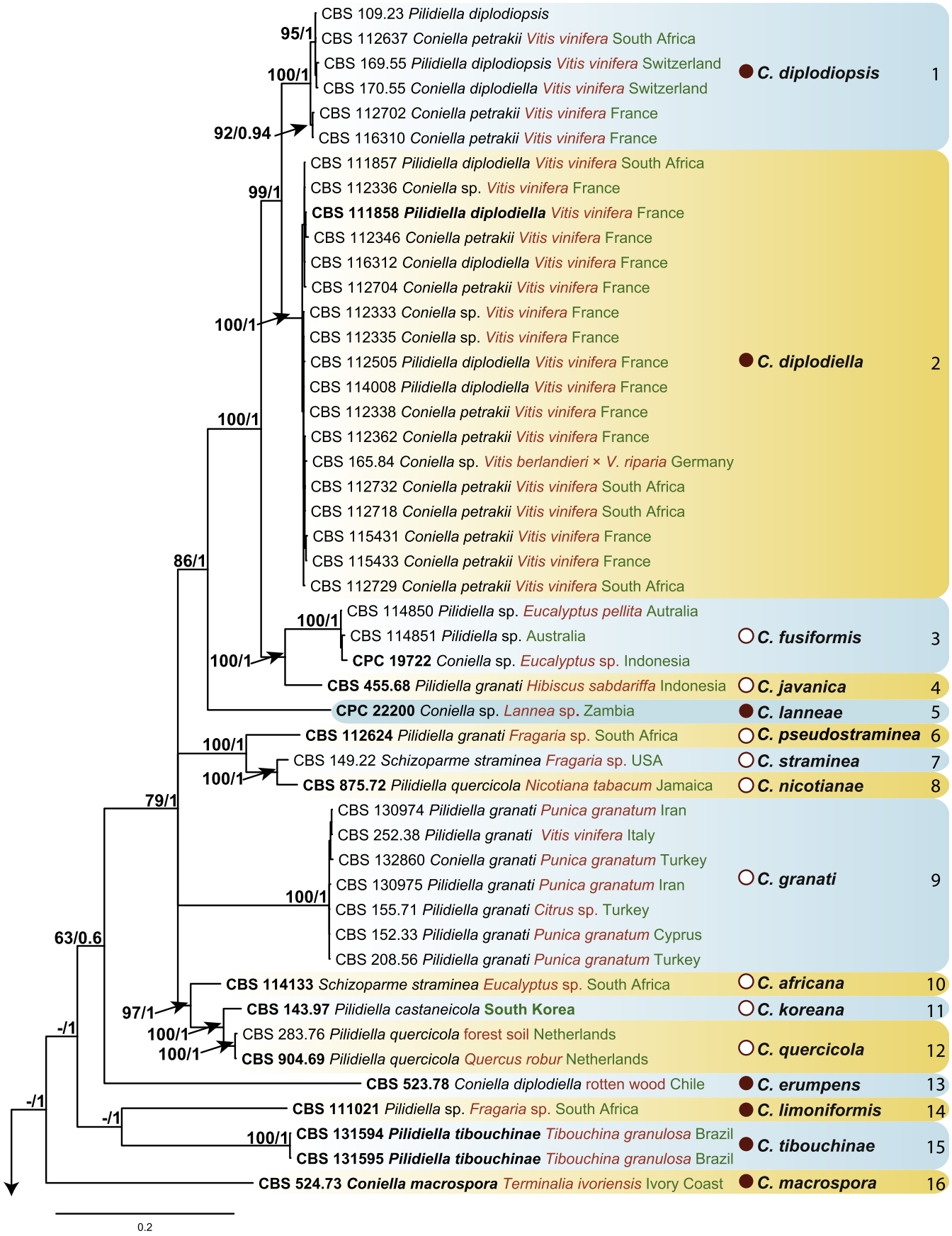

Fig. 2. Consensus phylogram (50 % majority rule) of 4 352 trees resulting from a phylogenetic analysis of the four loci (ITS, LSU, *rpb2*, *tef1*) using MrBayes v. 3.1.2 and PAUP v. 4.0b10. Parsimony bootstrap support values/Posterior probabilities are indicated at the nodes (only values for deeper nodes). The scale bar denotes the expected substitutions per site. Clades are numbered on the right of the boxes excluding the outgroup and *Coniella* species names with white dots and brown borders reflect hyaline to pale brown conidia, while those with solid brown dots reflect brown to dark brown conidia. Strain accession numbers are followed by the original species name (black), the isolation source (red) and country of origin (green). The branch to the outgroup was shortened to facilitate layout of the tree. The tree was rooted to *Melanconiella hyperoptica* (culture CBS 131696) and *Melanconiella* sp. (CBS 110385).

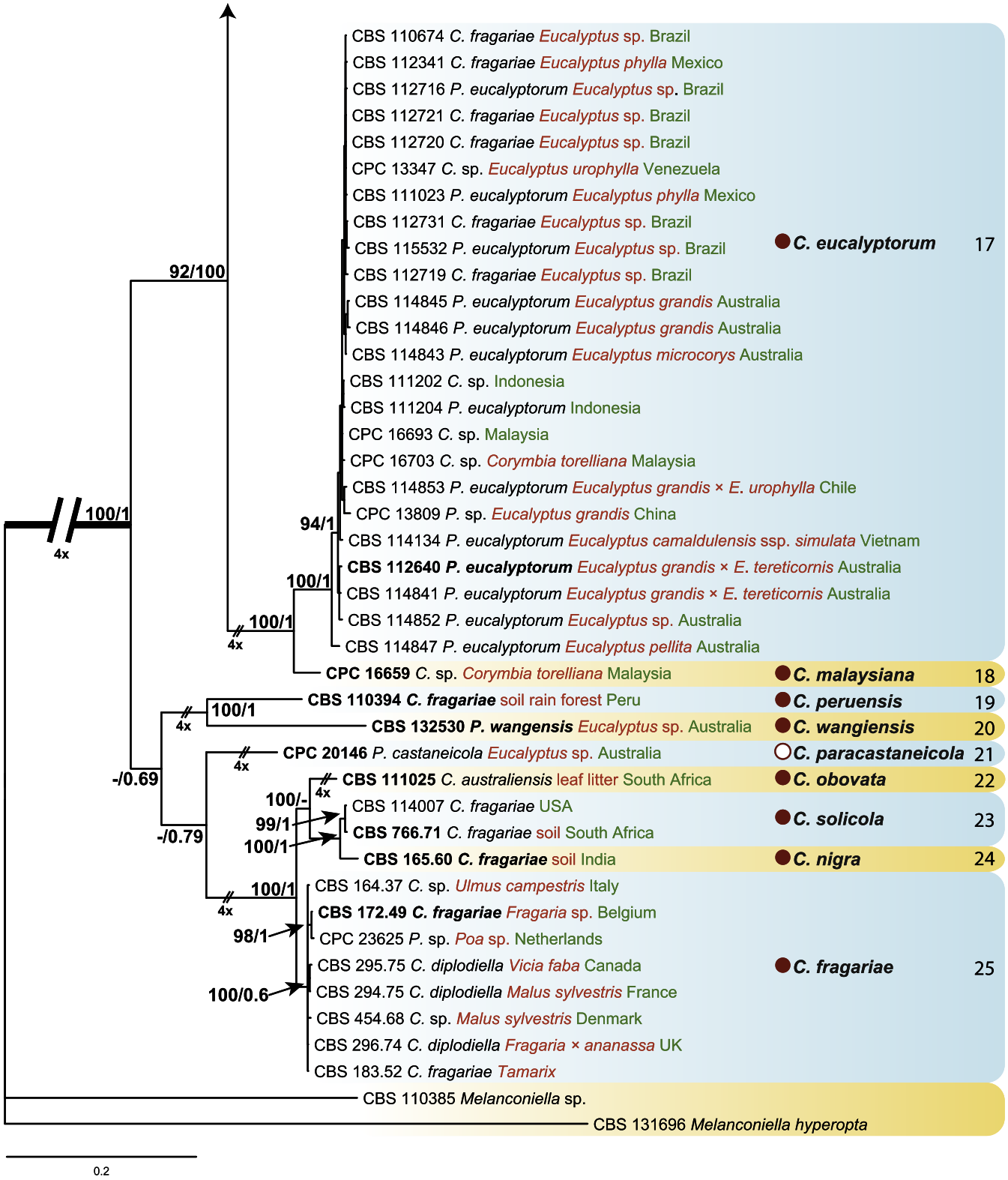

Fig. 2. (Continued).

proliferating percurrently, or with visible periclinal thickening. *Conidia* ellipsoid, globose, napiform, fusiform or naviculate with a truncate base and an obtuse to apiculate apex, unicellular, thin- or thick-walled, smooth, olivaceous brown to brown, sometimes with a longitudinal germ-slit, with or without a mucoid appendage extending from apex to base on one side; basal hilum with or without short tubular basal appendage. *Spermatophores* formed in same conidioma, hyaline, smooth, 1-septate with several apical conidiogenous cells, or reduced to conidiogenous cells. *Spermatogenous cells* cells hyaline, smooth, lageniform to subcylindrical, with visible apical periclinal thickening. *Spermatia* hyaline, smooth, red-shaped with rounded ends (adapted from Crous *et al.* 2014a).

Type species: *Coniella fragariae* (Oudem.) B. Sutton 1977 (syn. *Coniella pulchella* Höhn. 1918).

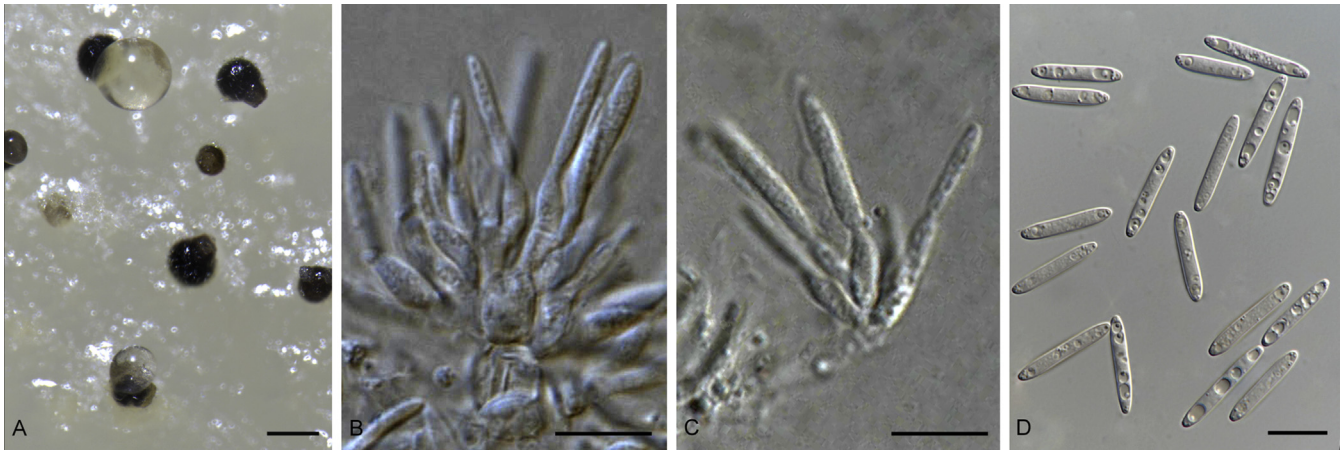

Fig. 3. *Coniella africana* (CBS 114133). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 230 µm, others = 10 µm.

Coniella africana L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817809. Fig. 3.

Etymology: Named after the continent where the species was collected, Africa.

Diagnosis: Saprobic. Occurring on *Eucalyptus nitens* leaf litter in South Africa. *Conidia* hyaline to pale yellowish, linear, cylindrical, sometimes bent to naviculate, germ slit absent (14.5–) 15–20.5(–21) × (2.5–)3(–3.5) µm (l: w = 5.6).

Presumed saprobe. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline becoming olivaceous to brown with age, to 230 µm diam. *Ostiole* central. *Conidiomatal wall* consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 7–10.5 × 1–2 µm, 0.5–1.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale yellowish when mature, cylindrical, sometimes bent to naviculate, apex acute to nearly rounded, base truncate, smooth-walled, multi-guttulate, germ slit absent (14.5–)15–20.5(–21) × (2.5–)3(–3.5) µm (l: w = 5.6).

Culture characteristics: Colonies on MEA with white aerial mycelium spreading in irregular zones with luteous margin and a few black conidiomata forming after 2 wk. On OA surface luteous to orange zones at centre with sparse aerial mycelium. On PDA surface disordered and disconnected luteous zones containing white aerial mycelium.

Material examined: **South Africa**, Mpumalanga, Barberton, from *Eucalyptus nitens* leaf litter, P.W. Crous, 11 May 1990 (**holotype** CBS H-22706, **isotype** PREM 51098, culture ex-type CBS 114133 = CPC 405).

Notes: *Coniella africana* (clade 10, Fig. 2) was originally reported as *Coniella castaneicola* (Crous & Van der Linde 1993). Conidia of *C. africana* (hyaline to pale yellowish when mature, with linear, cylindrical, sometimes bent to naviculate, (14.5–) 15–20.5(–21) × (2.5–)3(–3.5) µm *in vitro*, (13–25 × 2.5–3.5 µm *in vivo*)), are morphologically similar to *C. koreana* (clade 11, Fig. 2) (hyaline to pale yellowish brown, cylindrical, linear, often curved to falcate, (15–)16–19(–20) × (2–)2.5–3(–3.5) µm) and *C. quercicola* (clade 12, Fig. 2) (hyaline, cylindrical, slightly curved to naviculate, (13–)14–18(–19) × (2–)2.5–3(–3.5) µm). Phylogenetic analyses revealed *C. africana* as being distinct from *C. quercicola* and *C. koreana*, clustering in a separate clade (clade 10). *Coniella africana* is 89 % (*tef1*) and 97 % (*rpb2*) similar to *C. quercicola*, and 87 % (*tef1*) and 97 % (*rpb2*) similar to *C. koreana*. These species can only be distinguished using molecular sequence data.

Coniella angustispora (Samuels *et al.*) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817810.
Basionym: *Schizoparme angustispora* Samuels *et al.*, Mycotaxon 46: 465. 1993.
Synonym: *Pilidiella angustispora* (Samuels *et al.*) Rossman & Crous, IMA Fungus 6: 151. 2015.

Diagnosis: Plant pathogenic. Occurring on petioles of *Psidium guajava* in Hawaii. *Ascomata* solitary or gregarious. *Ascospores* hyaline, cylindrical to oblong-ellipsoid, reniform or allantoid, (6.5–)8.5–16(–17) × 2–3 µm.

Description and illustration: Samuels *et al.* (1993).

Notes: *Coniella angustispora* was originally described on petioles of *Psidium guajava*, Kauai, Nualola Trail, near Kokee Lodge, Hawaii (USA) (**holotype** BPI). Presently there are no cultures or DNA sequences available.

Coniella calamicola (J. Fröhl. & K.D. Hyde) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817811.
Basionym: *Schizoparme calamicola* J. Fröhl. & K.D. Hyde, Fungal Diversity Res. Ser. 3: 255. 2000.
Synonym: *Pilidiella calamicola* (J. Fröhl. & K.D. Hyde) Rossman & Crous, IMA Fungus 6: 151. 2015.

Diagnosis: Saprobic. Occurring on dead frond blades of *Daemonorops margaritae* in Hong Kong. *Ascomata* immersed, often in clusters of 2–3. *Ascospores* hyaline, oblong-ellipsoid, slightly flattened on one side, more rounded on one end than the other, aseptate, 14–18(–19) × (7.5–)9–10.5(–11.5) µm.

Description and illustration: Fröhlich & Hyde (2000).

Notes: *Coniella calamicola* was originally described from a dead frond blade of *Daemonorops margaritae* collected in the Tai Tam Country Park in Hong Kong (**holotype** HKU(M)JF31). Presently there are no cultures or DNA sequences available.

Coniella crousii (Rajeshk., Hepat & S.K. Singh) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817812.
Basionym: *Pilidiella crousii* Rajeshk., Hepat & S.K. Singh, Mycotaxon 115: 158. 2011.

Diagnosis: Plant pathogenic. Occurring on fruit of *Terminalia chebulae* in India. *Conidia* initially hyaline, becoming medium brown, straight to slightly curved, ellipsoid to narrowly ellipsoid, apex subobtuse, base truncate, (6–)7–12(–13.5) × (2.5–)3–5 µm (l: w = 2.2–2.3).

Description and illustration: Rajeshkumar *et al.* (2011).

Notes: *Coniella crousii* was originally described from fallen fruits of *Terminalia chebula* collected in the Western Gats of Mahabaleshwar, India (**holotype** AMH 9406, ex-type culture NFCCI 2213).

Coniella destruens (M.E. Barr & Hodges) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817813.
Basionym: *Gnomoniella destruens* M.E. Barr & Hodges, Mycologia 79: 782. 1987.
Synonyms: *Schizoparme destruens* (M.E. Barr & Hodges) Samuels *et al.*, Mycotaxon 46: 470. 1993.
Pilidiella destruens Crous & M.J. Wingf., Mycol. Res. 108: 299. 2004.

Descriptions and illustrations: Samuels *et al.* (1993), Van Niekerk *et al.* (2004).

Diagnosis: Plant pathogenic. Occurring on twigs of *Eucalyptus grandis* in Hawaii. *Ascospores* ellipsoidal, hyaline, thick-walled, granular, with terminal mucous caps, (9–)11–13 × (4.5–)5–6 µm. *Conidia* long, fusoid-ellipsoidal, widest in the middle, tapering to an acutely rounded apex and subtruncate base with minute scar, pale to medium brown, granular, (10–)12–13(–15) × (3–)4–5(–6) µm (l: w = 2.7).

Material examined: **USA**, Hawaii, on twigs of *Eucalyptus grandis*, Oct. 2000, M.J. Wingfield (**holotype** of *Pilidiella destruens*, CBS H-6945, **holotype** of *Gnomoniella destruens* NY, **isotype** BPI 596643).

Note: Unfortunately there are presently no cultures available of *C. destruens*, and this fungus will have to be recollected on *Eucalyptus* from Hawaii.

Coniella diplodiella (Speg.) Petr. & Syd., Feddes Repert., Beih. 42: 460. 1927. Fig. 4.
Basionym: *Phoma diplodiella* Speg., Ampelmiceti Italici no. 4. 1878.
Synonyms: *Coniothyrium diplodiella* (Speg.) Sacc., Syll. Fung. 3: 310. 1884.
Pilidiella diplodiella (Speg.) Crous & van Niekerk, Mycol. Res. 108: 293. 2004.

Coniella petrakii B. Sutton, The Coelomycetes (Kew): 422. 1980.

Diagnosis: Plant pathogenic. Occurring on canes of *Vitis vinifera* in Africa (South Africa), Asia (China, India), Australia, and Europe (Bulgaria, France, Greece, Italy, Sicily). *Conidia* hyaline when immature, becoming pale to medium brown, inequilateral, smooth, frequently with a hyaline, lateral appendage, narrowly ellipsoidal, apices tapering, subobtusely rounded, bases subtruncate, multiguttulate, straight to slightly curved, wall of medium thickness, multi-guttulate, (10–)12–15(–19) × (4–)5–6 µm (l: w = 2.3).

Description and illustration: Van Niekerk *et al.* (2004).

Material examined: **France**, on canes of *Vitis vinifera*, 2000, P.W. Crous (**epitype** designated in Van Niekerk *et al.* 2004, CBS H-6948, culture ex-epitype CBS 111858 = CPC 3708).

Notes: *Coniella diplodiella* (clade 2, Fig. 2) was first introduced as *Phoma diplodiella* Speg. (1878), isolated from *Vitis vinifera* collected in Italy. It was later renamed as *Coniothyrium diplodiella* (Speg.) Sacc. by Saccardo (1884) and as *Coniella diplodiella* (Speg.) Petr. & Syd. (Petrak & Sydow 1927). White rot of vine, also known as Coniella rot caused by *C. diplodiella*, has been recorded worldwide especially from warm temperate and tropical countries (Sutton & Waterston 1966). The fungus attacks injured berries and has been associated with serious losses following hailstorm damage. The disease usually begins with a yellow spot surrounded by a brownish haloes developing into minute black pycnidia (Snowden 2010). Recently, *C. diplodiella* was reported to cause a serious pre- and post-harvest disease on grapes, especially under high temperature and humidity conditions (Han *et al.* 2015).

Coniella diplodiopsis (Crous & van Niekerk) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817814. Fig. 5.
Basionym: *Pilidiella diplodiopsis* Crous & van Niekerk, Mycol. Res. 108: 296. 2004.

Diagnosis: Plant pathogenic. Occurring on canes of *Vitis vinifera* in Africa (South Africa), and Europe (Switzerland, France, Germany, Italy). *Conidia* pale to medium brown, narrowly ellipsoidal with attenuating conidial apices that are acutely rounded, (8–)10–12(–13) × (5–)6–7(–7.5) µm (l: w = 1.7).

Description and illustration: Van Niekerk *et al.* (2004).

Material examined: **Italy**, Sardegna, Sassari, on *Vitis vinifera* canes, 1984, P.W. Crous (**holotype** CBS H-6947; culture ex-type CBS 590.84 = CPC 3940).

Notes: *Coniella diplodiopsis* differs from *C. diplodiella* in that conidia are shorter, pale to medium brown, narrowly ellipsoidal, but with more attenuating apices (less pronounced when mature), that are acutely rounded. All strains used in the study originated from *Vitis vinifera*, collected from South Africa, France and Switzerland (Table 1), suggesting that *P. diplodiopsis* is probably host-specific (clade 1, Fig. 2).

Coniella erumpens L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817815. Fig. 6.

Etymology: Named after its erumpent conidiomata, bursting open upon maturity in culture.

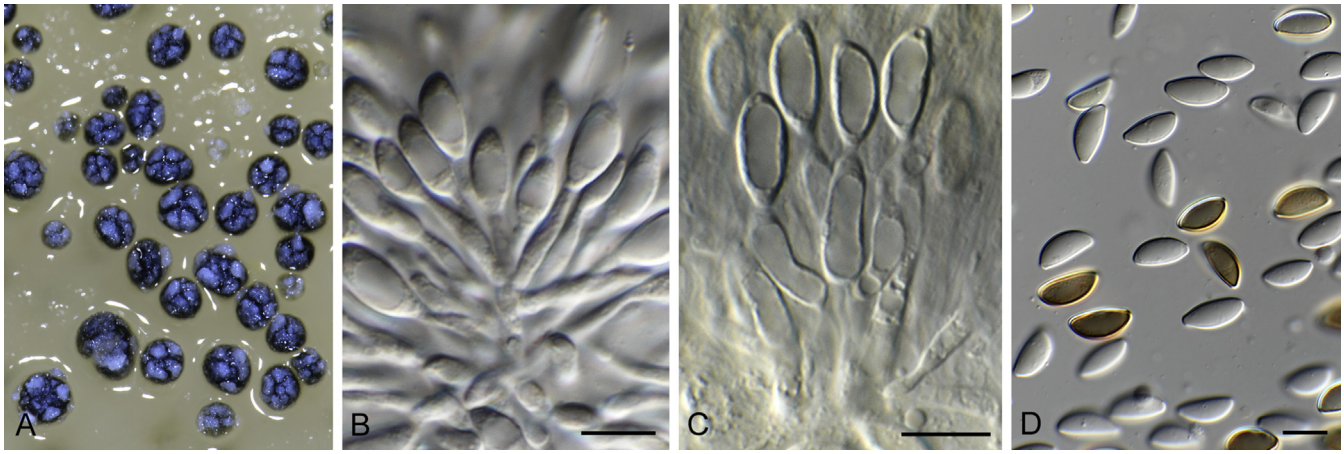

Fig. 4. *Coniella diplodiella* (CBS 111858). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars = 10 µm.

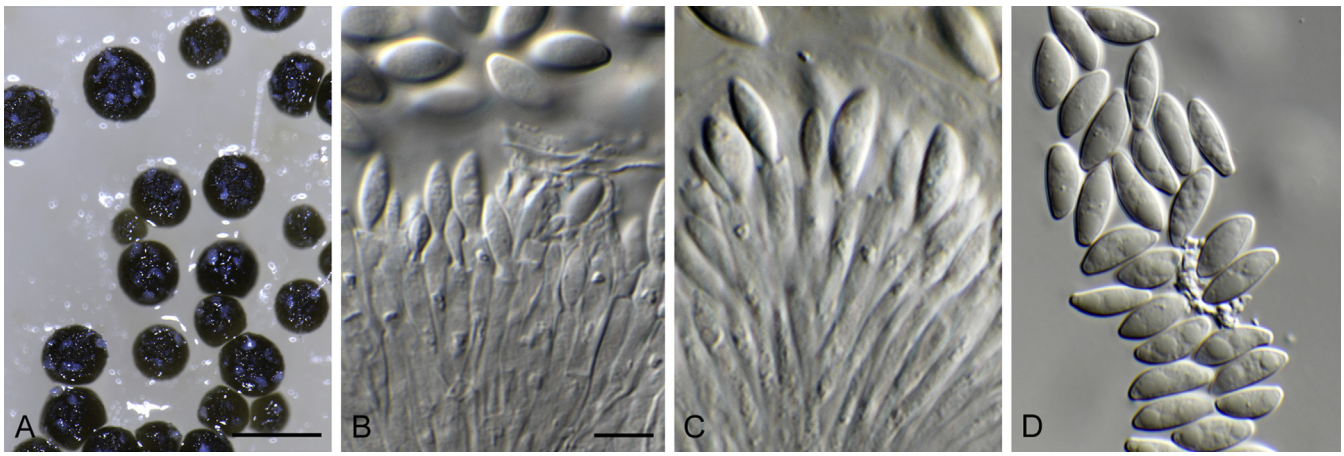

Fig. 5. *Coniella diplodiopsis* (CBS 590.84). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 300 µm, B applies to C, D = 10 µm.

Diagnosis: Saprobic. Occurring on rotton wood in Chile. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, lanceolate to ellipsoidal, inequilateral, apex rounded, slightly acute, truncate base, bi-guttulate when young, monoguttulate when mature, smooth- and thick-walled, germ slits absent, (7–)7.5–10(–10.5) × (3–)3.5–5(–5.5) µm (l: w = 2.2).

Presumed saprobic. *Conidiomata* separate, initially appearing hyaline, becoming olivaceous to black with age, often submerged in media and bursting open upon maturity, globose to depressed, up to 700 µm diam. *Ostiole* central. *Conidiomatal wall* consisting of 1–2 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thicker, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 6–12.5 × 2–3 µm, 1–2.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, lanceolate to ellipsoidal, inequilateral, apex rounded, slightly acute, widest at middle tapering to a wide, truncate base, bi-guttulate when young, monoguttulate when mature, smooth- and thick-walled, germ slits absent, (7–)7.5–10(–10.5) × (3–)3.5–5(–5.5) µm (l: w = 2.2).

Culture characteristics: Colonies on MEA turning chestnut-brown, surface with fluffy white aerial mycelium, spreading in irregular concentric zones filled with numerous black conidiomata that often erupt or burst open upon maturity, with olivaceous spore mass. On OA medium turns cinnamon-brown, surface with sparse white aerial mycelium, spreading in irregular concentric zones filled with inconspicuous conidiomata. On PDA surface with white aerial mycelium, spreading in irregular concentric zones; conidiomata absent or inconspicuous.

Material examined: **Chile**, Valdivia, on rotten wood, 1973, A.E. Gonzales (**holotype** CBS H-10720, culture ex-type CBS 523.78).

Notes: *Coniella erumpens* (clade 13, Fig. 2) was isolated from rotten wood collected from Valdivia, Chile, and was originally identified as *P. diplodiella*. The individual loci, ITS, *tef1*, LSU, *rpb2* as well as the concatenated tree of the 4 genes showed that this species is distinct from *P. diplodiella* which has only 89 % (*rpb2*) similarity. Morphological analysis confirmed the uniqueness of this species as also reflected by its cultural characteristics from MEA, pycnidial and conidial features. The pycnidia of this species have a tendency to burst or erupt upon maturity, and release the conidia in an olivaceous mass, hence the name *C. erumpens*.

Coniella eucalyptigena (Crous & M.J. Wingf.) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817816. Fig. 7.
Basionym: *Pilidiella eucalyptigena* Crous & M.J. Wingf., Persoonia 34: 179. 2015.

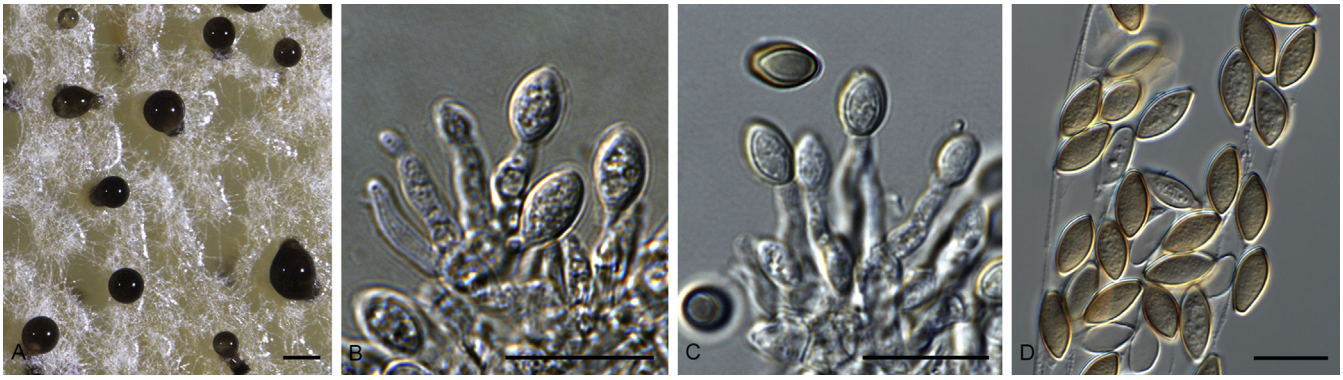

Fig. 6. *Coniella erumpens* (CBS 523.78). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 500 µm, others = 10 µm.

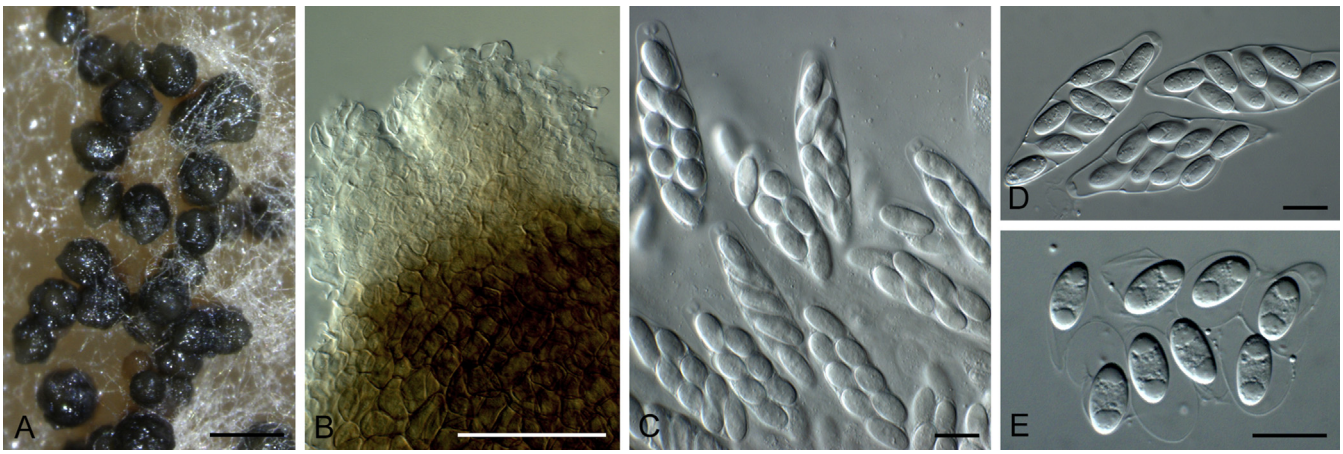

Fig. 7. *Coniella eucalyptigena* (CBS 139893). **A**. Ascomata forming on OA. **B**. Ostiolar area. **C, D**. Asci. **E**. Ascospores. Scale bars: A = 250 µm, others = 10 µm.

Diagnosis: Plant pathogenic. Occurring on leaves of *Eucalyptus brassiana* in Malaysia. *Ascospores* ellipsoidal, hyaline, thin-walled, granular, with terminal mucoid caps or lateral appendages up to 5 µm diam, or ascospore entirely encased in sheath; sheath disappearing with age, and ascospores becoming pale brown and surface appearing roughened (possibly remnants of sheath), (10–)12–13(–14) × (4–)5–6 µm (l: w = 2.2).

Description and illustration: Crous *et al.* (2015c).

Material examined: **Malaysia**, Sabah, on leaves of *Eucalyptus brassiana*, May 2014, M.J. Wingfield (**holotype** CBS H-22222, culture ex-type CPC 24793 = CBS 139893); CPC 24794.

Note: Only the sexual morph was observed on host material, and also formed in culture.

Coniella eucalyptorum (Crous & M. J. Wingf.) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817817. Fig. 8.
Basionym: *Pilidiella eucalyptorum* Crous & M. J. Wingf., Mycol. Res. 108: 296. 2004.

Diagnosis: Plant pathogenic. Occurring on leaves of *Eucalyptus grandis* × *E. tereticornis* hybrid in Australia. *Conidia* medium to dark red-brown, broadly ellipsoidal or limoniform, widest in the middle, tapering to an acutely rounded apex and a subtruncate base, multiguttulate, with a longitudinal germ slit, wall of medium thickness as in *C. fragariae*, but basal mucoid appendage less common than in *C. fragariae*, (9–)10–12(–14) × (6–)7–8 µm (l: w = 1.6)

Description and illustration: Van Niekerk *et al.* (2004).

Material examined: **Australia**, Queensland, Lannercost, plantation, from leaves of *Eucalyptus grandis* × *E. tereticornis* hybrid, 10 Aug. 1999, P.Q. Thu & R.J. Gibbs (**holotype** CBS H-6946, culture ex-type CBS 112640 = CPC 3904 = DFR 100185).

Notes: Van Niekerk *et al.* (2004) reported that this species was originally regarded as *C. fragariae* by Sharma *et al.* (1985) and Park *et al.* (2000). Due to its morphological differences from *C. fragariae* as confirmed by phylogenetic analyses, *C. eucalyptorum* was recognised as distinct (Van Niekerk *et al.* 2004). A similar phylogenetic result was obtained in this study, confirming the separation of *C. eucalyptorum* from *C. fragariae*. *Coniella eucalyptorum* is restricted to species of *Eucalyptus* (and *Corymbia*), and occurs commonly on this host in tropical and temperate climates such as Australia, Brazil, Chile, Indonesia, Malaysia, Mexico, Venezuela and Vietnam (Van Niekerk *et al.* 2004).

Coniella fragariae (Oudem.) B. Sutton, Mycol. Pap. 141: 47. 1977. Fig. 9.
Basionym: *Coniothyrium fragariae* Oudem., Versl. Meded. Ned. K. Akad. Wet., ser. 2, 18: 37. 1883.
Synonyms: *Clisosporium fragariae* (Oudem.) Kuntze, Rev. Gen. Pl. 3: 458. 1898.
Coniella pulchella Höhn., Ber. dt. bot. Ges. 36: 316. 1918.

Diagnosis: Plant pathogenic. Occurring on stems and leaves of *Fragaria*, in Australia, Canada, and Europe (Belgium, Denmark, France, Italy, The Netherlands, UK). *Conidia* ellipsoid, apices

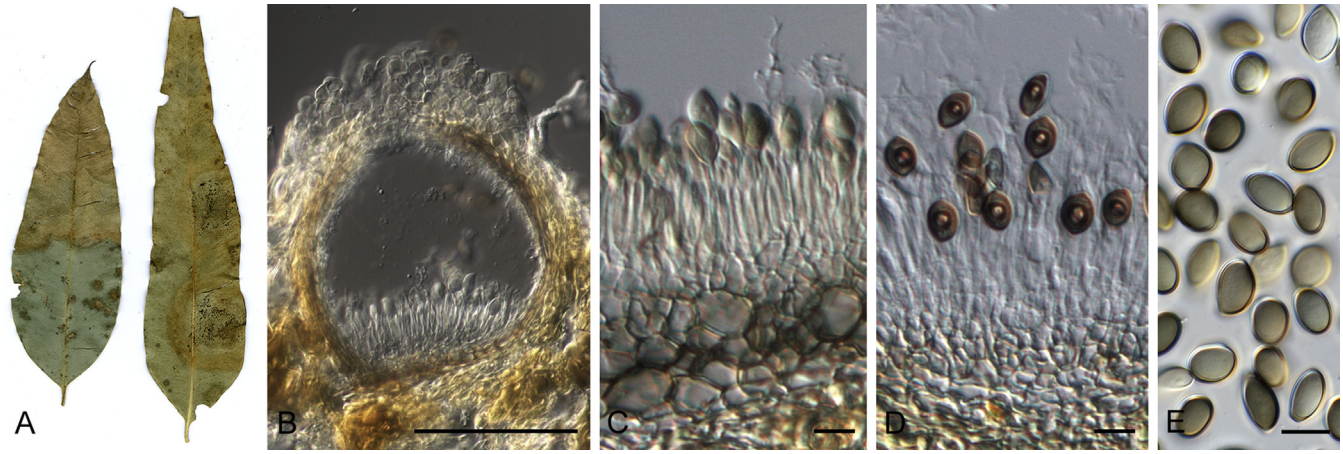

Fig. 8. *Coniella eucalyptorum* (CBS 112640). **A**. Leaf symptoms on *Eucalyptus* sp. **B**. Transverse section through a conidioma. **C, D**. Conidiogenous cells giving rise to conidia. **E**. Conidia. Scale bars: A = 500 µm, others = 10 µm.

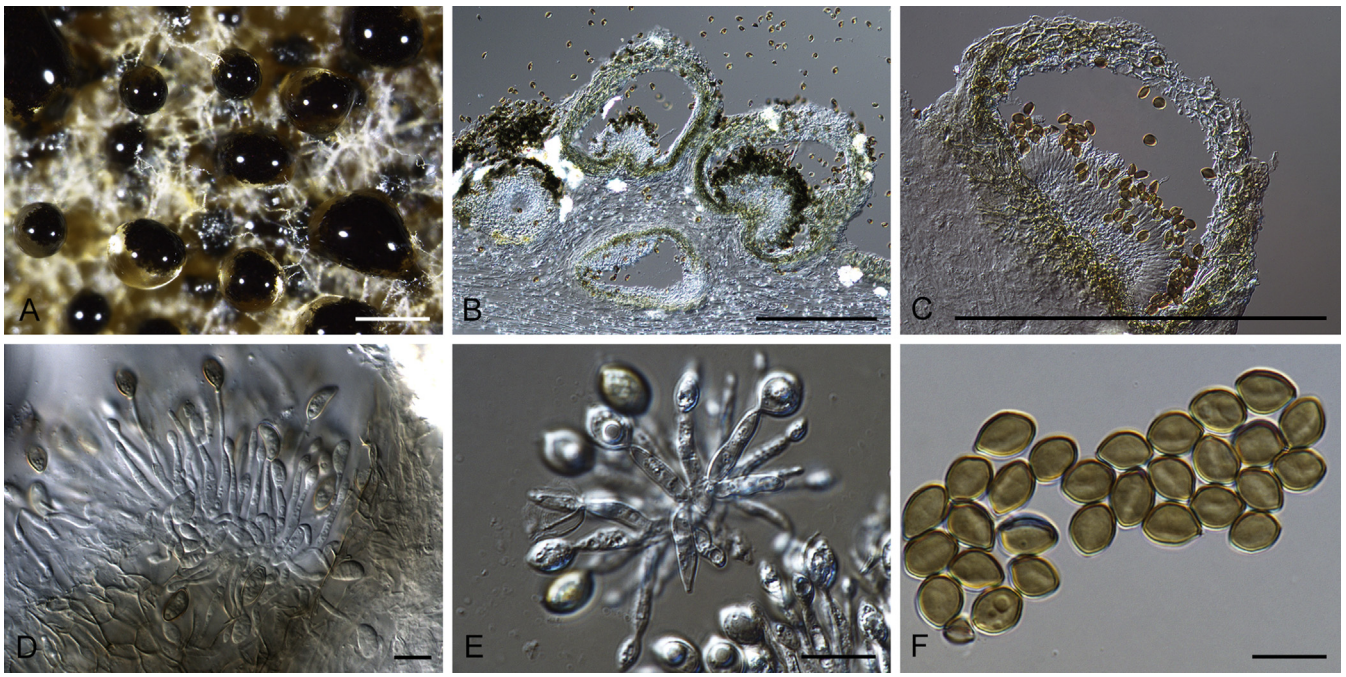

Fig. 9. *Coniella fragariae* (CBS 172.49). **A**. Conidiomata forming on PDA; **B, C**. Vertical sections through conidiomata. **D, E**. Conidiogenous cells giving rise to conidia. **D, F**. Conidia. Scale bars: A–C = 300 µm, others = 10 µm.

tapering, subobtusely rounded, tapering from middle towards a narrowly truncate base, medium brown, multi-guttulate when immature, becoming 1–2 guttulate when mature, wall darker brown than medium brown body of conidium, frequently with a lighter band of pigment extending over conidium, with a germ slit visible in older conidia, and mucous appendages also visible in lactic acid; appendages mostly basal, but also lateral along the length of the conidium, 7–12.5 × (4–)6–8(–10) µm (l: w = 1.4).

Description and illustration: Crous *et al.* (2014a).

Material examined: **Belgium**, Lint near Antwerpen, stem base of *Fragaria* sp., Apr. 1949, A. Jaarsveld (**neotype** designated in Crous *et al.* 2014a, CBS H-10697, culture ex-neotype CBS 172.49 = CPC 3930). Additional collections cited in Crous *et al.* (2014a).

Notes: *Coniella fragariae* (clade 25, Fig. 2) was first described in 1883 by C.A.J. Oudemans from The Netherlands, on *Fragaria vesca* (Crous *et al.* 2014a). It was reported from South Africa as *C. pulchella* by Marasas & Van Der Westhuizen (1971), but later reduced to synonymy with *C. fragariae* (Sutton 1980). Although this species was associated with many plant diseases such as leaf spots in *Eucalyptus* (Sharma *et al.* 1985, Old *et al.* 2003), these were probably *C. eucalyptorum* (see above), while records on other hosts (Sutton 1980) need to be confirmed.

Coniella fusiformis L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817818. Fig. 10.

Etymology: Named after the shape of its conidia (fusiform).

Diagnosis: Plant pathogenic. Occurring on leaves of *Eucalyptus* spp. in Australia and Indonesia. *Conidia* hyaline to pale yellowish brown with age, fusiform, monoguttulate to multiguttulate, germ slits absent, (8–)8.5–10(–11) × (2.5–)3–4.5(–5) µm (l: w = 2.2), with mucoid appendage alongside conidium.

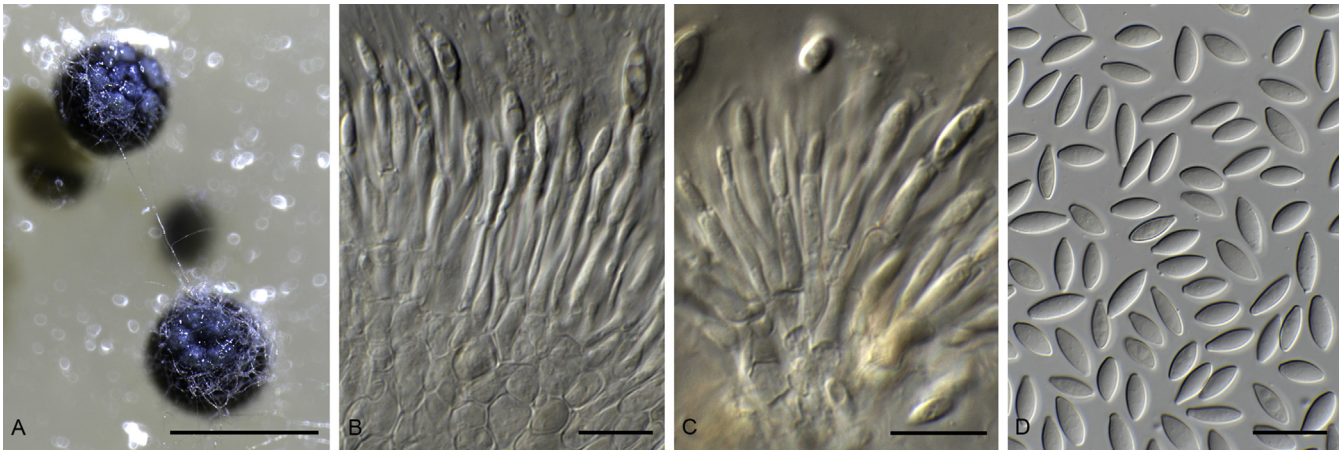

Fig. 10. *Coniella fusiformis* (CPC 19722). **A**. Conidiomata forming on OA; **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 500 µm, others = 10 µm.

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline becoming olivaceous to black with age, with plate-like structures, up to 500 µm diam. *Ostiole* single, central. *Conidiomatal wall* consisting of 2–3 layers of pale to medium brown *textura angularis*. *Conidiophores* densely aggregated, subulate, simple, frequently branched above, enclosed in mucoid sheath, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, hyaline, smooth, tapering, 6.5–12 × 1.5–3 µm, 1–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale yellowish brown with age, fusiform, apex acute, widest at middle tapering towards a truncate base, smooth-walled, monoguttulate to multiguttulate, germ slits absent, (8–)8.5–10(–11) × (2.5–)3–4.5(–5) µm (l: w = 2.2), with mucoid appendage alongside conidium.

Culture characteristics: Colonies on MEA sienna in colour, surface with profuse black conidiomata arranged in slightly concentric zones with sparse white fluffy aerial mycelium. On OA, medium forms a dark umber colour at outer margin; surface with numerous black conidiomata arranged in irregular circle, with sparse white aerial mycelium. On PDA medium forms a few olivaceous patches; surface with numerous black conidiomata and sparse white aerial mycelium.

Materials examined: **Australia**, Queensland, North Queensland, Taiflos, *Eucalyptus pelita*, collection date unknown, T. Burgess & G. Pegg, CBS H-22707, CBS 114850; Queensland, collection details unknown, CBS H-22708, CBS 114851. **Indonesia**, on leaves of *Eucalyptus* sp., 2011, M.J. Wingfield (**holotype** CBS H-22713, cultures ex-type CBS 141596 = CPC 19722).

Notes: Clade 3 (Fig. 2) contains three strains (CBS 114850, CBS 114851, CPC 19722), which were revealed to be phylogenetically and morphologically similar to one another. Both CBS 114850 and CBS 114851 were collected from Australia, while CPC 19722 was collected from Indonesia. Phylogenetic analyses using the concatenated LSU nrDNA, ITS nrDNA, *tef1* and *rpb2* revealed that these isolates together with their sister clade, *C. javanica* (clade 4, Fig. 2), deviate from *C. diplodiopsis* (clade 1) and *C. diplodiella* (clade 2), representing a separate clade. The *rpb2* sequences showed a 96 % similarity to both *C. diplodiella* (CBS 111858) and *C. javanica* (CBS 455.68). Morphological examination of these species revealed conidial similarities, i.e. hyaline to pale yellowish brown, fusiform to ellipsoidal, inequilateral, differing only in their conidial dimensions. Hence, these isolates, CBS 114850, CBS 114851 and CPC 19722, are described as a novel species, *C. fusiformis*.

Coniella granati (Sacc.) Petrak & Sydow, Beij. Rep. spec. nov. regni veg. 42: 461. 1927. Fig. 11.
Basionym: *Phoma granatii* Sacc., Novo G. bot. ital. 8: 200. 1876.
Synonyms: *Macrophoma granatii* (Sacc.) Berl. & Vogl., Atti Soc. Venet. Trent. Sc. Nat. 10: 202. 1886.
Pilidiella granatii (Sacc.) Aa, Verh. K. ned. Akad Wet. Ser. 2, 61: 51. 1972 [1973].
Phoma versoniana Sacc., Michelia 2: 272. 1881.
Zythia versoniana (Sacc.) Sacc., Syll. Fung. 3: 614. 1884.
Anathasthoopa simba Subram. Ramakr., Proc. Ind. Acad. Sci. 43: 174. 1956.
Coniella simba (Subram. & Ramakr.) Sutton, Canad. J. Bot. 47: 607. 1969.

Diagnosis: Plant pathogenic. Occurring on fruit of *Punica garantum*, in Brazil, Asia (China, Korea, Pakistan), Europe (Cyprus, Greece, Italy, The Netherlands, Spain, Turkey, Ukraine), Iran, and the USA (CA, NC). Also reported on other hosts (see below). *Conidia* hyaline to olivaceous brown, ellipsoid, apex obtuse, base truncate, with mucoid appendage along the side of the conidium, 9–16 × 3–4.5 µm (l: w = 3.5).

Description and illustration: Nag Raj (1993).

Material examined: **Italy**, on *Vitis vinifera* fruit, unknown collection date, G. Goidànich, culture CBS 252.38 = ATCC 12685 = CPC 3714.

Notes: *Coniella granati* (clade 9, Fig. 2) was first described by Saccardo (1876) as *Phoma granatii*, isolated from *Punica granatum* collected in Italy (BPI **isotype**, Saccardo – Mycotheca Veneta #514 on calyx, petals and rarely on leaves). This species is known to occur on many hosts including *Anogeissus acuminata*, *Ceasalpinia pulcherrima*, *Hevea* sp., and *Vitis vinifera* from Burma, Cyprus, Greece, India, Jamaica, Nigeria, and UK (Sutton 1980). *Coniella granati* is a widespread pathogen of *P. granatum* recorded in Brazil, Cyprus, Italy, Korea, North Carolina, Pakistan, The Netherlands, and USA (Farr & Rossman 2016). It was

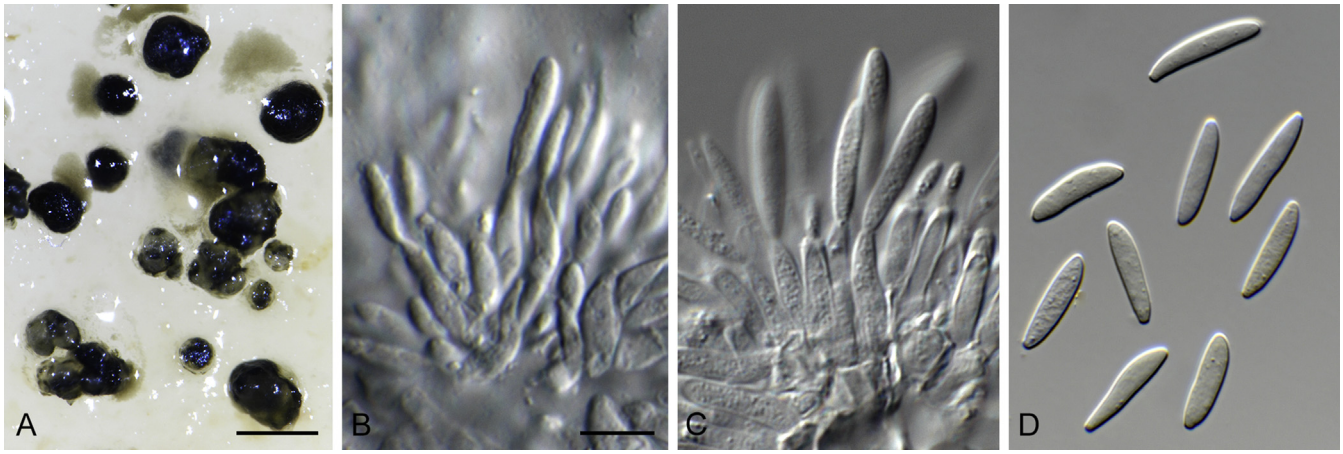

Fig. 11. *Coniella granati* (CBS 130974). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 300 µm, others = 10 µm.

reported to cause seedling blight on *Eucalyptus*, forming browning, which extends and covers the entire leaf, stem, thus killing the seedlings (Sharma *et al.* 1985). It is a well known pathogen of pomegranate, and has been associated with crown rot and wilt in Turkey (Çeliker *et al.* 2012), dieback and fruit rot in Iran (Mirabolfathy *et al.* 2012) fruit rot in Florida (USA), Greece, Israel (Tziros & Tzavella-Klonari 2008, Levy *et al.* 2011, KC & Vallad 2016), fruit rot and twig blight in China (Chen *et al.* 2014), post harvest decay in Spain (Palou *et al.* 2010), and shoot blight and canker in Greece (Thomidis 2015).

Samuels *et al.* (1993) (in Nag Raj 1993) described the sexual morph of *C. granati* as *Schizoparme versoniana* on fruit of *Punica granatum* collected in Spain (holotype PAD, isotypes BPI, K. NY). Presently neither cultures nor DNA sequences are available to confirm this sexual-asexual connection.

Coniella javanica L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817819. Fig. 12.

Etymology: Named after the locality where the species was collected, Java, Indonesia.

Diagnosis: Plant pathogenic. Occurring on *Hibiscus sabdariffa* in Indonesia. *Conidia* hyaline to pale yellowish brown with age, fusiform to ellipsoidal, inequilateral, apex acute, widest at the middle tapering to slightly truncate base, smooth-walled, mono- to multiguttulate, germ slits absent, (11–)11.5–14.5(–15) × (3–)3.5–4.5(–5) µm (l: w = 3.1), with mucoid appendage alongside conidium.

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, with plate-like structures, to 410 µm diam. *Ostiole* central, 30–60 µm diam. *Conidiomatal wall* consisting of 2–4 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thicker, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, hyaline, smooth, tapering, 6–10 × 1.5–3 µm, 1–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale yellowish brown with age, fusiform to ellipsoidal, inequilateral, to slightly broad canoe shaped, apex acute, widest at middle tapering to slightly truncate base, smooth-walled, mono- to multiguttulate, germ slits absent, (11–)11.5–14.5(–15) × (3–)3.5–4.5(–5) µm (l: w = 3.1), with mucoid appendage alongside conidium.

Culture characteristics: Colonies on MEA surface with prolific black conidial masses spreading from centre, arranged in irregular concentric zones, alternating with fluffy white aerial mycelium. On OA surface with profuse black conidiomata and sparse aerial mycelium. On PDA surface with numerous olivaceous conidiomata and sparse mycelium.

Material examined: **Indonesia**, Java, Bogor, Roselle Garden, leaf spot in *Hibiscus sabdariffa*, collection date unknown, J.H. van Emden (**holotype** CBS H-22705, culture ex-type CBS 455.68).

Notes: *Coniella javanica* (clade 4, Fig. 2) is morphologically similar to its sister clade *C. fusiformis* in having a fusiform conidia, but its conidia are longer and thinner. This species is morphologically similar to *C. musaiaensis* var. *hibisci* (Sutton 1980) based on its fusiform and curved conidial shape, as well as conidial size (11–16 × 3.5–5 µm). *Coniella musaiaensis* var. *hibisci* was described from *Hibiscus esculentus* collected in Nigeria. However, the ITS nrDNA and *tef1* sequences of an African strain from *Hibiscus* sp. (CBS 109757 = ARS 3534) and *C. javanica* (CBS 455.68) are only 90 % and 94 % similar, respectively.

Coniella koreana L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817820. Fig. 13.

Etymology: Named after the country (Korea) where the material was collected.

Diagnosis: Ecology unknown. Occurring on unknown host in South Korea. *Conidia* hyaline to pale yellowish brown, smooth, cylindrical, linear, often curved to falcate, apex acute to nearly rounded, base truncate, smooth-walled, multiguttulate, germ slit absent, (15–)16–19(–20) × (2–)2.5–3(–3.5) µm (l: w = 6).

Ecology unknown. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black, up to 700 µm diam. *Ostiole* central, 24–25 µm diam. *Conidiomatal wall* consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thicker, subulate, simple, frequently branched above, reduced to

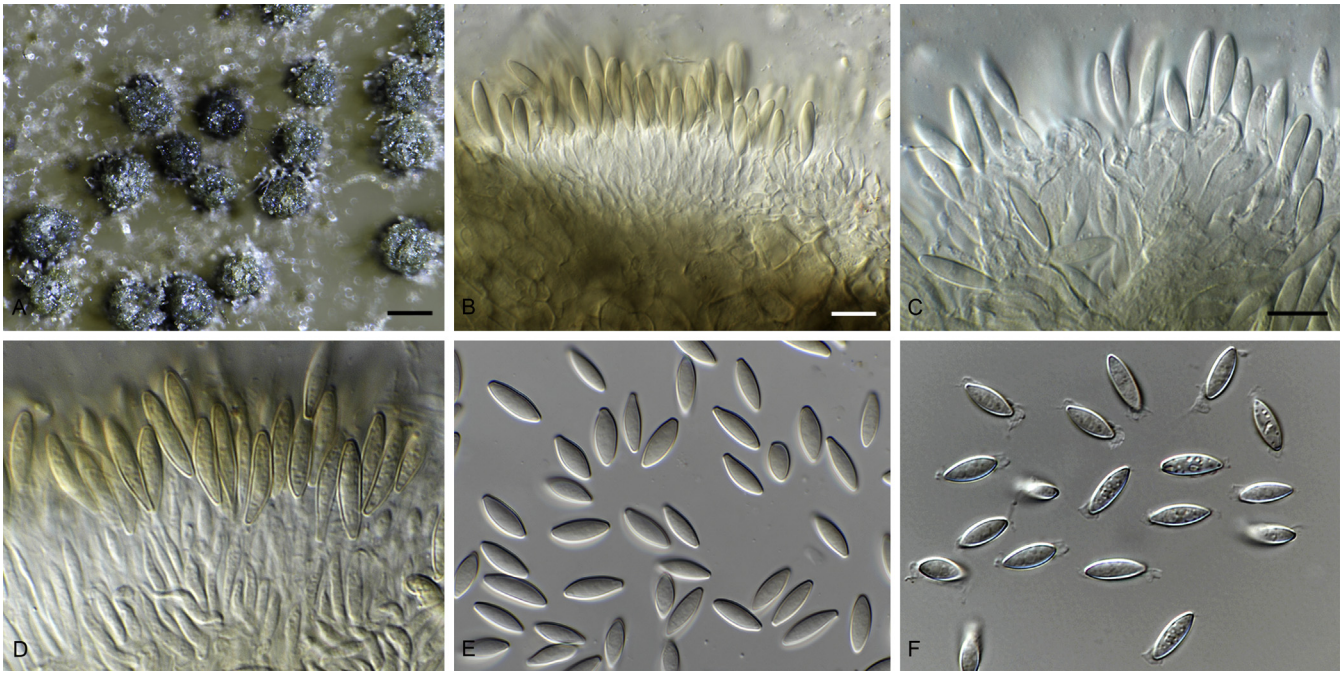

Fig. 12. *Coniella javanica* (CBS 455.68). **A**. Conidiomata forming on OA. **B–D**. Conidiogenous cells giving rise to conidia. **E, F**. Conidia. Scale bars: A = 400 µm, others = 10 µm.

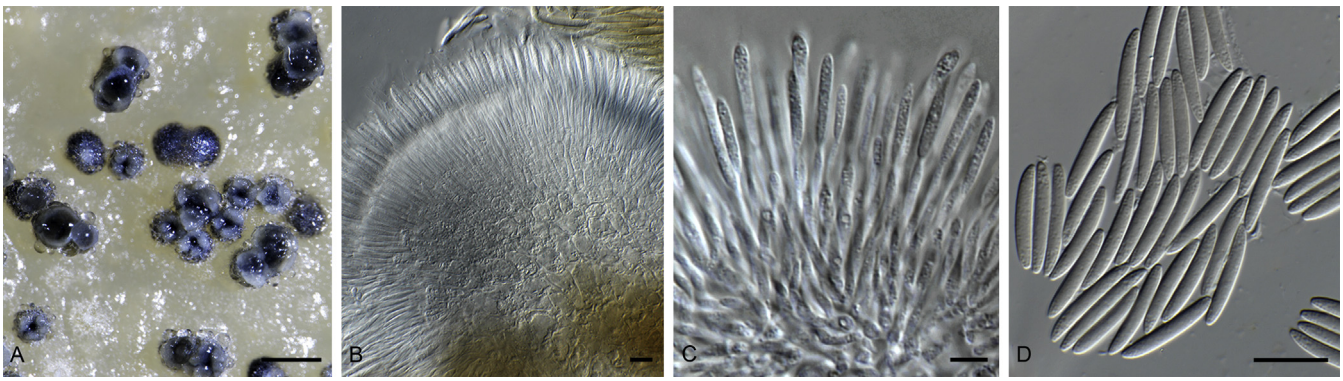

Fig. 13. *Coniella koreana* (CBS 143.97). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 600 µm, others = 10 µm.

conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, hyaline, smooth, tapering, 5.5–13 × 1.5–3 µm, and 1–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale yellowish brown, smooth, cylindrical, linear, often curved to falcate, apex acute to nearly rounded, base truncate, smooth-walled, multi-guttulate, germ slit absent, (15–)16–19(–20) × (2–)2.5–3(–3.5) µm (l: w = 6).

Culture characteristics: Colonies on MEA surface with fluffy, white aerial mycelium spreads in irregular, slightly imbricated concentric zones filled with numerous black conidiomata. On OA surface with sparse white aerial mycelium spreading in irregular concentric zones filled with numerous black conidiomata. On PDA surface with white aerial mycelium spreads in irregular concentric zones, not forming conspicuous conidiomata.

Material examined: **South Korea**, host unknown, 1997, K.S. Bae (**holotype** CBS H-22710, isotype BRIP 748451, culture ex-type CBS 143.97).

Notes: *Coniella koreana* (clade 11, Fig. 2) was originally identified as *C. castaneicola* (Sutton 1980), based on the morphological similarity of the conidia being linear, falcate, and pale brown. Pycnidial and conidial dimensions of *C. koreana* [to 700 µm diam; (15–)16–19(–20) × (2–)2.5–3(–3.5) µm] are distinct from those of *C. castaneicola* [110–200 µm; 13–29 × 2.5–3.5(–4) µm] (Nag Raj 1993). Phylogentic analyses also revealed that *C. koreana* (clade 11) differs from its closest relative *C. quercicola* (clade 12), sharing 93 % similarity (*tef1*).

Coniella lanneae L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817821. Fig. 14.

Etymology: Named after the host genus, *Lannea*, from which the species was isolated.

Diagnosis: Endophyte. Occurring in leaves of *Lannea* sp. in Zambia. *Conidia* hyaline to pale yellowish brown at maturity, asymmetrical, fusiform, slightly curved to broadly naviculate, apex acute, widest at the middle, tapering towards a truncate base, smooth-walled, bi- to multiguttulate, germ slits absent, (9–)10–13(–13.5) × (3.5–)4–5(–5.5) µm (l: w = 2.6), with mucoid appendage alongside conidium.

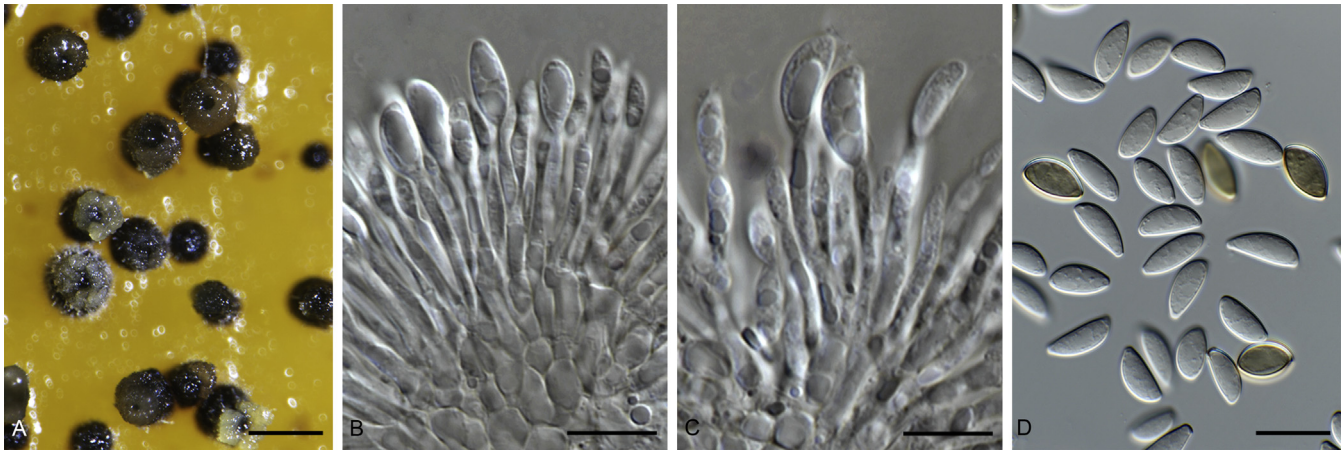

Fig. 14. *Coniella lanneae* (CPC 22200). **A**. Conidiomata forming on OA; **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 200 µm, others = 10 µm.

Endophyte. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to dark brown with age, to 220 µm diam. *Ostiole* central, 20–30 µm diam. *Conidiomatal wall* consisting of 3–4 layers of medium brown *textura angularis*; *Conidiophores* densely aggregated, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* simple, hyaline, smooth, tapering, 8–15 × 2–4 µm, 1–2.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale yellowish brown at maturity, asymmetrical, fusiform, slightly curved to broadly naviculate, apex acute, widest at middle, tapering towards a truncate base, smooth-walled, bi- to multiguttulate, germ slits absent, (9–)10–13(–13.5) × (3.5–)4–5(–5.5) µm (l: w = 2.6), with mucoid appendage alongside conidium.

Culture characteristics: Colonies on MEA cinnamon in colour, surface with prolific black conidial masses arranged in irregular concentric zones of alternating black and white fluffy aerial mycelium. On OA medium distinct orange zones at the centre, surface with olivaceous to black conidiomata arranged in concentric zones with sparse, inconspicuous aerial mycelia. On PDA colony of white aerial mycelium covering a slightly luteous zone at centre, surface with a few discreet, black conidiomata and thin white aerial mycelium.

Material examined: **Zambia**, -14.32722, 24.93639, altitude 1133 m, on leaves of *Lannea* sp., 18 Mar. 2013, M. van der Bank (**holotype** CBS H-22712, culture ex-type CBS 141597 = CPC 22200).

Notes: *Coniella lanneae* (clade 5, Fig. 2) appears to be morphologically similar to *C. diplodiella*, *C. diplodiopsis*, *C. fusiformis* and *C. javanica* in having conidia that are hyaline to pale yellowish brown, asymmetrical, fusiform, slightly curved to broadly naviculate; their conidia still differ in size. Phylogenetic examination using a multigene dataset shows that *C. lanneae* clusters apart (clade 5) from the main clade (clades 1, 2, 3, and 4) representing *C. diplodiella*, *C. diplodiopsis*, *C. fusiformis* and *C. javanica* respectively. Further analysis using *rpb2* sequence data revealed *C. lanneae* to be 92–94 % similar to closely related species (*C. diplodiella*, *C. fusiformis*, *C. javanica*).

Coniella limoniformis L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817822. Fig. 15.

Etymology: Named after the shape of its conidia (limoniform).

Diagnosis: Plant pathogenic. Occurring on leaves of *Fragaria* sp. in South Africa. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, broadly ellipsoidal to limoniform, inequilateral, slightly folded with longitudinal slit, naviculate in side view, apex apiculate, widest in the middle, tapered into narrowly truncate base, monoguttulate when young, distinctly multiguttulate when mature, germ slit present, (10–)10.5–14(–14.5) × (5–)5.5–7.5(–8) µm (l: w = 2), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, to 610 µm diam. *Ostiole* central, 60–92 µm diam, becoming papillate. *Conidiomatal wall* consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–3 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 14–30 × 1–3 µm, 1–1.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, broadly ellipsoidal to limoniform, inequilateral, slightly folded with longitudinal slit, naviculate in side view, apex apiculate, widest in middle, tapered into narrowly truncate base, monoguttulate when young, distinctly multiguttulate when mature, germ slit present, (10–)10.5–14(–14.5) × (5–)5.5–7.5(–8) µm (l: w = 2), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Culture characteristics: Colonies on MEA chestnut-brown, surface with fluffy white aerial mycelium spreading outward in regular, imbricated concentric circles with abundant black conidiomata. On OA surface with sparse white aerial mycelium with numerous black conidiomata, spreading in irregular concentric zones. On PDA surface with abundant white aerial mycelium, with profuse black conidiomata, spreading in irregular concentric zones.

Material examined: **South Africa**, Mpumalanga, from *Fragaria* sp., date unknown, C. Roux (**holotype** CBS H-22704, culture ex-type CBS 111021 = PPRI 3870 = CPC 3828 = ARC-MYC J 13102).

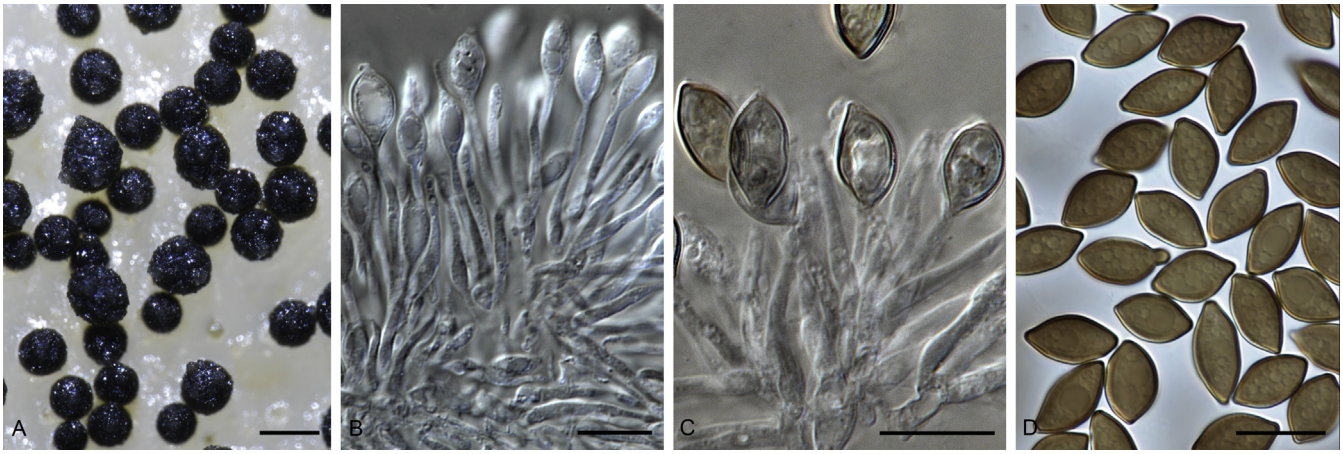

Fig. 15. *Coniella limoniformis* (CBS 111021). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 600 µm, others = 10 µm.

Notes: *Coniella limoniformis* (clade 14, Fig. 2) has distinct lemon-shaped conidia, which have the tendency to appear boat-shaped when observed in its side view and have a notable guttule. It is morphologically and phylogenetically distinct from its sister clade *C. tibouchinae* (clade 15, Fig. 2), by having a subreniform, ovoid to subovoid conidia and lacking germ slits. The *tef1* analysis (results not shown) revealed that the two species have only 75 % similarity.

Coniella macrospora Aa, Proc. Kon. Ned. Akad. Wetensch., C 86(2): 121. 1983.
Synonym: *Pilidiella macrospora* (Aa) Crous & van Niekerk, Mycotaxon 115: 161. 2011.

Diagnosis: Presumed saprobe. Occurring on stems of *Terminalia ivorensis* in Ivory Coast. *Conidia* greenish, becoming dark brown, ovoid, ellipsoid, pyriform, seldom almost globose, (18.5–) 25–29(–32.5) × (13–)16–20(–21.5) µm (l: w = 1.5).

Description and illustration: Van der Aa (1983).

Material examined: **Ivory Coast**, Forêt de Kouin near Man, from brownish discolourations on the stem of a withering *Terminalia ivorensis*, 1973, F. Brunck (ex-holotype culture CBS 524.73 = CPC 3935).

Notes: *Coniella macrospora* (clade 16, Fig. 2) was introduced by Van der Aa (1983) as a new species of *Coniella*. Conidia are greenish, becoming dark brown, ovoid, ellipsoid, pyriform, seldom almost globose, (18.5–)25–29(–32.5) × (13–) 16–20(–21.5) µm (l: w = 1.5). It was regarded as a *Pilidiella* species by Van Niekerk *et al.* (2004), and the combination was formally published in Rajeshkumar *et al.* (2011). Based on the current analyses, we propose the use of the original name *C. macrospora*, as introduced by Van der Aa (1983).

Coniella malaysiana L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817823. Fig. 16.

Etymology: Named after Malaysia, the country where this species was collected.

Diagnosis: Plant pathogenic. Occurring on leaves of *Corymbia torelliana* in Malaysia. *Conidia* hyaline to pale brown, fusoid to ellipsoid, inequilateral, apex acutely rounded, widest in the middle, tapering to a truncate base, yellowish brown, thick-walled, germ slits absent, (8–)8.5–11(–11.5) × (3–)3.5–4.5(–5) µm (l: w = 2.5), with mucoid appendage alongside conidium.

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, to 550 µm diam. *Ostiole* central. *Conidiomatal wall* consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thicker, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 2–5 supporting cells. *Conidiogenous* cells simple, tapering, hyaline, smooth, 8.5–18 × 1.5–3.5 µm, 0.5–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale brown, fusoid to ellipsoid, inequilateral, apex acutely rounded, widest in middle, tapering to a truncate base, yellowish brown, thick-walled, germ slits absent, (8–)8.5–11(–11.5) × (3–) 3.5–4.5(–5) µm (l: w = 2.5), with mucoid appendage alongside conidium.

Culture characteristics: Colonies on MEA luteous with dark chestnut-brown pigment, surface with white to pinkish white aerial mycelium and sparse sporulation. On OA medium turns luteous with chestnut-brown pigment, surface with sparse aerial mycelium and sporulation. On PDA medium pale chestnut-brown at centre, surface with thin white aerial mycelium.

Material examined: **Malaysia**, on leaves of *Corymbia torelliana*, 2009, S.S. Lee (**holotype** CBS H-22711, culture ex-type CBS 141598 = CPC 16659).

Notes: *Coniella malaysiana* in clade 18 (Fig. 2) has conidia that are similar but smaller [(8–)8.5–11(–11.5) × (3–)3.5–4.5(–5) µm] than those of its sister clade *C. eucalyptorum* (9–) 10–12(–14) × (6–)7–8 µm. Phylogenetically *C. malaysiana* differs from *C. eucalyptorum* by having only 85 % similarity in *tef1* and 97 % similarity in *rpb2* sequences.

Coniella nicotianae L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817824. Fig. 17.

Etymology: Named after the host genus *Nicotiana*, from which this fungus was isolated.

Diagnosis: Plant pathogenic. Occurring on *Nicotiana tabacum* in Jamaica. *Conidia* hyaline, asymmetrical, linear to cylindrical,

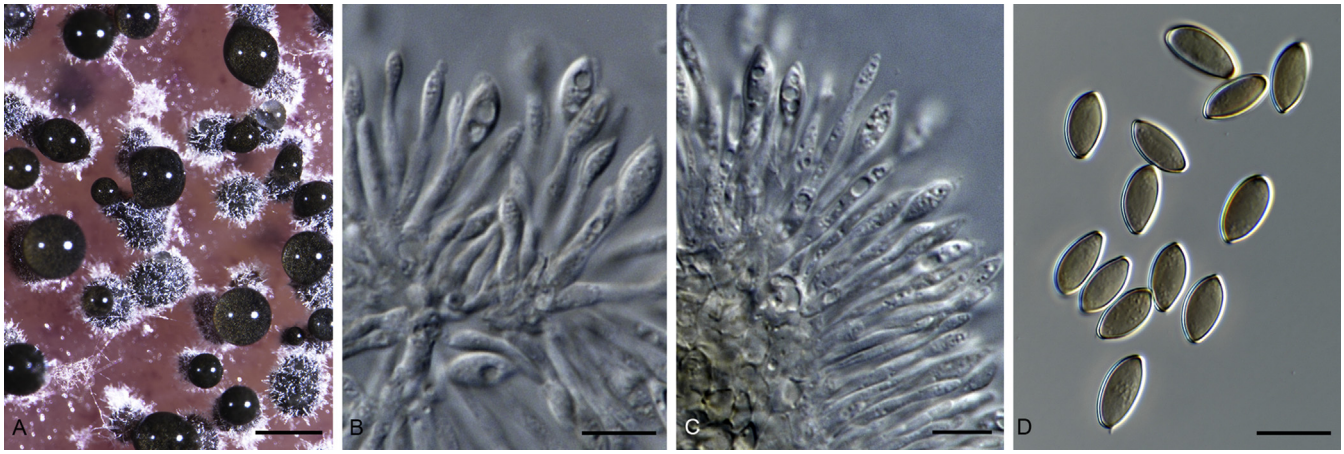

Fig. 16. *Coniella malaysiana* (CPC 16659). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 550 µm, others = 10 µm.

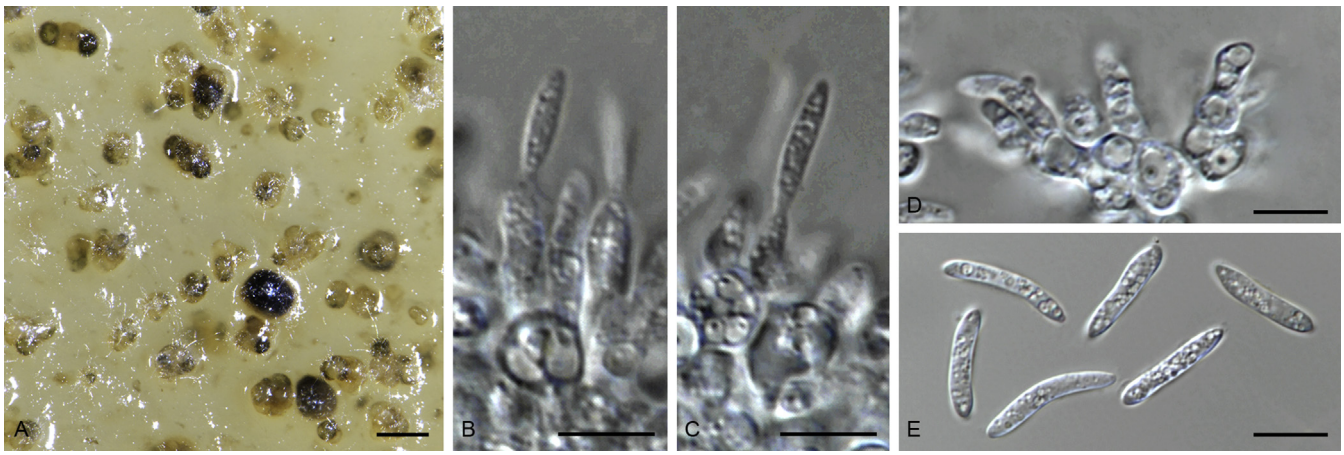

Fig. 17. *Coniella nicotianae* (CBS 875.72). **A**. Conidiomata forming on OA. **B–D**. Conidiogenous cells giving rise to conidia. **E**. Conidia. Scale bars: A = 130 µm, others = 10 µm.

sometimes curved, apex acute to rounded, base truncate, smooth-walled, multiguttulate, germ slits absent, (16–) 16.5–19.5(–20) × (2–)2.5–3.5(–4) µm (l: w = 6).

Plant pathogenic. *Conidiomata* pycnidial, separate, immersed or superficial, globose to depressed, initially hyaline, becoming olivaceous to dark brown, up to 120 µm diam. *Ostiole* central. *Conidiomatal wall* consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, thick and short, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting cells. *Conidiogenous cells* slightly thick-walled, tapering, hyaline, 4–8 × 1–2 µm, 1–1.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline, asymmetrical, linear to cylindrical, sometimes curved, apex acute to rounded, base truncate, smooth-walled, multiguttulate, germ slits absent, (16–) 16.5–19.5(–20) × (2–)2.5–3.5(–4) µm (l: w = 6).

Culture characteristics: Colonies on MEA surface with prolific fluffy mycelium with black conidiomata arranged in variegated, irregular concentric zones with alternating white and grey coloured mycelia. On OA surface with abundant black conidiomata with sparse, inconspicuous aerial mycelium. On PDA colony with white mycelium at centre; surface with a few, discrete black conidiomata.

Material examined: **Jamaica**, on *Nicotiana tabacum*, 29 Sep. 1972, collector unknown (**holotype** CBS H-17072, culture ex-type CBS 875.72).

Notes: *Coniella nicotianae* in clade 8 (Fig. 2) appears morphologically similar to *C. straminea* (clade 7, Fig. 2), which has ellipsoid, slightly inequilateral or curved conidia. However, the conidiomata of *C. nicotianae* are smaller (up to 120 µm diam) and its conidia are longer (16–)16.5–19.5(–20) × (2–) 2.5–3.5(–4) µm, while *C. straminea* has much larger conidiomata (200–300 µm diam) and shorter conidia, 10–13 × 3–4 µm (Samuels *et al.* 1993). Phylogenetic analyses suggest that this species is distinct from *C. straminea*, having 97 % similarity based on *tef1* sequences.

Coniella nigra (P.N. Mathur *et al.*) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817825. Fig. 18.
Basionym: *Cyclodomella nigra* P.N. Mathur *et al.*, Sydowia 13: 145. 1959.

Diagnosis: Presumed saprobe. Occurring in soil in India. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, symmetrical to inequilateral, ellipsoidal to limoniform, apex acute to apiculate, widest in the middle, tapering towards a narrowly truncate base, smooth-walled, with yellowish to pale brown thick wall, multiguttulate when young, biguttulate when mature,

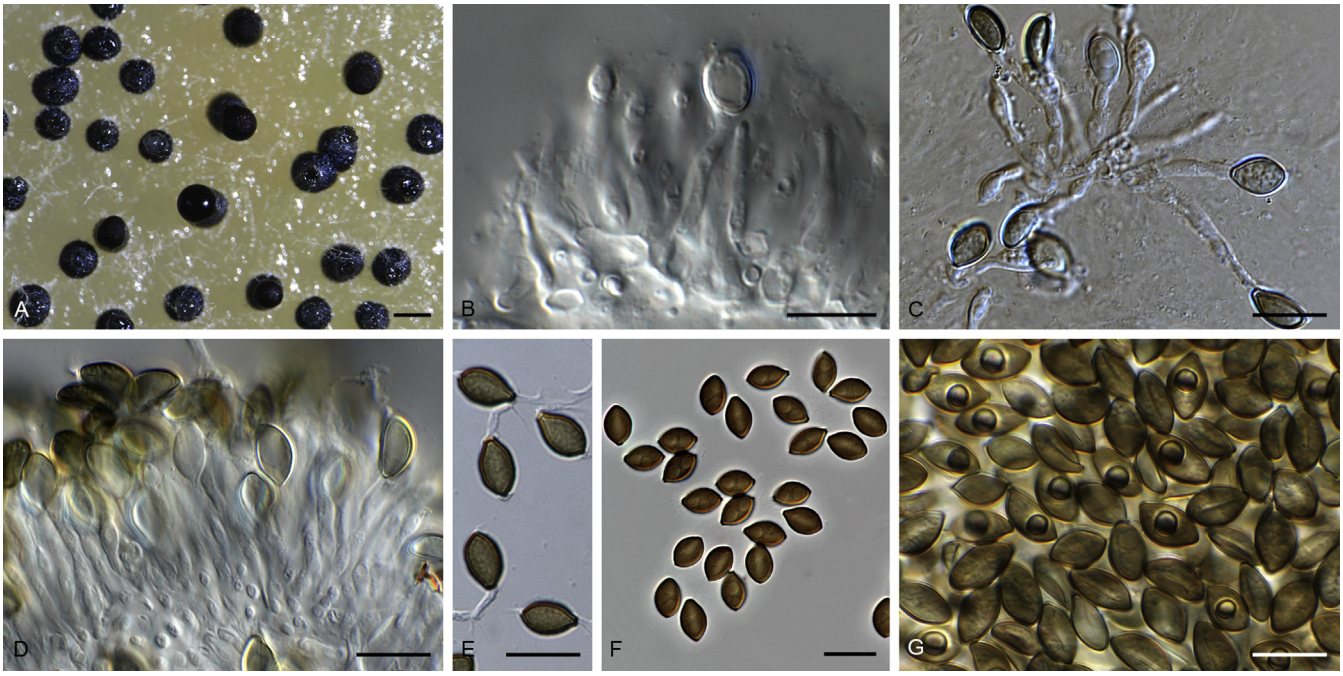

Fig. 18. *Coniella nigra* (CBS 165.60). **A**. Conidiomata forming on OA. **B–D**. Conidiogenous cells giving rise to conidia. **E–G**. Conidia. Scale bars: A = 350 µm, others = 10 µm.

longitudinal germ slit present, (7–)7.5–10(–11) × (4–)4.5–7(–7.5) µm (l: w = 1.6), with mucoid appendage alongside conidium.

Presumed saprobe. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, to 370 µm diam. *Ostiole* central, 20–25 µm diam, becoming papillate. *Conidiomatal wall* consisting of 3–4 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thick-walled, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 2–4 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 11.5–20 × 1.5–2.5 µm, 1–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, symmetrical to inequilateral, ellipsoidal to limoniform, apex acute to apiculate, widest in the middle, tapering towards a narrowly truncate base, smooth-walled, with yellowish to pale brown thick wall, multiguttulate when young, biguttulate when mature, longitudinal germ slit present, (7–)7.5–10(–11) × (4–)4.5–7(–7.5) µm (l: w = 1.6), with mucoid appendage alongside conidium. Developing conidia and conidiophores frequently enclosed in a mucoid sheath.

Culture characteristics: Colonies with sparse aerial mycelium and immersed, dispersed, hyaline to olivaceous or dark olivaceous conidiomata. On MEA surface black due to sporulation, conidiomata arranged in irregular concentric rings, with tinges of orange mycelium at centre. On OA surface with black conidiomata, zones of orange pigment and irregular margin. On PDA surface with few to numerous black conidiomata, and sparse white aerial mycelium.

Material examined: **India**, Maharashtra, from soil, Jan. 1959, V.V. Bhatt (culture ex-holotype CBS 165.60 = IMI 181519 = IMI 181599 = CPC 4198).

Notes: The basionym *Cyclodomella nigra* is the type species of the monotypic generic name *Cyclodomella*. Petrak (1960) considered this species to be a cultural form of *Coniella diplodiella* and Sutton (1969) reduced *Cyclodomella* to synonymy under *Coniella*, regarding *Cyclodomella nigra* as synonym of *Coniella fragariae*. However, morphological analysis showed that *Coniella nigra* is distinct from *C. diplodiella* and *C. fragariae* based on conidial morphology. Phylogenetically, it also clustered on its own but with the genus *Coniella*, and therefore a new combination is proposed for *Cyclodomella nigra* in *Coniella* (clade 24, Fig. 2). *Coniella nigra* is morphologically very similar to *C. solicola* [conidia (7–)7.5–11.5(–12) × (4.5–)5–7.5(–8) µm] (clades 12, 24, Fig. 2), and the two species can only be separated based on DNA data.

Coniella obovata L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817826. Fig. 19.

Etymology: Named after its obovoid conidia.

Diagnosis: Presumed saprobe. Occurring on leaf litter in South Africa. *Conidia* hyaline to pale brown becoming dark brown at maturity, smooth, symmetrical to inequilateral, obovate, apex obtusely rounded, widest at the middle, tapering towards a narrowly truncate base, multiguttulate when young, mostly 1–2-guttulate when mature, smooth-walled, with yellowish to dark brown thick wall, (8–)8.5–11.5(–12) × (5–)5.5–8.5(–9) µm (l: w = 1.4), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Presumed saprobe. *Conidiomatal* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming brown to dark brown with age, to 600 µm diam. *Ostiole* central. *Conidiomatal wall* consisting of 2–3 layers of medium

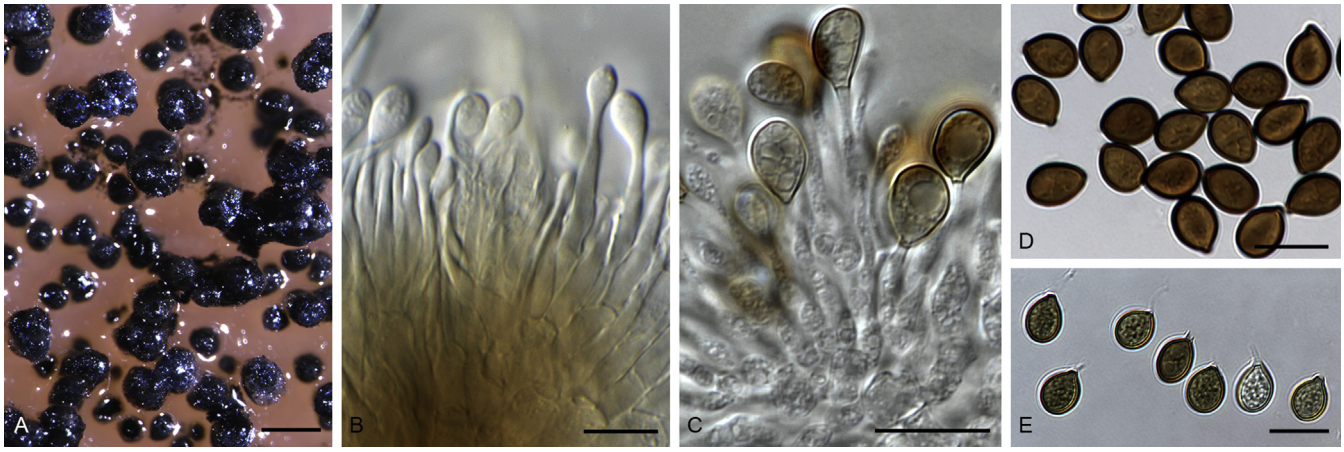

Fig. 19. *Coniella obovata* (CBS 111025). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D, E**. Conidia. Scale bars: A = 600 µm, others = 10 µm.

brown *textura angularis*. *Conidiophores* densely aggregated, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 2–4 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 10–17 × 1.5–3 µm, 1–2 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline to pale brown becoming dark brown at maturity, smooth, symmetrical to inequilateral, obovate, apex obtusely rounded, widest at middle, tapering towards a narrowly truncate base, multiguttulate when young, mostly 1–2-guttulate when mature, smooth-walled, with yellowish to dark brown thick wall, (8–)8.5–11.5(–12) × (5–)5.5–8.5(–9) µm (l: w = 1.4), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Culture characteristics: Colonies with immersed, sparse, hyaline, olivaceous to dark olivaceous pycnidia. On MEA colonies pale cinnamon, surface with abundant conidiomata with sparse greyish aerial mycelium. On OA colonies rosy vinaceous, surface with numerous black conidiomata, and white to greyish aerial mycelium. On PDA colonies pale vinaceous, surface with numerous black conidiomata and sparse white to greyish aerial mycelium.

Material examined: **South Africa**, Gauteng, from leaf litter, 1981, K.T. van Warmelo (**holotype** CBS H-22703, culture ex-type CBS 111025 = IMI 261318 = CPC 4196).

Notes: *Coniella obovata* in clade 22 (Fig. 2) is morphologically similar to *C. australiensis* which has dark brown, globose to napiform, 10–14 × 7–11 µm conidia (Sutton 1980). *Coniella obovata* has smaller pycnidia and conidia, and is phylogenetically distinct from its neighbouring clades, sharing 96 % similarity to both *C. solicola* and *C. fragariae* based on *rpb2* sequence data, confirming its uniqueness as a novel species. The most distinct feature of this species is its production of rosy vinaceous pigment on OA and pale vinaceous pigment on PDA.

Coniella paracastaneicola L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817827. Fig. 20.

Etymology: Named after its morphological similarity to *Coniella castaneicola*.

Diagnosis: Endophyte, presumed saprobe. Occurring on leaves of *Eucalyptus* sp. in Australia. *Conidia* hyaline, becoming pale olivaceous with age, smooth, solitary, granular to guttulate, fusoid to naviculate, apex obtuse, base truncate, (21–)25–28(–31) × (3–)4(–5) µm (l: w = 6.5), with mucoid appendage along side of conidium. Developing conidia and conidiophores are frequently encased in a mucoid sheath.

Endophyte, presumed saprobe. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black, to 350 µm diam. *Ostiole* central, 18–29 µm diam. *Conidiomatal wall* 12–26 µm thick, consisting of 3–4 layers of grey-brown *textura angularis*. *Conidiophores* smooth, 2–3-septate, branched, subcylindrical, 20–40 × 4–5 µm, encased in mucus. *Conidiogenous cells* hyaline, smooth, subcylindrical, 10–20 × 3–4 µm, with apex 2–3 µm, and inconspicuous collarette that dissolves with age; apex with periclinal thickening or percurrent proliferation. *Conidia* hyaline, becoming pale olivaceous with age, smooth, solitary, granular to guttulate, fusoid to naviculate, apex obtuse, base truncate, (21–)25–28(–31) × (3–)4(–5) µm (l: w = 6.5), with mucoid appendage along side of conidium. Developing conidia and conidiophores are frequently encased in a mucoid sheath.

Culture characteristics: Colonies on MEA chestnut-brown, surface with white aerial mycelium, spreading in irregular, imbricated, concentric circles with inconspicuous black conidiomata. On OA surface with sparse white aerial mycelium, and with a few black conidiomata at centre. On PDA surface with abundant white aerial mycelium, and inconspicuous black conidiomata.

Material examined: **Australia**, Victoria, Toolangi State Forest, S37°33′25.3″ E145°31′55.9″, on leaves of *Eucalyptus* sp. (*Myrtaceae*), 9 Nov. 2014, P.W. Crous, J. Edwards & P.W.J. Taylor (**holotype** CBS H-22702, culture ex-type CPC 20146 = CBS 141292); *ibid*., CPC 25498.

Notes: *Coniella castaneicola* was accepted as asexual morph of *Schizoparme straminea* (Maas *et al.* 1979). Subsequent studies accepted this synonymy and treated it as a cosmopolitan taxon with numerous synonyms (Sutton 1980, Nag Raj 1993, Samuels *et al.* 1993). When Shear (1923) originally described *S. straminea* (on leaf litter of *Rosa* sp., Arlington Farm, Virginia,

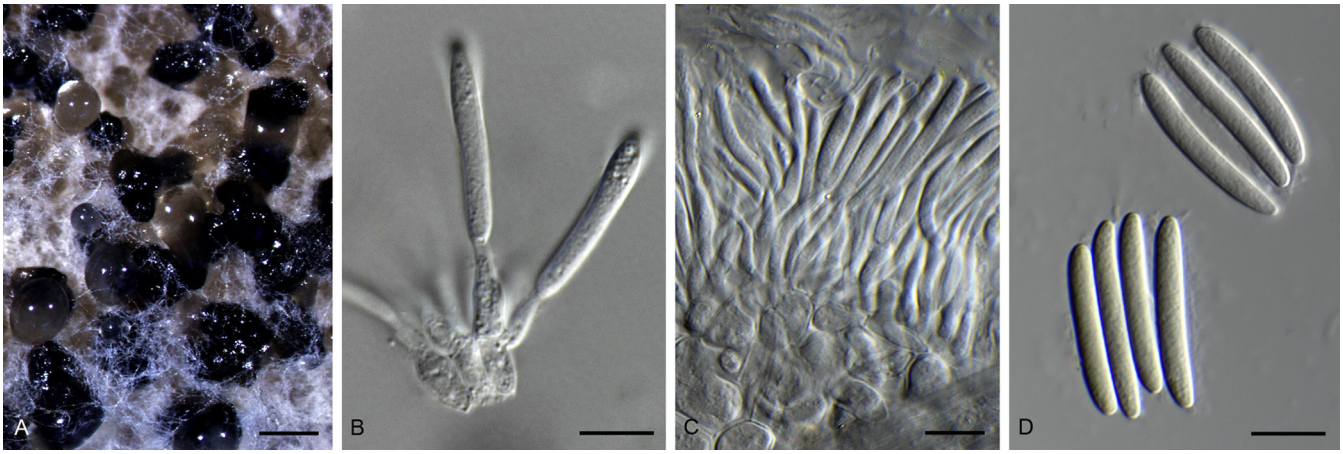

Fig. 20. *Coniella paracastaneicola* (CBS 141292). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 350 µm, others = 10 µm.

USA), conidia were noted as 15–20 × 3–4 µm. However, he listed many hosts for the fungus, including *Fragaria*, the host on which the conidial form was first observed by B.O. Dodge. A culture from *Fragaria* was also deposited at CBS as CBS 149.22, and is accepted as authentic for the name *Schizoparme straminea* (see *Coniella straminea* below).

Maas *et al.* (1979) treated *Sphaeropsis quercicola* (using material from *Fragaria*, Beltsville, Maryland USA, conidia 13–20 × 2–3 µm), as synonym of *Schizoparme straminea*, comparing it to CBS 875.72 (from Jamaica, on *Nicotiana tabacum*, described here as *C. nicotianae*). *Sphaeropsis quercicola* was originally described as *Macrodiplodia quercicola* (on leaves of *Quercus robur*, Bussum, The Netherlands, treated here as *C. quercicola*). *Coniella castaneicola* was originally described as *Gloeosporium castaneicola* (on *Castanea vesca*, Delaware, USA, conidia 20 × 2–2.5 µm), but requires fresh collections to resolve its status. *Coniella eucalypticola* (on *Eucalyptus* sp., Bangalore, India, conidia 19–29 × 2.5–3.5 µm, *fide* Nag Raj 1976) appears to represent yet another distinct species in this complex that needs to be recollected and epitypified.

Coniella paracastaneicola in clade 21 (Fig. 2) is morphologically similar to other taxa in the *C. castaneicola* complex, which have fusiform, falcate, pale brown conidia. *Coniella paracastaneicola* is phylogenetically distinct from the clade containing *Coniella straminea* (clade 7, Fig. 2), with 82 % similarity using *rpb2* sequences.

Coniella peruensis Crous & M. Chr., Sydowia 67: 94. 2015. Fig. 21.

Diagnosis: Presumed saprobe. Occurring in soil in Peru. *Conidia* ellipsoidal to limoniform, apices tapering, subobtusely rounded, tapering from middle towards a narrowly truncate base, medium brown, multi-guttulate, wall darker brown than medium brown body of conidium, (9–)10–11(–12) × (6.5–)7(–8) µm (l: w = 1.5)

Description and illustration: Crous *et al.* (2015b).

Material examined: **Peru**, Iquitos, from soil of rain forest, dep. 4 Mar. 2002, *M. Christensen* (**holotype** CBS H-2194, culture ex-type CBS 110394 = RMF 74.01).

Notes: *Coniella peruensis* (clade 19, Fig. 2) was originally identified as *Coniella fragariae*, which has conidia that are 7–12.5 × 4–10 µm, but is phylogenetically distinct from *C. fragariae* and has somewhat smaller conidia (Crous *et al.* 2014a). In this study we confirm that *C. peruensis* is distinct from its closest sister clades, *C. wangiensis* (clade 20, Fig. 2) and *C. fragariae* (clade 25). Morphologically, conidia of *C. wangiensis* [(9–)10–11(–13) × (7–)8–9(–10) µm] are similar in length, but slightly wider, and frequently have a minute basal cellular appendage.

Coniella pseudogranati (Crous) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817829. Fig. 22.
Basionym: *Schizoparme pseudogranati* Crous, Persoonia 32: 219. 2014.
Synonym: *Pilidiella pseudogranati* (Crous) Rossman & Crous, IMA Fungus 6: 151. 2015.

Diagnosis: Endophyte, presumed saprobe. Occurring on *Terminalia stuhlmannii* in Zambia. *Conidia* hyaline, smooth, guttulate, fusoid to naviculate, apex subobtuse, base truncate, thin-walled with mucoid appendage along side of conidium, straight to curved, frequently inequalateral, (19–)21–24(–25) × (3–)4 µm.

Description and illustration: Crous *et al.* (2014b).

Culture characteristics: Colonies with clear growth zones in concentric circles and sparse aerial mycelium. On PDA, OA and MEA surface buff, reverse buff to honey.

Material examined: **Zambia**, on *Terminalia stuhlmannii* (*Combretaceae*), 28 Feb. 2013, M. van der Bank (**holotype** CBS H-21692, culture ex-type CPC 22545 = CBS 137980).

Notes: *Coniella pseudogranati* was not included in the phylogenetic tree (Fig. 2) since we were not able to amplify the *rpb2* gene of this isolate. However, the individual ITS nrDNA and *tef1* trees demonstrate this taxon to cluster separate from others included in this study.

Coniella pseudostraminea L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817830. Fig. 23.

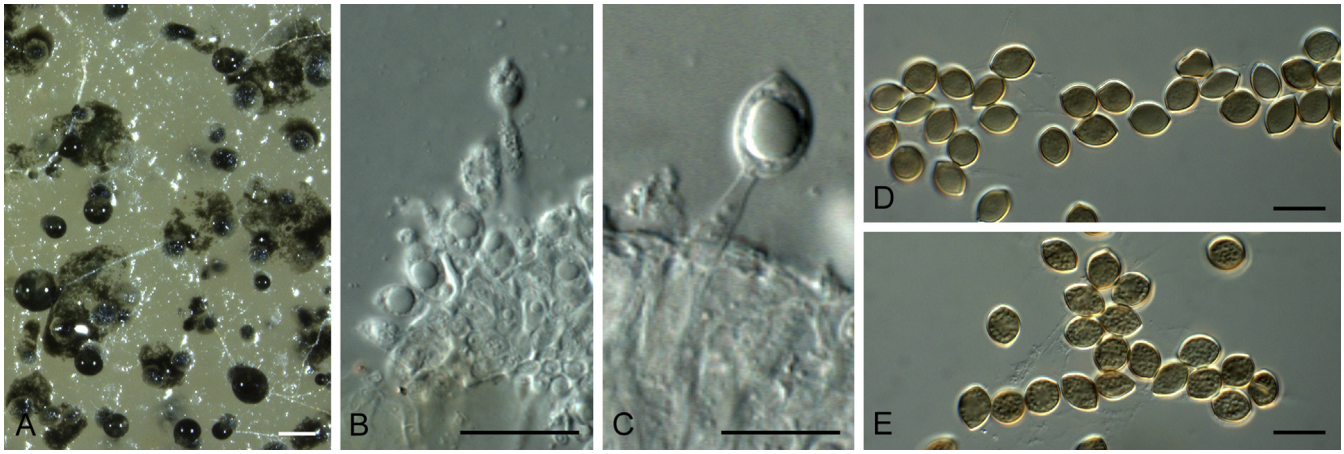

Fig. 21. *Coniella peruensis* (CBS 110394). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D, E**. Conidia. Scale bars: A = 200 µm, others = 10 µm.

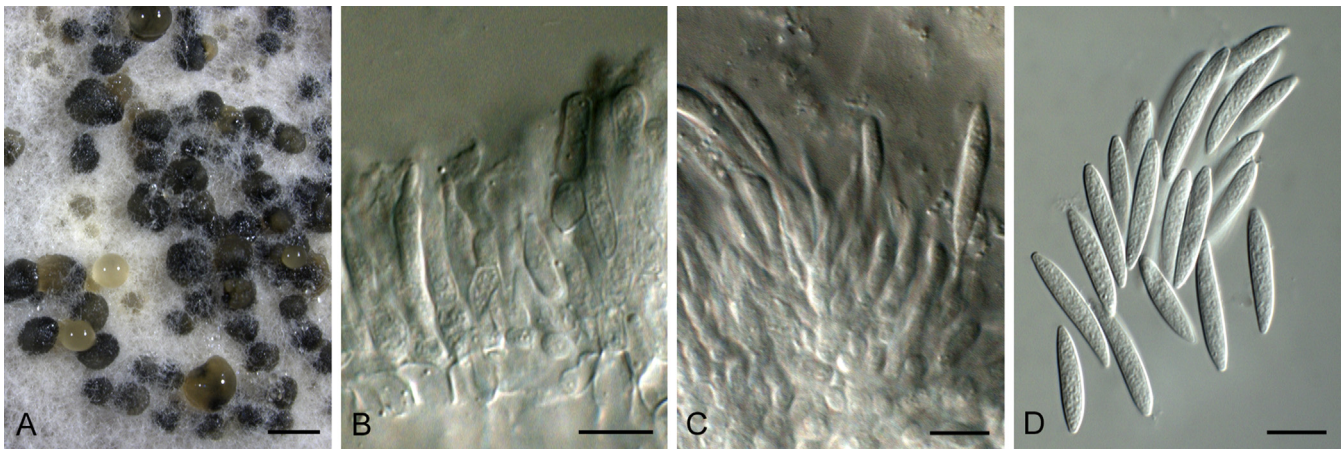

Fig. 22. *Coniella pseudogranati* (CBS 137980). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 200 µm, others = 10 µm.

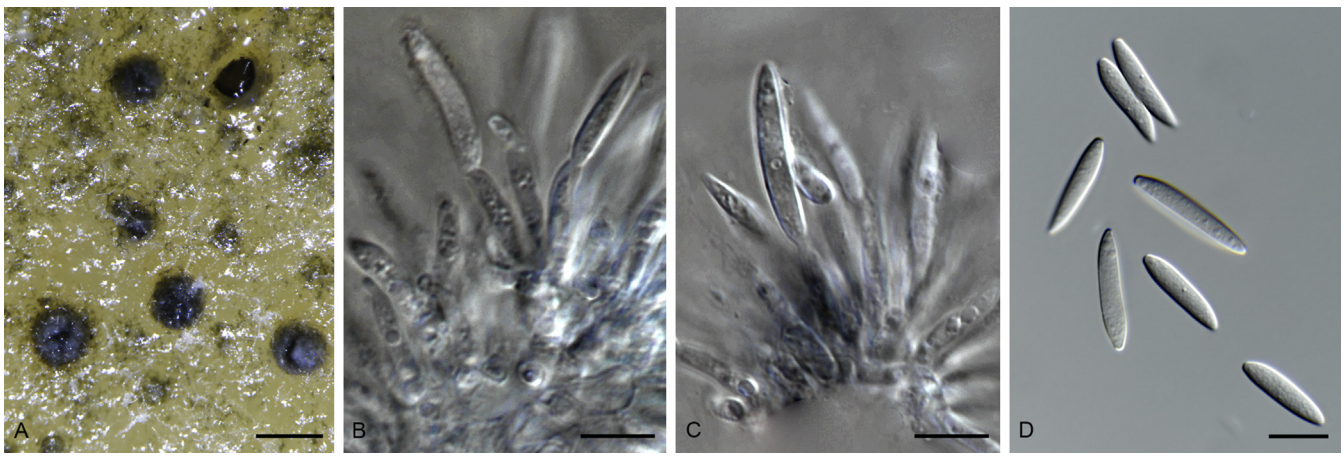

Fig. 23. *Coniella pseudostraminea* (CBS 112624). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 300 µm, others = 10 µm.

Etymology: Named after its resemblance to *Coniella straminea*.

Diagnosis: Plant pathogenic. Occurring on leaves of *Fragaria* sp. in South Africa. *Conidia* hyaline, inequilateral, linear or curved, fusiform to naviculate, smooth-walled, apex obtuse to rounded, base truncate, multiguttulate, germ slits absent, (15–) 16–19(–20) × (2.5–)3–4(–4.5) µm (l: w = 4.8).

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, to 300 µm diam. *Ostiole* central, 22–25 µm diam. *Conidiomatal wall* 13–19 µm thick, consisting of 2–3 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–2 supporting

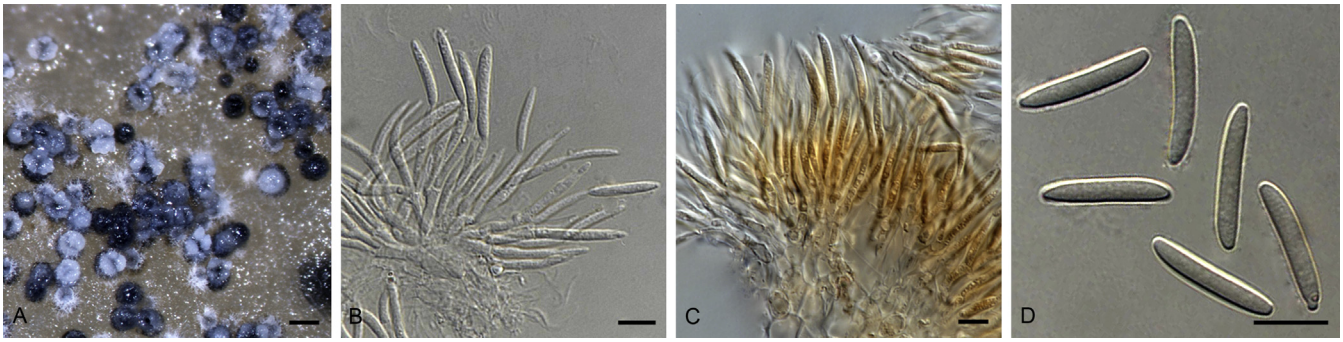

Fig. 24. *Coniella quercicola* (CBS 904.69). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia **D**. Conidia. Scale bars: A = 300 µm, others = 10 µm.

cells. *Conidiogenous cells* simple, hyaline, smooth, tapering, 10–16.5 × 1.5–3 µm, 1–2.3 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline, inequilateral, linear or curved, fusiform to naviculate, smooth-walled, apex obtuse to rounded, base truncate, multiguttulate, germ slits absent, (15–)16–19(–20) × (2.5–)3–4(–4.5) µm (l: w = 4.8).

Culture characteristics: Colonies on MEA rust in colour, with fluffy white aerial mycelium and inconspicuous black conidiomata. On OA colonies have thin olivaceous to white aerial mycelium. On PDA colonies have thin white aerial mycelium at the centre.

Material examined: **South Africa**, Gauteng, Pretoria, on leaves of *Fragaria* sp., 4 Nov. 2009, P.W. Crous (**holotype** CBS H-22700, culture ex-type CBS 112624 = IMI 233050).

Notes: *Coniella pseudostraminea* in clade 6 (Fig. 2) is morphologically similar to its sister species, *C. straminea*, but with slightly longer conidia. The phylogenetic analysis revealed that *C. pseudostraminea* has 97 % similarity with *C. straminea* based on the *rpb2* sequences.

Coniella quercicola (Oudem.) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817831. Fig. 24.
Basionym: *Macroplodia quercicola* Oudem., Ned. Kruidk. Archf, 3 sér. 2(3): 752. 1902.
Synonyms: *Sphaeropsis quercicola* (Oudem.) Sacc., Syll. Fung. 18: 315. 1906.
Pilidiella quercicola (Oudem.) Petr., Beih. Reprium nov. Spec. Regni veg. 42: 462. 1927.

Diagnosis: Plant pathogenic. Occurring on leaves and twigs of *Quercus* spp. in Europe (The Netherlands), and Pakistan. *Conidia* hyaline, asymmetrical, smooth-walled, cylindrical, slightly curved to naviculate, aseptate, rounded to acute apex, tapered to a subtruncate basal end, germ slits absent, (13–)14–18(–19) × (2–)2.5–3(–3.5) µm (l: w = 5.3).

Plant pathogenic. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, up to 320 µm diam. *Ostiole* central, 15–20 µm diam. *Conidiomatal wall* 3–7 mm thick, consisting of 3–4 layers of dark brown *textura angularis*. *Conidiophores* densely aggregated, slightly thicker, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 1–5 supporting cells. *Conidiogenous* cells simple, tapering, hyaline, smooth, 8–16 × 1–2.5 µm, 0.5–1.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening. *Conidia* hyaline, asymmetrical, smooth-walled, cylindrical, slightly curved to naviculate, aseptate, rounded to acute apex, tapered to a subtruncate basal end, germ slits absent, (13–)14–18(–19) × (2–)2.5–3(–3.5) µm (l: w = 5.3).

Culture characteristics: Colonies spreading with sparse aerial mycelium and uneven catenulate zonation. On OA surface with sparse aerial mycelia and few black conidiomata in concentric circles. On PDA surface with thin white aerial mycelium. On MEA surface slightly imbricated with uneven zonated aerial mycelium and a few black conidiomata.

Material examined: **The Netherlands**, Province Gelderland, Vorden, Hackford, *Quercus robur* leaf litter, Aug. 1969, E. Jansen (**neotype** designated here CBS H-17071, MBT372455, culture ex-neotype CBS 904.69); Arnhem, excrements of *Glomerus* sp., which had eaten forest soil, Mar. 1976, H. Schoot, CBS H-17073, culture CBS 283.76.

Notes: *Coniella quercicola* (clade 12, Fig. 2), based on *Macroplodia quercicola*, was originally described from leaves of *Quercus robur* collected in Bussum, The Netherlands. It was described as having pale brown, cylindrical conidia, 24 × 4 µm (Saccardo & Saccardo 1906). We were unable to locate the original type material for study (L), and therefore designate a neotype collected from the same host and country.

Coniella solicola L.V. Alvarez & Crous, **sp. nov.** MycoBank MB817832. Fig. 25.

Etymology: Named after the substrate, specifically soil, from which the species was isolated.

Diagnosis: Presumed saprobe. Occurring in soil in South Africa. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, symmetrical to inequilateral, ellipsoidal to citriform, apex acute to apiculate, widest in the middle, tapering towards a narrowly truncate base, smooth-walled, multiguttulate when young, biguttulate when mature, longitudinal slit present, (7–)7.5–11.5(–12) × (4.5–)5–7.5(–8) µm (l: w = 1.6), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Presumed saprobe, from soil. *Conidiomata* separate, immersed or superficial, globose to depressed, initially appearing hyaline, becoming olivaceous to black with age, to 300 µm diam. *Ostiole* central, 50–70 µm diam, becoming papillate. *Conidiomatal wall* consisting of 3–4 layers of medium brown *textura angularis*. *Conidiophores* densely aggregated, slightly thick-walled, subulate, simple, frequently branched above, reduced to conidiogenous cells, or with 2–3 supporting cells. *Conidiogenous cells* simple, tapering, hyaline, smooth, 6–12 × 1.5–3.5 µm,

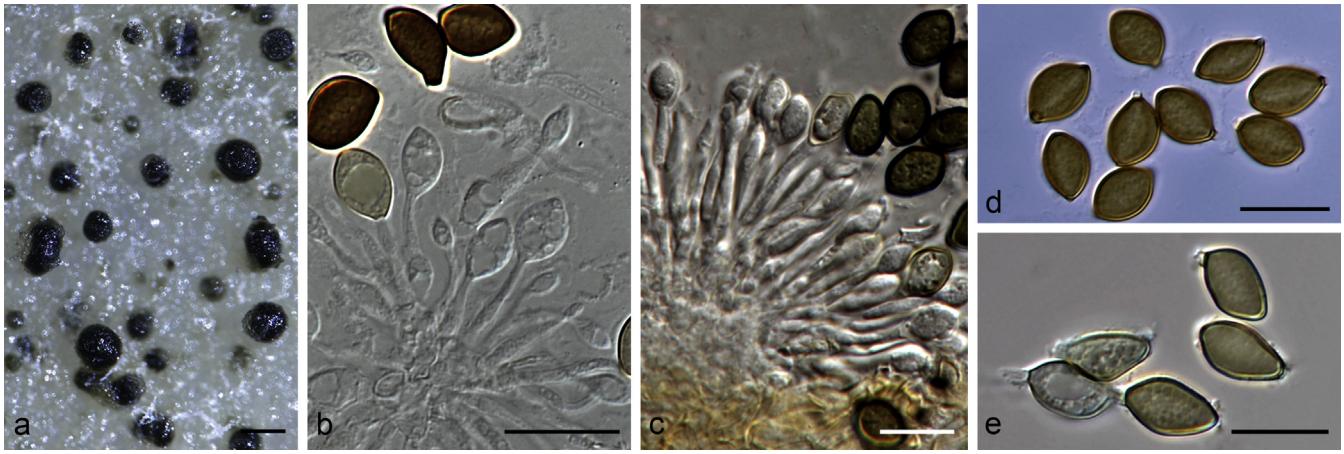

Fig. 25. *Coniella solicola* (CBS 766.71). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D, E**. Conidia. Scale bars: A = 300 µm, others = 10 µm.

1–2.5 µm wide at apex, surrounded by a gelatinous coating, apex with visible periclinal thickening or percurrent proliferation. *Conidia* hyaline to pale brown, becoming dark brown at maturity, smooth, symmetrical to inequilateral, ellipsoidal to citriform, apex acute to apiculate, widest in the middle, tapering towards a narrowly truncate base, smooth-walled, with yellowish to pale brown thick wall, multiguttulate when young, biguttulate when mature, longitudinal slit present, (7–)7.5–11.5(–12) × (4.5–)5–7.5(–8) µm (l: w = 1.6), frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long, with mucoid appendage alongside conidium.

Culture characteristics: Colonies with sparse aerial mycelium and immersed to partly immersed, dispersed, hyaline to dark olivaceous conidiomata. On MEA surface black due to sporulation, arranged in irregular concentric rings with semi fluffy aerial mycelium. On OA surface with black conidiomata with inconspicuous aerial mycelium. On PDA surface with few to numerous black conidiomata and powder white aerial mycelium at the centre.

Materials examined: **South Africa**, Potchefstroom, from soil, collection date unknown, M.C. Papendorf (**holotype** CBS H-10721, culture ex-type CBS 766.71). **USA**, Texas, collection date unknown, B.C. Sutton, CBS 114007 = IMI 253210 = CPC 4199.

Notes: *Coniella solicola* in clade 23 (Fig. 2) was originally identified as *C. fragariae*, with which it appears to be morphologically similar in conidial shape and size, 7–12.5 × 4–10 µm (Van Niekerk *et al.* 2004). The conidia of *C. solicola* are more ellipsoidal to limoniform with acute to apiculate apices than those of *C. fragariae*. Phylogenetic analyses also suggest its distinctiveness as a novel species clustering in a separate clade (clade 23, Fig. 2) having 98 % *rpb2* similarity with *C. fragariae* (clade 25, Fig. 2).

Coniella straminea (Shear) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817833. Fig. 26.
Basionym: *Schizoparme straminea* Shear, Mycologia 15: 121. 1923.

Diagnosis: Plant pathogenic. Occurring on *Fragaria* and *Rosa* spp. in the USA (VA). Ascospores aseptate, ellipsoid, inequilateral, hyaline to pale yellowish with age, 11–13 × 3–4 µm.

Descriptions and illustrations: Shear (1923), Maas *et al.* (1979), Samuels *et al.* (1993).

Material examined: **USA**, *Fragaria* sp., 6 Sep. 1920, C.L. Shear, culture CBS 149.22 = CPC 3932.

Notes: The asexual morph of *Schizoparme straminea* (Maas *et al.* 1979) was regarded as *Coniella castaneicola*. Subsequent authors (Sutton 1980, Nag Raj 1993, Samuels *et al.* 1993) accepted this synonymy and treated it as a cosmopolitan taxon with numerous synonyms including *C. quercicola*. When Shear (1923) originally described *S. straminea* (on leaf litter of *Rosa* sp., Arlington Farm, Virginia, USA), he listed many hosts for this species, including *Fragaria*, the host on which the conidial form was first observed. A culture from *Fragaria* was also deposited by C.L. Shear at CBS as CBS 149.22, and is accepted as "authentic" for the name *Schizoparme straminea*. *Coniella castaneicola* was originally described as *Gloeosporium castaneicola* (on *Castanea vesca*, Delaware, USA, conidia 20 × 2–2.5 µm), but requires fresh collections to resolve its status.

Coniella stromatica (Samuels *et al.*) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817834.
Basionym: *Schizoparme stromatica* Samuels *et al.*, Mycotaxon 46: 474. 1993.
Synonym: *Pilidiella stromatica* (Samuels *et al.*) Rossman & Crous, IMA Fungus 6: 152. 2015.

Diagnosis: Saprobic. Occurring on tree bark in Belém, Brazil. *Ascomata* erumpent, aggregated, papillate. *Ascospores* hyaline, becoming brown, (13–)13.7–17.5(–20) × 7–9.4(–11.5) µm. *Conidia* broadly ellipsoid, brown, with longitudinal germ slit, (10.5–)12.4–19.7(–21.7) × (7–)8–10(–10.5) µm.

Description and illustration: Samuels *et al.* (1993).

Notes: *Coniella stromatica* was originally described from bark of an unidentified tree collected in Pará, Belém, Brazil (**holotype** MG, **isotypes** BPI, NY). Presently neither cultures nor DNA sequence data are available.

Coniella terminaliicola L.V. Alvarez & Crous, **nom. nov.** MycoBank MB817837.

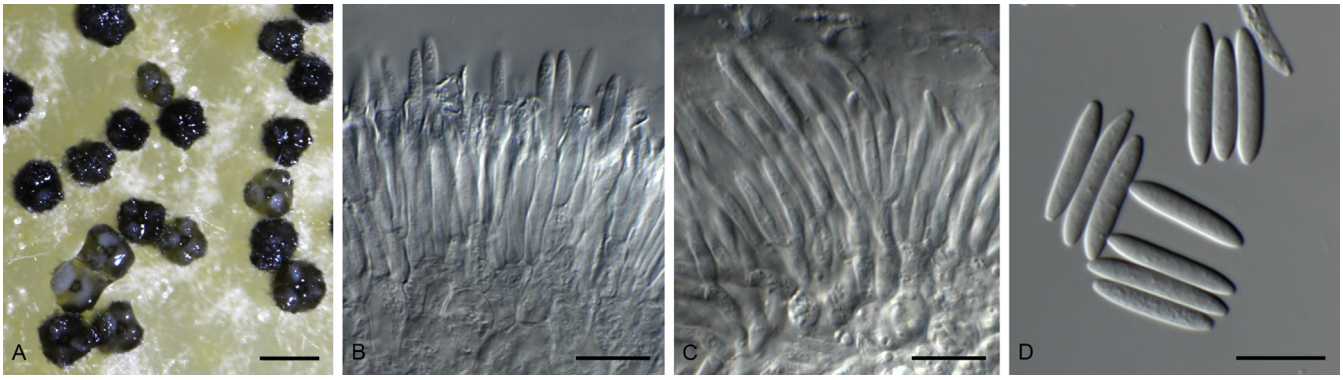

Fig. 26. *Coniella straminea* (CBS 149.22). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D**. Conidia. Scale bars: A = 300 µm, others = 10 µm.

Basionym: *Schizoparme terminaliae* Samuels *et al.*, Mycotaxon 46: 478. 1993.
Synonym: *Pilidiella terminaliae* (Samuels *et al.*) Rossman & Crous, IMA Fungus 6: 152. 2015.

Diagnosis: Plant pathogenic. Occurring on leaves of *Terminalia superba* in Ecuador. *Ascomata* solitary to aggregated, becoming erumpent. *Ascospores* hyaline, becoming brown, narrowly to broadly ellipsoid, (10–)11.3–13.9(–15) × (3–)3.5–5.7(–6) µm.

Description and illustration: Samuels *et al.* (1993).

Notes: *Coniella terminaliicola* is introduced as a new name for *Schizoparme terminaliae* in *Coniella*, as *Coniella terminaliae* is already occupied. This species was originally described from leaves of *Terminalia superba* collected in Ecuador (**holotype** BPI). Presently neither cultures nor DNA sequence data are available. In addition to *C. terminaliicola* several other species of *Coniella* have been described from *Terminalia*, namely *C. crousii*, *C. macrospora*, *C. pseudogranati*, and *C. terminaliae*.

Coniella tibouchinae (B.E.C. Miranda *et al.*) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817835. Fig. 27.
Basionym: *Pilidiella tibouchinae* B.E.C. Miranda *et al.*, IMA Fungus 3: 4. 2012.

Diagnosis: Plant pathogenic. Occurring on leaves of *Tibouchina granulosa* in Brazil. *Conidia* mostly broadly ellipsoidal, often somewhat flattened on one side, oblong, subreniform, ovoid to subovoid, apex rounded, subtruncate at base, hilum sometimes slightly protuberant, aseptate, hyaline when immature, becoming smoky-brown at maturity, smooth, guttulate, 10–13 × 6–8 µm (l: w = 1.7).

Description and illustration: Miranda *et al.* (2012).

Material examined: **Brazil**, Minas Gerais, Viçosa, campus of the Universidade Federal de Viçosa, on leaves of *Tibouchina granulosa*, 8 Mar. 2010, B.E.C. Miranda (**holotype** VIC 31443, isotype CBS H-20827; cultures ex-holotype CPC 18511 = CBS 131594, CPC 18512 = CBS 131595).

Notes: *Coniella tibouchinae* as *P. tibouchinae* was established as novel species based on the ITS nrDNA and LSU nrDNA sequence data, which confirmed it as distinct from other known taxa. It was identified as the main cause of foliage blight and dieback, considered one of the most widespread and damaging diseases affecting *T. granulosa* in the field, gardens, and also nurseries.

Coniella wangiensis (Crous & Summerell) L.V. Alvarez & Crous, **comb. nov.** MycoBank MB817836. Fig. 28.
Basionym: *Pilidiella wangiensis* Crous & Summerell, Persoonia 28: 177. 2012.

Diagnosis: Plant pathogenic. Occurring on leaves of *Eucalyptus* sp. in Australia. *Conidia* broadly ellipsoidal to globose, apiculate, granular with central guttule, hyaline when immature, becoming medium brown, frequently with minute basal cellular appendage, hyaline, cylindrical, 1–2 µm long; conidia at times flattened along one side, or collapsing with age; apex tapering to an apiculus, 1–2 µm diam, base tapering to a truncate hilum, 1–1.5 µm diam, (9–)10–11(–13) × (7–)8–9(–10) µm (l: w = 1.2).

Description and illustration: Crous *et al.* (2012).

Material examined: **Australia**, Northern Territory, Wangi Falls, Litchfield National Park, from leaves of *Eucalyptus* sp., 24 Apr. 2011, P.W. Crous & B.A. Summerell (**holotype** CBS H-20969, culture ex-type CBS 132530 = CPC 19397).

Notes: Crous *et al.* (2012) regarded this species to be morphologically similar with *C. australiensis*, and to differ only in having somewhat smaller conidia (9–13 × 7–10 µm) and an apical apiculus. In the present study *P. wangiensis* appeared to be closely related to *C. peruensis* (clade 19, Fig. 2), which is distinct from the *C. fragariae* clade (clade 25, Fig. 2).

Species unexamined and excluded

Anthasthoopa aceris G.Z. Wang, Bull. bot. Res., Harbin 3(2): 128. 1983.

Notes: Described from leaves of *Acer pseudosieboldienum*, Mt. Chingbai, Jilin, China. Presently this species is not known from culture or from DNA.

Coniella australiensis Petr., Sydowia 9: 567. 1955.

Notes: Described from leaves of *Pelargonium australe*, Mt. Colee, nr. Canberra, Australia (**holotype** in W). Presently this species is not known from culture or from DNA.

Coniella castaneicola (Ellis & Everh.) B. Sutton, The Coelomycetes (Kew): 420. 1980.

Notes: Described as *Gloeosporium castaneicola* (on *Castanea vesca*, Delaware, USA), but requires fresh collections to resolve its status.

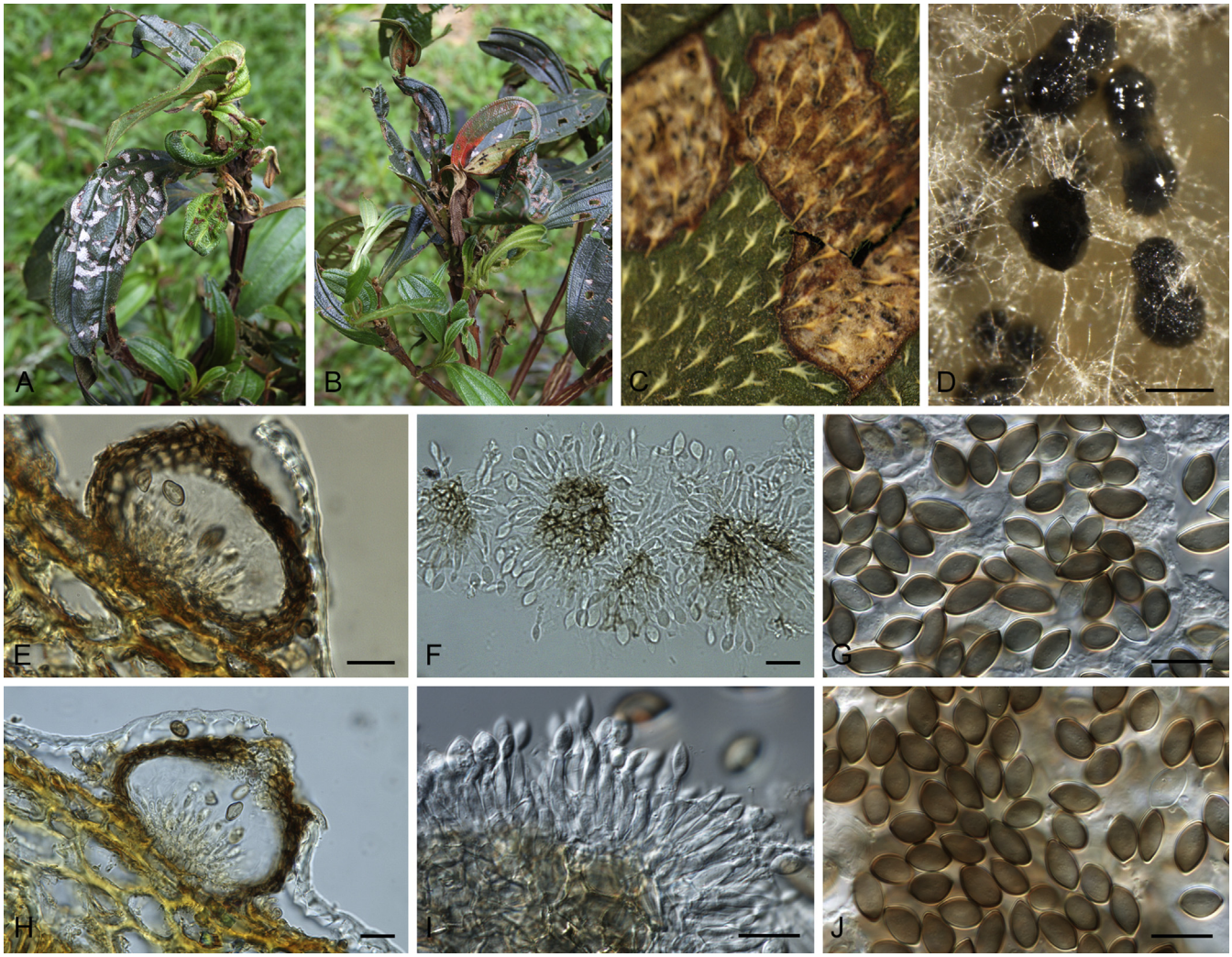

Fig. 27. *Coniella tibouchinae* (CBS 131594). **A–C**. Leaf spots and curling on *Tibouchina granulosa*. **D**. Conidiomata forming on OA. **E, H**. Vertical sections through conidiomata. **F, I**. Conidiogenous cells giving rise to conidia. **G, J**. Conidia. Scale bars: D = 100 µm, others = 10 µm.

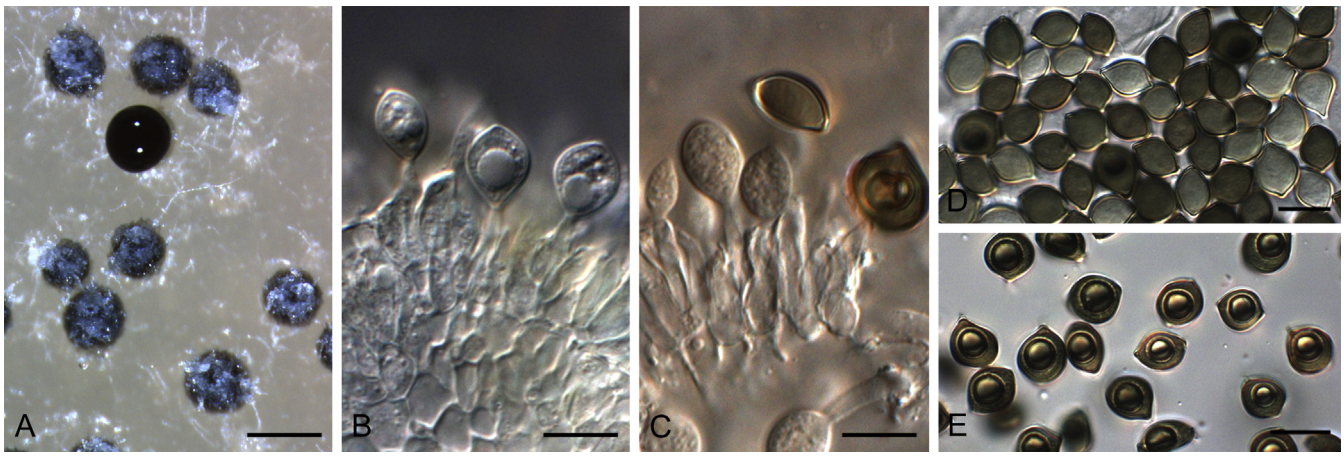

Fig. 28. *Coniella wangiensis* (CBS 132530). **A**. Conidiomata forming on OA. **B, C**. Conidiogenous cells giving rise to conidia. **D, E**. Conidia. Scale bars: A = 200 µm, others = 10 µm.

Coniella citri G.P. Agarwal & N.D. Sharma, in Sharma & Agarwal, Sydowia 26: 261. 1974 [1972].

Notes: Described from leaves of *Citrus medica*, India, and treated as synonym of *C. castaneicola* by Nag Raj (1993). Presently this species is not known from culture or from DNA.

Coniella clypeata Matsush., Matsush. Mycol. Mem. 9: 27. 1996.

Notes: Described from decaying leaf of unidentified tree, Japan (**holotype** Matsushima Fungus Collection, Kobe, 5H413). Presently this species is not known from DNA.

Coniella costae Dianese *et al.*, Mycol. Res. 97: 1234. 1993.

Notes: Described from leaves of *Myrcia tomentosa*, Brazil (**holotype** UB 355). Presently this species is not known from culture or from DNA.

Coniella delicata B. Sutton, The Coelomycetes (Kew): 422. 1980.

Notes: Described from *Aeridis crassifolia*, Thailand (**holotype** IMI 191546). Presently this species is not known from culture or from DNA.

Coniella duckerae H.Y. Yip, Trans. Br. mycol. Soc. 89(4): 587. 1987.

Notes: Described from the rhizosphere of *Lepidospermum concavum*, Australia (**holotype** DAR 55703, **isotype** VPRI 13689). Presently this species is not known from culture or from DNA.

Coniella eucalypticola Nag Raj, Canad. J. Bot. 54: 1370. 1976.

Notes: Described from leaves of *Eucalyptus* sp., Bangalore, India (**holotype** DAOM 150596). Presently this species is not known from culture or from DNA.

Coniella genistae Bat. & Peres, Saccardoa 1: 58. 1960.

Notes: Described from branches of *Genista tinctoria*, Germany. Presently this species is not known from culture or from DNA.

Coniella minima B. Sutton & Thaung, Nova Hedwigia 26(1): 10. 1975.

Notes: Described from leaves of *Eucalyptus camaldulensis*, Myanmar, Burma (**holotype** IMI 179300). Presently this species is not known from culture or from DNA.

Coniella musaiaensis* var. *hibisci B. Sutton, The Coelomycetes (Kew): 420. 1980.

Notes: Described from *Hibiscus esculenti*, Nigeria (IMI 129200). Presently no ex-type strain or DNA data are available. One strain in the CBS culture collection (CBS 109757 = ARS 3534) originates from *Hibiscus* sp. in Africa, and further study is needed to resolve if this could be a potential epitype.

Coniella musaiaensis* var. *musaiaensis B. Sutton, Canad. J. Bot. 47: 607. 1969.

Notes: Described from leaves of *Bauhinia reticulata*, Sierra Leone (**holotype** IMI 103345). Presently this species is not known from culture or from DNA.

Coniella oryzae S. Ahmad, Biologia, Lahore 14: 4. 1968.

Notes: Described from culms of *Oryza sativa*, Pakistan. Presently this species is not known from culture or from DNA.

Coniella petrakioidea Nag Raj, Coelomycetous Anamorphs with Appendage-bearing Conidia (Ontario): 233. 1993.

Notes: Described from leaves of unidentified tree collected in Nigeria [**holotype** IMI 99367(b)]. Presently this species is not known from culture or from DNA.

Coniella populina Naumov, Notul. syst. Sect. cryptog. Inst. bot. Acad. Sci. U.S.S.R. 7: 118. 1951.

Notes: Described from branches of *Populus tremula*, Leningrad, Russia. Presently this species is not known from culture or from DNA.

Coniella simba (Subram. & K. Ramakr.) B. Sutton, Canad. J. Bot. 47: 607. 1969.

Notes: Described from dead legumes of *Caesalpinia pulcherrima*, India (**holotype** MUBL 808 = IMI 110496). Presently this species is not known from culture or from DNA.

Coniella terminaliae Firdousi *et al.*, Acta Bot. Indica 22: 134. 1994.

Notes: Described from *Terminalia tormentosa*, Madhya Pradesh (**holotype** IMI 323384). Presently this species is not known from culture or from DNA.

Pilidiella duvauicola (Speg.) Petr. & Syd., Feddes Repert. Spec. Nov. Regni Veg., Beih. 42: 464 (1927)

Notes: Described from leaves of *Duvaua longifolia* (? = *Schinus longifolia*), Argentinia. Presently this species is not known from culture or from DNA.

Pilidiella jambolana S. Ahmad, Biologia, Lahore 13: 38. 1967.

Notes: Described from leaf of *Eugenia jambolana*, Pakistan. Presently this species is not known from culture or from DNA.

Pilidiella tamaricina S. Ahmad, Biologia, Lahore 13: 38. 1967.

Notes: Described from branches of *Tamarix articulata*, Pakistan. Presently this species is not known from culture or from DNA.

Schizoparme botrytidis Samuels, M.E. Barr & Lowen, Mycotaxon 46: 468. 1993.

Notes: Described from tree bark, Puerto Rico (**holotype** BPI). Presently this species is not known from culture or from DNA.

Schizoparme versoniana (Sacc. & Penz.) Nag Raj & Lowen, Mycotaxon 46: 480. 1993.

Notes: Described from fruit of *Punica granatum*, Spain (**holotype** PAD, **isotypes** BPI, K, NY). Presently this species is not known from culture or from DNA.

DISCUSSION

The genera *Coniella*, *Pilidiella* and *Schizoparme* contain cosmopolitan species that are known to cause diseases on

numerous host plants. However, several studies in the last few decades raised conflicting ideas as to whether *Coniella* should be separated from *Pilidiella* along with its sexual morph *Schizoparme*, or be considered as a single genus, with *Coniella* having priority. Von Arx (1981) separated *Pilidiella* from *Coniella* based on conidial pigmentation; *Pilidiella* having hyaline to pale brown conidia and *Coniella* having dark brown conidia. Castlebury *et al.* (2002) demonstrated a distinct separation of *Coniella* from *Pilidiella* and its *Schizoparme* sexual morph based on LSU nrDNA sequences. Van Niekerk *et al.* (2004) furthermore confirmed the separation of *Pilidiella* (typified from *P. castaneicola*) and *Coniella* (typified from *C. fragariae*) based on their ITS, *tef1* and LSU sequence data. Rossman *et al.* (2007) subsequently erected the family *Schizoparmaceae* to accommodate *Schizoparme* and its asexual morph *Pilidiella*, as well as the closely related asexual genus *Coniella*. The sexual genus *Schizoparme* (1923) was then reduced to synonymy (Rossman *et al.* 2015) to protect the asexual genus *Pilidiella* (1927), in response to one name for fungi based on the International Code of Nomenclature for algae, fungi and plants (McNeill *et al.* 2012).

Wijayawardene *et al.* (2016) regarded *Coniella* and *Pilidiella* as two separate genera, based on differences in conidial pigmentation as cited by Von Arx (1981), phylogenetic data presented by Castlebury *et al.* (2002) and Van Niekerk *et al.* (2004) and other related studies (Rossman *et al.* 2007, 2015). On the other hand, Sutton (1980) and Nag Raj (1993) did not consider the difference in conidial pigmentation significant to separate the two genera, but instead regarded *Pilidiella* as synonym of *Coniella*. Muthumary & Vanaja (1986) also supported this idea based on the development of conidiomata in *Coniella* (*C. fragariae*) being similar to that of *Pilidiella* (*P. quercicola*), as revealed in the study performed by Maas *et al.* (1979). Such confusion or inconsistency was regarded by Wijayawardene *et al.* (2016) to be due to poor delimitation and understanding of generic and species boundaries, not only for *Coniella* and *Pilidiella*, but also in other coelomycetous fungi.

In the present study multigene phylogenetic analyses combined with a large set of cultures enabled us to resolve the generic boundaries in *Schizoparmaceae*. Based on a four-gene phylogeny (ITS, LSU, *tef1* and *rpb2*) the basal node was found to be well resolved (parsimony bootstrap 100/Bayesian posterior probability 1), suggesting that there is presently only a single genus in *Schizoparmaceae*, to which the older name *Coniella* should be applied. Although a smaller subset of cultures found the type of *Coniella* to cluster apart from the type of *Pilidiella* (Castlebury *et al.* 2002, Van Niekerk *et al.* 2004), the boundaries became less clear once additional species were added (Fig. 2), showing that conidial pigmentation and conidial germ slits or appendages were gained or lost several times within the *Schizoparmaceae*, and that the pale and pigmented taxa were essentially intermixed. Furthermore, the feature of conidial volume being correlated to conidial pigmentation (e.g. *Pilidiella*, pale brown conidia, l: w > 1.5; *Coniella*, dark brown conidia, l: w $\leq$ 1.5; Van Niekerk *et al.* 2004), also proved to be untenable once more species were included in the dataset. Conidial volume was commonly used by Nag Raj (1993) to distinguish closely related species of appendaged coelomycetes, and has been shown to work well to distinguish taxa in e.g. *Botryosphaeriaceae* (Phillips *et al.* 2013), but its application to distinguish genera (Van Niekerk *et al.* 2004) was shown to be wrong in the present study. In spite of detailed morphological descriptions for all species known from culture, we also specifically decided to not include a morphological key in this paper, as there are simply too many species complexes, meaning that in future species of *Coniella* have to be identified based on morphology in conjunction with DNA sequence data.

Ecologically species of *Coniella* are known as saprobes, plant pathogens or endophytes. Several host genera are now also known to harbour more than one species, e.g. *Eucalyptus*, *Fragaria*, *Hibiscus*, *Psidium*, *Punica*, *Terminalia* and *Vitis*. Although some species appear to have wide host ranges, occurring on leaf litter, rotting bark, and soil, we suspect that some with reported wide host ranges e.g. *C. fragariae* and *C. granati* may in fact represent species complexes. Several species appear to be highly host specific, e.g. *C. crousii* on *Terminalia*, *C. destruens* and *C. eucalyptorum* on *Eucalyptus*, *C. diplodiella* and *C. diplodiopsis* on *Vitis*, *C. quercicola* on *Quercus*, and *C. tibouchinae* on *Tibouchina*.

Species of *Coniella* share common morphological characteristics in terms of conidiomatal anatomy, conidiophores and conidiogenesis, but vary with regard to conidial size, shape, colour, the presence of a germ slit, guttules, basal or lateral mucoid appendages, and cultural characteristics. Conidial pigmentation was found to be unreliable to separate these genera, as in some taxa conidia remain hyaline until turning pale brown at maturity, while in others they quickly turn pale brown, becoming dark brown at maturity (Fig. 2). Some species originally treated in *Pilidiella*, e.g. *P. eucalyptorum* and *P. wangiensis*, have conidia that eventually turn dark brown, being more typical of *Coniella* than *Pilidiella sensu* Von Arx (1981). As a result, based on both the phylogenetic and morphological analyses, it is proposed that all species of *Pilidiella* and *Schizoparme* (linked to taxa with hyaline or brown conidia) be considered as synonyms of *Coniella* as the accepted generic name based on priority.

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REFERENCES

Carbone I, Kohn LM (1999). A method for designing primer sets for speciation studies in filamentous ascomycetes. *Mycologia* **91**: 553–556.

Castlebury LA, Rossman AY, Jaklitsch WJ, *et al.* (2002). A preliminary overview of the *Diaporthales* based on large subunit nuclear ribosomal DNA sequences. *Mycologia* **94**: 1017–1031.

Çeliker NM, Uysal A, Çetinel B, *et al.* (2012). Crown rot on pomegranate caused by *Coniella granati* in Turkey. *Australasian Plant Disease Notes* **7**: 161–162.

Chen Y, Shao D-D, Zhang A-F, *et al.* (2014). First report of a fruit rot and twig blight on pomegranate (*Punica granatum*) caused by *Pilidiella granati* in Anhui province of China. *Plant Disease* **98**: 695.

Crous PC, Giraldo A, Hawksworth DL, *et al.* (2014a). The genera of fungi: fixing the application of type species of generic names. *IMA Fungus* **5**: 141–160.

Crous PW, Gams W, Stalpers JA, *et al.* (2004). MycoBank: an online initiative to launch mycology into the 21st century. *Studies in Mycology* **50**: 19–22.

Crous PW, Hawksworth DL, Wingfield MJ (2015a). Identifying and naming plant-pathogenic fungi: past, present, and future. *Annual Review of Phytopathology* **53**: 246–267.

Crous PW, Schumacher RK, Wingfield MJ, *et al.* (2015b). Fungal systematics and Evolution: FUSE 1. *Sydowia* **67**: 81–118.

Crous PW, Shivas RG, Quaedvlieg W, *et al.* (2014b). Fungal Planet description sheets: 214–280. *Persoonia* **32**: 184–306.

Crous PW, Summerell BA, Shivas RG, *et al.* (2012). Fungal Planet description sheets: 107–127. *Persoonia* **28**: 138–182.

Crous PW, Van der Linde EJ (1993). New and interesting fungi. 11. *Eucalyptus* leaf fungi. *South African Journal of Botany* **59**: 300–304.

Crous PW, Verkley GJM, Groenewald JZ, *et al.* (2009). *Fungal biodiversity. [CBS laboratory manual series no. 1.]*. CBS-KNAW Fungal Biodiversity Centre, Utrecht.

Crous PW, Wingfield MJ, Guarro J, *et al.* (2015c). Fungal Planet description sheets: 320–370. *Persoonia* **34**: 167–266.

Crous PW, Wingfield MJ, Park RF (1991). *Mycosphaerella nubilosa* a synonym of *M. molleriana*. *Mycological Research* **95**: 628–632.

De Hoog GS, Gerrits van den Ende AHG (1998). Molecular diagnostics of clinical strains of filamentous Basidiomycetes. *Mycoses* **41**: 183–189.

Farr DF, Rossman AY (2016). *Fungal databases, systematic botany & mycology laboratory.* ARS, USDA. Retrieved June 30, 2016, from. http://nt.ars-grin.gov/fungal databases/.

Ferreira FA, Alfenas AC, Coelho L (1997). Portas-de-entrada para *Coniella fragariae* em folhas de eucalipto. *Revista Árvore* **21**: 307–311.

Fröhlich J, Hyde KD (2000). Palm microfungi. *Fungal Diversity Research Series* **3**: 1–375.

Gomes RR, Glienke C, Videira SIR, *et al.* (2013). *Diaporthe*: a genus of endophytic, saprobic and plant pathogenic fungi. *Persoonia* **31**: 1–41.

Groenewald JZ, Nakashima C, Nishikawa J, *et al.* (2013). Species concepts in *Cercospora*: spotting the weeds among the roses. *Studies in Mycology* **75**: 115–170.

Han J, Chen D, Huang J, *et al.* (2015). Antifungal activity and biocontrol potential of *Paenibacillus polymyxa* HT16 against white rot pathogen (*Coniella diplodiella* Speq.) in table grapes. *Biocontrol Science and Technology* **25**: 1120–1132.

Hillis DM, Bull JJ (1993). An empirical test of bootstrapping as a method for assessing confidence in phylogenetic analysis. *Systematic Biology* **42**: 182–192.

Katoh K, Standley DM (2013). MAFFT multiple sequence alignment software version 7: improvements in performance and usability. *Molecular Biology and Evolution* **30**: 772–780.

KC AN, Vallad GE (2016). First report of *Pilidiella granati* causing fruit rot and leaf spots on pomegranate in Florida. *Plant Disease* **100**: 1238.

Levy E, Elkind G, Ben-Arie R, *et al.* (2011). First report of *Coniella granati* causing pomegranate fruit rot in Israel. *Phytoparasitica* **39**: 403–405.

Liu YJ, Whelen S, Hall BD (1999). Phylogenetic relationships among ascomycetes: evidence from an RNA polymerse II subunit. *Molecular Biology and Evolution* **16**: 1799–1808.

Maas JL, Pollack FG, Uecker FA (1979). Morphology and development of *Pilidiella quercicola*. *Mycologia* **71**: 93–102.

Marasas WFO, Van Der Westhuizen GCA (1971). New and interesting records of South African fungi, part VII. *Bothalia* **10**: 411–416.

Mathur PN, Thirumalachar MJ (1959). Studies on some Indian soil fungi 1. Some new or noteworthy *Sphaeropsidales*. *Sydowia* **13**: 143–146.

Matheny PB (2005). Improving phylogenetic inference of mushrooms with RPB1 and RPB2 nucleotide sequences (*Inocybe*; Agaricales). *Molecular Phylogenetics and Evolution* **35**: 1–20.

McNeill J, Barrie FR, Buck WR, *et al.* (2012). *International Code of nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011* [*Regnum Vegetabile* no. 154.]. A.R.G. Gantner Verlag, Ruggell.

Mirabolfathy M, Groenewald JZ, Crous PW (2012). First report of *Pilidiella granati* causing dieback and fruit rot of pomegranate (*Punica granatum*) in Iran. *Plant Disease* **96**: 461.

Miranda BEC, Barreto RW, Crous PW, *et al.* (2012). *Pilidiella tibouchinae* sp. nov. associated with foliage blight of *Tibouchina granulosa* (quaresmeira) in Brazil. *IMA Fungus* **3**: 1–7.

Muthumary J, Vanaja R (1986). Development of conidiomata in *Coniella fragariae*. *Transactions of the British Mycological Society* **87**: 109–113.

Nag Raj TR (1976). Miscellaneous microfungi. I. *Canadian Journal of Botany* **54**: 1370–1376.

Nag Raj TR (1993). *Coelomycetous anamorphs with appendage-bearing conidia*. Mycologue Publications, Waterloo, Canada.

Nylander JAA (2004). *MrModeltest v. 2*. Program distributed by the author. Evolutionary Biology Centre, Uppsala University, Sweden.

O'Donnell K, Cigelnik E, Nirenberg HI (1998). Molecular systematics and phylogeography of the *Gibberella fujikuroi* species complex. *Mycologia* **90**: 465–493.

Old KM, Wingfield MJ, Yuan ZQ (2003). *A manual of diseases of eucalypts in South-East Asia*. Center for International Forestry Research (CIFOR), Bogor, Indonesia.

Palou L, Guardado A, Montesinos-Herrero C (2010). First report of *Penicillium* spp. and *Pilidiella granati* causing postharvest fruit rot of pomegranate in Spain. *New Disease Reports* **22**: 21.

Park RF, Keane PJ, Wingfield MJ, *et al.* (2000). Fungal diseases of eucalypt foliage. In: *Diseases and pathogens of eucalypts* (Keane PJ, Kile GA, Podger FD, Brown BN, eds). CSIRO publishing, Australia: 153–239.

Petrak F (1960). Ergebnisse einer Revision der Grundtypen verschiedener Gattungen der Askomyzeten und Fungi imperfecti. *Sydowia* **14**: 347–354.

Petrak F, Sydow H (1927). Die Gattungen der Pyrenomyzeten, Sphaeropsideen und Melanconieen. I. Der phaeosporen Sphaeropsideen und die Gattung *Macrophoma*. *Feddes Repertorium Speciarum Novarum Regni Vegetabilum Beihefte* **42**: 1–551.

Phillips AJL, Alves A, Abdollahzadeh J, *et al.* (2013). The *Botryosphaeriaceae*: genera and species known from culture. *Studies in Mycology* **76**: 51–167.

Rajeshkumar KC, Hepat RP, Gaikwad SB, *et al.* (2011). *Pilidiella crousii* sp. nov. from the northern Western Ghats, India. *Mycotaxon* **115**: 155–162.

Rayner RW (1970). *A mycological colour chart*. Commonwealth Mycological Institute, Kew, UK.

Rehner SA, Samuels GJ (1994). Taxonomy and phylogeny of *Gliocladium* analysed from nuclear large subunit ribosomal DNA sequences. *Mycological Research* **98**: 625–634.

Ronquist F, Huelsenbeck JP (2003). MrBayes 3: Bayesian phylogenetic inferenceunder mixed models. *Bioinformatics* **19**: 1572–1574.

Rossman AY, Farr DF, Castlebury LA (2007). A review of the phylogeny and biology of the *Diaporthales*. *Mycoscience* **48**: 135–144.

Rossman AY, Adams GC, Cannon PF, *et al.* (2015). Recommendations of generic names in *Diaporthales* competing for protection or use. *IMA Fungus* **6**: 145–154.

Saccardo PA (1876). Fungi Veneti novi vel critici. Series V. *Nuovo Giornale Botanico Italiano* **8**(2): 162–211.

Saccardo PA (1884). Sylloge Fungorum: Sylloge Sphaeropsidearum et Melanconiearum. *Sylloge Fungorum* **3**: 1–840.

Saccardo PA, Saccardo D (1906). Supplementum universale. Pars VII. Discomycetae-Deuteromycatae. *Sylloge Fungorum* **18**: 1–838.

Samuels GJ, Barr ME, Lowen R (1993). Revision of *Schizoparme* (*Diaporthales*, *Melanconidaceae*). *Mycotaxon* **46**: 459–483.

Sharma JK, Mohanan C, Maria Florence EJ (1985). Disease survey in nurseries and plantations of forest tree species grown in Kerala. *Kerala Forest Research Institute Research Report* **36**: 1–268.

Shear CL (1923). Life histories and undescribed genera and species of fungi. *Mycologia* **15**: 120–131.

Snowden AL (2010). *A colour atlas of post-harvest diseases and disorders of fruits and vegetables*. In: *General introduction and fruits*, **vol. 1**. University of Cambridge. Manson Publishing.

Subramanian CV, Ramakrishnan K (1956). *Anthasthoopa*, a new genus of the *Sphaeropsidales*. *Proceedings of the Indian Academy of Sciences* **43**: 172–174.

Sung GH, Sung JM, Hywel-Jones NL, *et al.* (2007). A multi-gene phylogeny of *Clavicipitaceae* (Ascomycota, Fungi): identification of localized incongruence using a combinational bootstrap approach. *Molecular Phylogenetics and Evolution* **44**: 1204–1223.

Sutton BC (1969). Type studies of *Coniella*, *Anthasthoopa*, and *Cyclodomella*. *Canadian Journal of Botany* **47**: 603–608.

Sutton BC (1980). *The Coelomycetes. Fungi imperfecti with pycnidia, acervuli and stromata*. Commonwealth Mycological Institute, Kew, UK.

Sutton BC, Waterston JM (1966). Coniella diplodiella. *CMI Descriptions of Pathogenic Fungi and Bacteria* **82**: 1–2.

Swofford DL (2003). *PAUP*: phylogenetic analysis using parsimony (*and other methods), version 4*. Sinauer Associates, Sunderland, Massachusetts.

Tamura K, Stecher G, Peterson D, *et al*. (2013). MEGA6: Molecular Evolutionary Genetics Analysis version 6.0. *Molecular Biology and Evolution* **30**: 2725–2729.

Thomidis T (2015). Pathogenicity and characterization of *Pilidiella granati* causing pomegranate diseases in Greece. *European Journal of Plant Pathology* **141**: 45–50.

Tziros GT, Tzavella-Klonari K (2008). Pomegranate fruit rot caused by *Coniella granati* confirmed in Greece. *Plant Pathology* **57**: 783.

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.

Villesen P (2007). FaBox: an online toolbox for fasta sequences. *Molecular Ecology Notes* **7**: 965–968.

Van der Aa HA (1983). A new species of *Coniella*. *Proceedings van de Koninklijke Nederlandse Akademie van Wetenschappen Section C* **86**: 121–125.

Van Niekerk JM, Groenewald JZ, Verkley GJM, *et al*. (2004). Systematic reappraisal of *Coniella* and *Pilidiella*, with specific reference to species occurring on *Eucalyptus* and *Vitis* in South Africa. *Mycological Research* **108**: 283–303.

Von Arx JA (1973). Centraalbureau voor Schimmelcultures Baarn and Delft. Progress Report 1972. *Verhandelingen der Koninklijke Nederlandsche Akademie van Wetenschappen, Afdeling Natuurkunde* **61**: 59–81.

Von Arx JA (1981). *The genera of fungi sporulating in pure culture*, 3rd edn. J Cramer, Vaduz.

Von Höhnel F (1918). Dritte vorlaufige Mitteilung mycologischer Ergebnisse (Nr. 201–304). *Berichte der Deutschen Botanischen Gesellschaft* **36**: 309–317.

White TJ, Bruns T, Lee S, *et al*. (1990). Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics. In: *PCR protocols: a guide to methods and applications* (Innis MA, Gelfand DH, Sninsky JJ, White TJ, eds). Academic Press, San Diego: USA: 315–322.

Wijayawardene NN, Hyde KD, Wanasinghe DN, *et al*. (2016). Taxonomy and phylogeny of dematiaceous coelomycetes. *Fungal Diversity* **77**: 1–316.

Wingfield MJ, De Beer ZW, Slippers B, *et al*. (2012). One fungus, one name promotes progressive plant pathology. *Molecular Plant Pathology* **13**: 604–613.