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LULESIA SINGER (1970), AN OLDER NAME FOR *CLITOCELLA* KLUTING, T.J. BARONI & BERGEMANN (2014, *ENTOLOMATACEAE*)

Abstract

In the present work, an epitype collection for Lulesia densifolia, type species of Lulesia, and one for Clitocybe alachuana, are designated. Multigene phylogenetic analysis suggests that Lulesia is a priority synonym of the genus Clitocella, a recent segregate from Rhodocybe s.l. Even the macroscopic appearance of the basidiomes and the shape and structure of the basidiospores are compatible with the synonymization of the two genera. Accordingly, there are thirteen species of Clitocella which have to be combined into Lulesia. Clitocella subgenus Rhodopleurella and C. subgenus Paraclitopilus are here also combined in Lulesia.

Riassunto

Nel presente lavoro vengono designati gli epitipi di Lulesia densifolia, specie tipo di Lulesia, e di Clitocybe alachuana. L'analisi filogenetica multigenica indica che Lulesia è un sinonimo prioritario del genere Clitocella, di recente segregato dal genere Rhodocybe s.l. Anche l'aspetto macroscopico dei basidiomi e la forma e struttura delle basidiospore sono concordi con la sinonimizzazione dei due generi. Tredici sono le specie di Clitocella che sono quindi da ricombinare in Lulesia. Clitocella subgenus Rhodopleurella e C. subgenus Paraclitopilus vengono qui ricombinati in Lulesia.

Key words: *Basidiomycota*, *Agaricomycetes*, *Agaricales*, *Tricholomatineae*, rhodocyboid fungi, taxonomy

Introduction

The genus *Lulesia* was established by Singer (1970) for accommodating two taxa previously considered as part of *Armillariella* Singer (Singer 1951; Singer & Digilio 1951), viz. *A. densifolia* Singer (type of *Lulesia*) and *Clitocybe alachuana* Murrill. The generic name *Lulesia* derives from "Quebrada de Lules", a locality in the province of Tucumán in Argentina, where the type collection of *A. densifolia* was found (Singer & Digilio 1951; Singer 1970). Singer (1970) differentiated *Lulesia* from *Armillariella* by having a zonate pileus, very narrow lamellae, a bitter taste, smaller spores, a trichodermic pileus covering, and a terricolous/humicolous habitat. Additionally, *L. densifolia* spores were described as smooth in some mounting media (methylene blue, carmine-acetic acid, and Melzer's reagent) but appear slightly rounded-angular and nodulose in aqueous NH_3 and KOH in light microscopy (Singer & Digilio 1951; Singer 1970, 1986). According to Singer & Digilio (1951) and Singer (1986) this slight irregularity of the spore surface would be reminiscent of the spores of the species in genus *Rhodocybe* Maire.

Baroni (1981) and Bigelow (1982, 1985), after studying the type collection of *Clitocybe alachuana* Murrill (from Florida), considered it a later synonym of *Rhodocybe mundula* (Lasch) Singer, and this conclusion was also followed by Singer (1986). The species recognized in *Lulesia* were recently supplemented by Lechner *et al*. (2006) with another new species from Argentina, *L. lignicola* B.E. Lechner & J.E. Wright.

With the exclusion of *Clitocybe alachuana* from the genus, *Lulesia* was characterized by an agaricoid gymnocarpic basidiome with convex to depressed ± zonate, subglabrous to slightly velutinous, dry, brown pileus; stipe solid, concolorous to pileus, often with white rhizomorphs; lamellae decurrent, whitish, very narrow; taste farinaceous, mild to slightly bitter; spore deposit white to cream. Basidiospores largely ellipsoid, appearing rounded-angular, inamyloid; basidia 1-2 or 4-spored; cystidia absent or indistinct; hymenophoral trama regular to subregular; pileipellis a trichoderm of thick-walled, brown hyphae, inamyloid and non-dextrinoid; stipitipellis similar in structure, non-dextrinoid to dextrinoid; clamp connections absent. Terricolous, lignicolous, presumably saprotrophic; tropical to subtropical, thermophilous, Argentina (Singer 1986; Lechner *et al*. 2006) and Dominican Republic (Angelini & Contu 2012).

Based only on morphological data, *Lulesia* was placed by Singer (1970, 1986) in subtribe *Omphalineae* Singer (tribe *Clitocybeae* Fayod, family *Tricholomataceae* R. Heim ex Pouzar), by Lechner *et al*. (2006) and Agerer (2018) in *Tricholomataceae* s.l., and by He *et al*. (2019) in *incertae sedis Agaricales*. In the supplementary materials of the first molecular work also including a sequence (nrLSU) generated from a collection of *Lulesia* (Varga *et al*. 2019), *L. densifolia* clustered within *Clitocella* Kluting, T.J. Baroni & Bergemann, a genus recently segregated from *Rhodocybe* s.l. (*Entolomataceae* Kotl. & Pouzar) (Kluting *et al*. 2014). Based on this preliminary molecular indication Kalichman *et al*. (2020), in their compendium of generic names of agarics and *Agaricales*, placed *Lulesia* in the *Entolomataceae*.

No further collections of *L. densifolia* apart from the original ones were reported until recent findings in the Dominican Republic (Angelini & Contu 2012). The aim of the present work was to assess the phylogenetic placement of *Lulesia* by using a multilocus molecular approach.

Materials & Methods

DNA extraction, amplification, and sequencing

Total DNA was extracted from dry specimens employing a modified protocol based on Murray & Thompson (1980). PCR reactions (Mullis & Faloona 1987) included 35 cycles with an annealing temperature of 54 ºC. The primers ITS1F and ITS4 (White *et al*. 1990; Gardes & Bruns 1993) were employed to amplify the ITS rDNA nuclear region, LR0R and LR5 (Vilgalys & Hester 1990; Cubeta *et al*. 1991) were used for the LSU rDNA nuclear region, EF1-983F, EF1-1567R and EF1- 2218R (Rehner & Buckley 2005) for the translation elongation factor *1α* (*tef1*) gene, and bRPB2-6F2 (reverse of bRPB2-6R2), and bRPB2-7R2 for the RNA polymerase II second largest subunit (*rpb2*) gene (Matheny *et al*. 2007). PCR products were checked in 1% agarose gels, and amplicons were sequenced with one or both PCR primers. Sequences were corrected to remove reading errors in chromatograms.

Phylogenetic analyses

Two different datasets were built from sequences produced in the present work and others available in public databases (**Tables 1-2**): 1) *Entolomataceae*-dataset aimed to resolve the phylogenetic relationships of *L. densifolia* within this family. It included sequences of three different loci (LSU, *RPB2* and *TEF-1α*) from the main lineages analyzed by Kluting *et al*. (2014) and Baroni *et al*. (2020). Sequences of *Infundibulicybe geotropa* (Bull.) Harmaja (*Omphalinaceae* Vizzini, Consiglio & M. Marchetti) were employed as outgroup; 2) Based on the first larger analysis, a *Clitocella*-dataset aimed to provide a more accurate view of the position of *Lulesia* within this genus. It included sequences of five different loci (ITS, LSU, *RPB2*, *TEF-1*α and *ATP6*) from all the species recognized in Vizzini *et al*. (2023). Sequences of *Clitopilus prunulus* were employed as outgroup.

BLASTn (Altschul *et al.* 1990) was used to select the most closely related sequences from the International Nucleotide Sequence Database Collaboration public database (INSDC, Arita *et al*. 2021). All sequences employed are listed in **Tables 1-2**. Sequences first were aligned in MEGA 5.0 (Tamura *et al*. 2011) or MEGA 6.0 (Tamura *et al*. 2013) with its Clustal W or MUSCLE (Edgar 2004) applications and then realigned manually as needed to establish positional homology. The analysis of Dataset 1 (*Entolomataceae*, three partitions: LSU, *RPB2* and *TEF-1α*) was run locally, while that of Dataset 2 (*Clitocella*, five partitions: ITS rDNA, LSU rDNA, *RPB2*, *TEF-1α* and *ATP6*) was run through the CIPRES Science Gateway platform (Miller *et al*. 2010). Both datasets were loaded in MrBayes 3.2.6 (Ronquist *et al*. 2012), where a Bayesian analysis was performed (GTR+G+I model, two simultaneous runs, four chains, temperature set to 0.2, sampling every 100th generation) until the average split frequencies between the simultaneous runs fell below 0.01 after 4.28 M (*Entolomataceae*) and 2.32 M (*Clitocella*) generations. Finally, a full search for the best-scoring maximum likelihood tree was performed in RAxML 8.2.12 (Stamatakis 2014) using the standard search algorithm (same partitions, GTRCAT model, 2000 bootstrap replications). The significance threshold was set above 0.95 for posterior probability (PP) and 70% bootstrap proportions (BP).

Results

In the phylogenetic tree of the *Entolomataceae* (**Fig. 1**), all the six genera currently recognized within the family (Kluting *et al*. 2014; Baroni *et al*. 2020), viz. *Clitocella* Kluting, T.J. Baroni & Bergemann, *Clitopilopsis* Maire, *Clitopilus* (Fr. ex Rabenh.) P. Kumm., *Entoloma* (Fr.) P. Kumm. s.l., *Rhodocybe* s.s., and *Rhodophana* Kühner, were found to be significantly monophyletic. *Lulesia densifolia* clusters within *Clitocella* in its subgenus *Clitocella*. In the phylogenetic tree focused on *Clitocella* (**Fig. 2**), the three subgenera recognized by Vizzini *et al*. (2023) were obtained again, viz. *C*. subgen. *Clitocella*, *C*. subgen. *Paraclitopilus* Vizzini & Consiglio, and *C*. subgen. *Rhodopleurella* Vizzini & Consiglio. *Lulesia densifolia* and *L. alachuana* fall within *C*. subgen. *Clitocella*.

As a consequence of these findings, the genus *Lulesia* Singer (1970) is here considered a priority synonym of *Clitocella* Kluting, T.J. Baroni & Bergemann (2014) and the necessary taxonomic modifications are proposed below (viz. species and subgenera of *Clitocella* are combined in *Lulesia*).

Lulesia Singer, *Fl. Neotrop*., Monogr. 3: 16 (1970)

Synonyms: *Clitocella* Kluting, T.J. Baroni & Bergemann, *Mycologia* 106 (6): 1135 (2014). Type: *Clitocella popinalis* (Fr.) Kluting, T.J. Baroni & Bergemann, *Mycologia* 106 (6): 1138 (2014).

Basionym: *Agaricus popinalis* Fr., *Syst. Mycologia*. (Lundae) 1: 194 (1821), nom. sanct.
"*Clitocella*" Kluting, T.J. Baroni & Bergemann, in Kluting, A Revised Generic Classification for the *Rhodocybe-Clitopilus* clade, Thesis, Middle Tennessee State University: 20. 2013, nom. inval., Art. 32.1 (a) (Shenzhen Code, Turland *et al*. 2018).
Rhodocybe sect. *Decurrentes* (Konrad & Maubl.) Singer, *Lilloa* 22: 609. 1951, partim.

Type: ***Lulesia densifolia*** (Singer) Singer, *Fl. Neotrop*., Monogr. 3: 16 (1970)

Synonym: *Armillariella densifolia* Singer, in Singer & Digilio, *Lilloa* 25: 72 (1952) [1951].

Epitype here designated (MycoBank MBT10017391): Dominican Republic, P.to Plata, Sosua, 05 Dec. 2013, *leg*. and *det*. C. Angelini, JBSD125861 (GenBank: ITS rDNA OR994620; LSU rDNA OR994669; SSU rDNA OR994670; *RPB2* PP001698, *TEF-1α* PP001699 [duplo MCVE28358 and CORT014744 (incorrectly reported as 02 Dec. 2011)]. **Figs 3 c-d**, **f-h**.

Lulesia alachuana (Murrill) Singer, *Fl. Neotrop*., *Monogr.* 3: 17 (1970)

Synonyms: *Clitocybe alachuana* Murrill, *Proc. Fla. Acad. Sci.* 7 (2/3): 107 (1945) [1944].

Armillariella alachuana (Murrill) Singer, *Lilloa* 22: 216 (1951)

Epitype here designated (MycoBank MBT10017392): United States of America, Florida, Putnam, Ordway-Swisher Biol. Station, Mill Creek Swamp Bridge, 06 July 2017, *leg*. M. Smith, *det*. T.J. Baroni, FLAS-F-61088 (GenBank: ITS rDNA MH399861) (duplo CORT014753).5

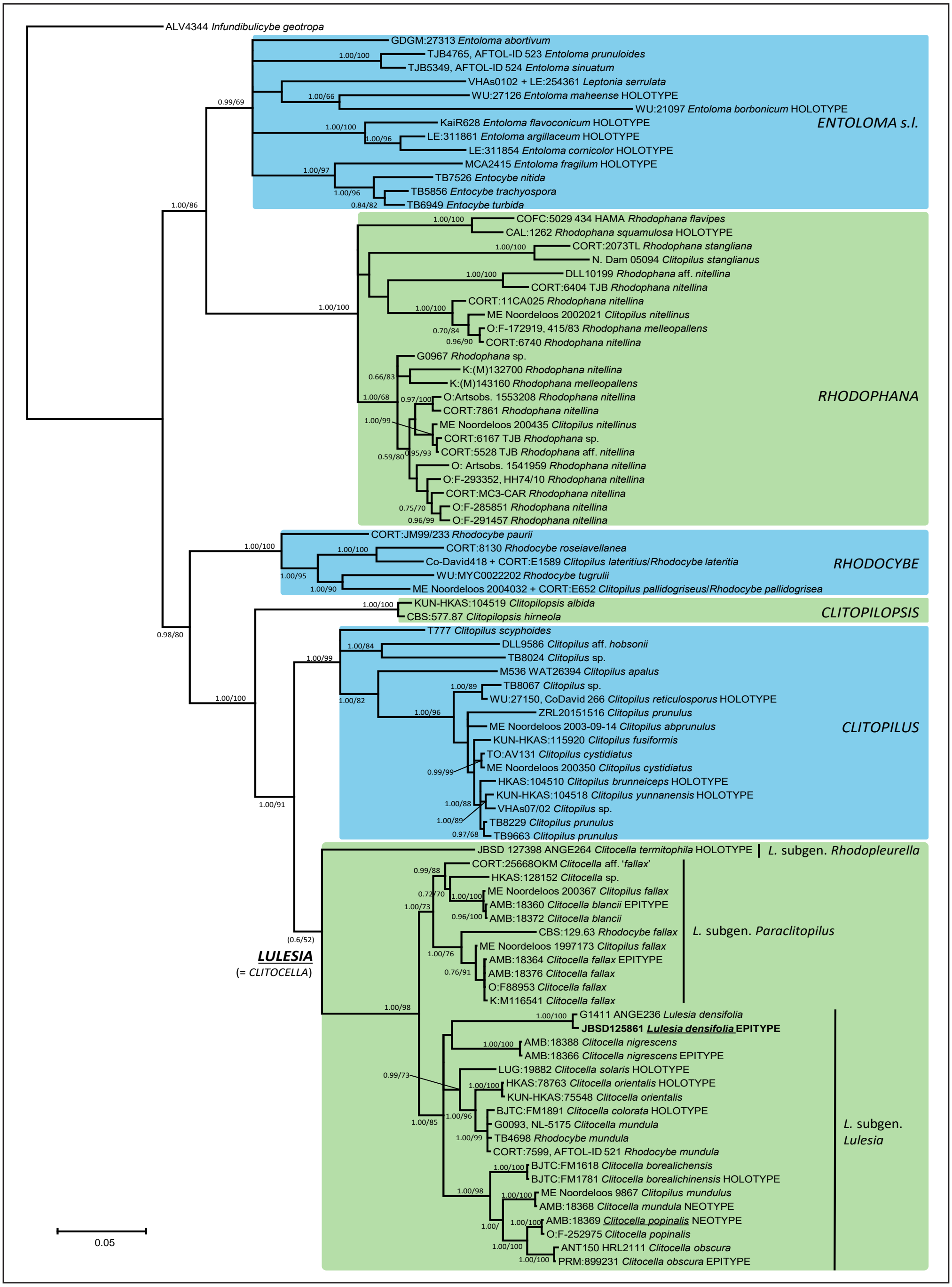

Fig. 1. Bayesian inference phylogram built with nucleotide sequence data of three loci (LSU, *RPB2*, and *TEF-1α*) of the main lineages inside family *Entolomataceae*, rooted with *Infundibulicybe geotropa* (*Omphalinaceae*) as outgroup taxon. The main genera are shown in color boxes while subgenera names are shown next to vertical bars. Nodes were annotated if supported by >0.95 Bayesian PP (left) or >70% ML BP (right). Exceptionally, subsignificant values were also annotated in parentheses. Boldface names represent samples sequenced for this study.

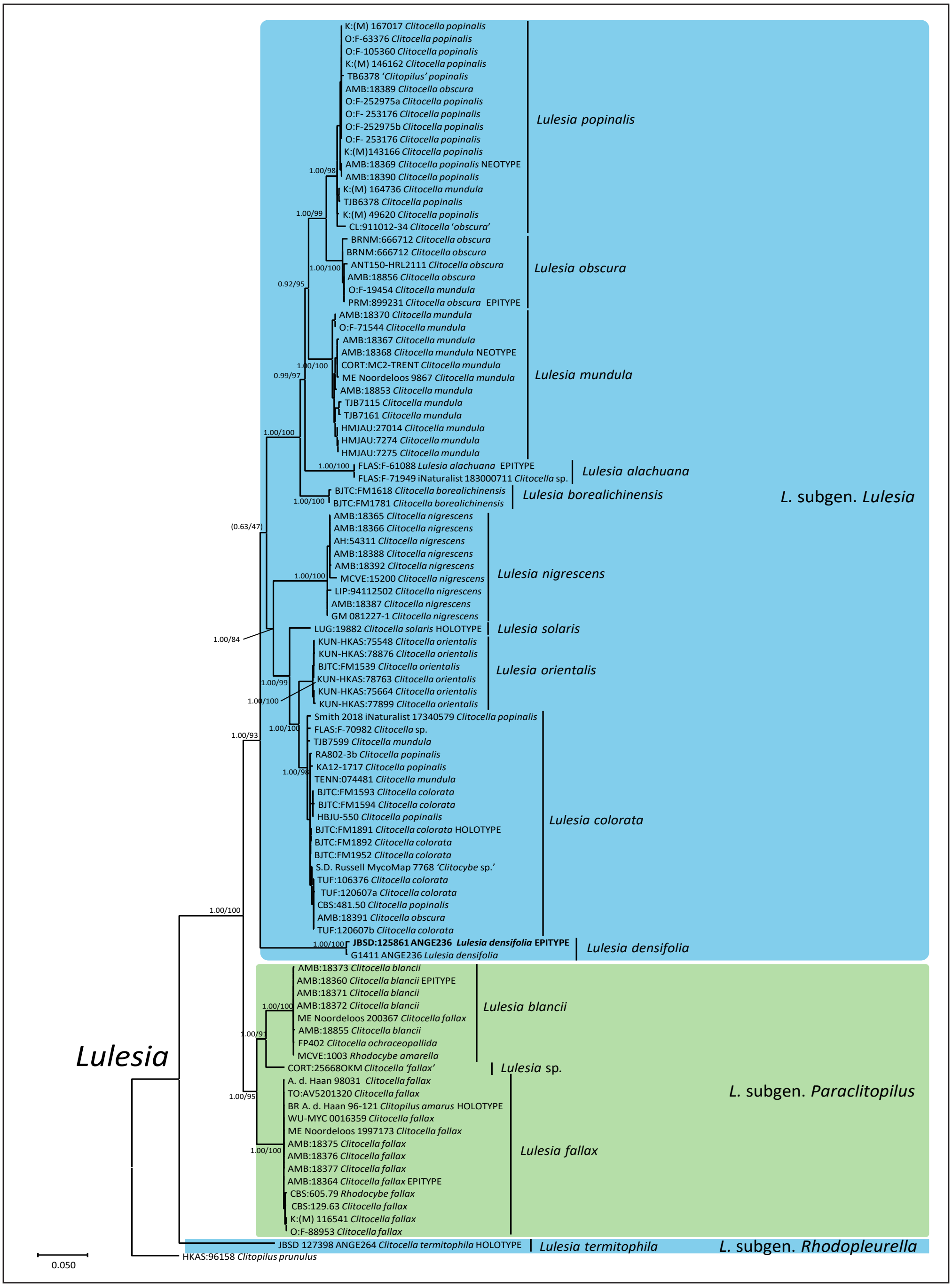

Fig. 2. Bayesian inference phylogram built with nucleotide sequence data of five loci (ITS, LSU, *RPB2*, *TEF-1α* and *ATP6*) of the main lineages inside the genus *Clitocella*, rooted with *Clitopilus prunulus* as outgroup taxon. The main subgenera are shown in color boxes. Nodes were annotated if supported by >0.95 Bayesian PP (left) or >70% ML BP (right). Exceptionally, subsignificant values were also annotated in parentheses. Boldface names represent samples sequenced for this study.

Lulesia subgenus ***Lulesia***, autonym.

Lulesia subgenus ***Paraclitopilus*** (Vizzini & Consiglio) Vizzini & Consiglio comb. nov.
MycoBank MB851520

Basionym: *Clitocella* subgen. *Paraclitopilus* Vizzini & Consiglio, *Persoonia* 50: 146 (2023).
Type: *Omphalia fallax* Quél., *C. r. Assoc. Franç. Avancem. Sci.* 24 (2): 617 (1896) '1895'.

Lulesia subgenus ***Rhodopleurella*** (Vizzini & Consiglio) Vizzini & Consiglio comb. nov.
MycoBank MB851521

Basionym: *Clitocella* subgen. *Rhodopleurella* Vizzini & Consiglio, *Persoonia* 50: 152 (2023).
Type: *Clitocella termitophila* T.J. Baroni & Angelini, in Baroni, Angelini, Bergemann, Lodge, Lacey, Curtis & Cantrell, *Mycol. Progr.* 19 (10): 1087 (2020).

Lulesia blancii (Maire) Vizzini, Consiglio, P. Alvarado, Angelini & M. Marchetti, comb. nov.
MycoBank MB851522

Basionym: *Rhodopaxillus blancii* Maire, *Bull. Soc. Hist. nat. Afr.* N. 36 (3): 30 (1945).

Lulesia borealichinensis (L. Fan & N. Mao) Vizzini, Consiglio, P. Alvarado, Angelini & M. Marchetti, comb. nov.
MycoBank MB851523

Basionym: *Clitocella borealichinensis* L. Fan & N. Mao, in Mao, Lv, Xu, Zhao & Fan, *MycoKeys* 88: 157 (2022).

Lulesia nigrescens (Maire) Vizzini, Consiglio, P. Alvarado, Angelini & M. Marchetti, comb. nov.
MycoBank MB851524

Basionym: *Rhodopaxillus nigrescens* Maire, *Bull. Soc. Hist. nat. Afr. N.* 36 (3): 31 (1945).

Lulesia orientalis (S.P. Jian & Zhu L. Yang) Vizzini, Consiglio, P. Alvarado, Angelini & M. Marchetti, comb. nov.
MycoBank MB851525

Basionym: *Clitocella orientalis* S.P. Jian & Zhu L. Yang, in Jian, Bau, Zhu, Deng, Yang, Zhao, *Mycologia* 112 (2): 391 (2020).

Lulesia pallescens (Silva-Filho & Cortez) Vizzini, Consiglio, P. Alvarado, Angelini & M. Marchetti, comb. nov.
MycoBank MB851526

Basionym: *Clitocella pallescens* Silva-Filho & Cortez, in Silva-Filho, Teixeira-Silva & Cortez, *Darwiniana*, n.s. 6 (1): 61 (2018).

Lulesia solaris (Musumeci, Consiglio & Vizzini) Musumeci, Consiglio & Vizzini, comb. nov.
MycoBank MB851527

Basionym: *Clitocella solaris* Musumeci, Consiglio & Vizzini, *Persoonia* 50: 144 (2023).

Clitocella colorata L. Fan & N. Mao, *Omphalia fallax* Quél., *Agaricus mundulus* Lasch, *Rhodopaxillus obscurus* Pilát, *Agaricus popinalis* Fr., *Rhodocybe semiarboricola* T.J. Baroni, and *Clitocella termitophila* T.J. Baroni & Angelini were very recently combined in *Lulesia* via Index Fungorum e-Publishing (https://www.indexfungorum.org/names/IndexFungorumRegister.htm; https://www.indexfungorum.org/names/IndexFungorumPublicationsListing.asp) by Baroni *et al*. (2023) in a non-ethical predatory way even though we agreed on joint work.

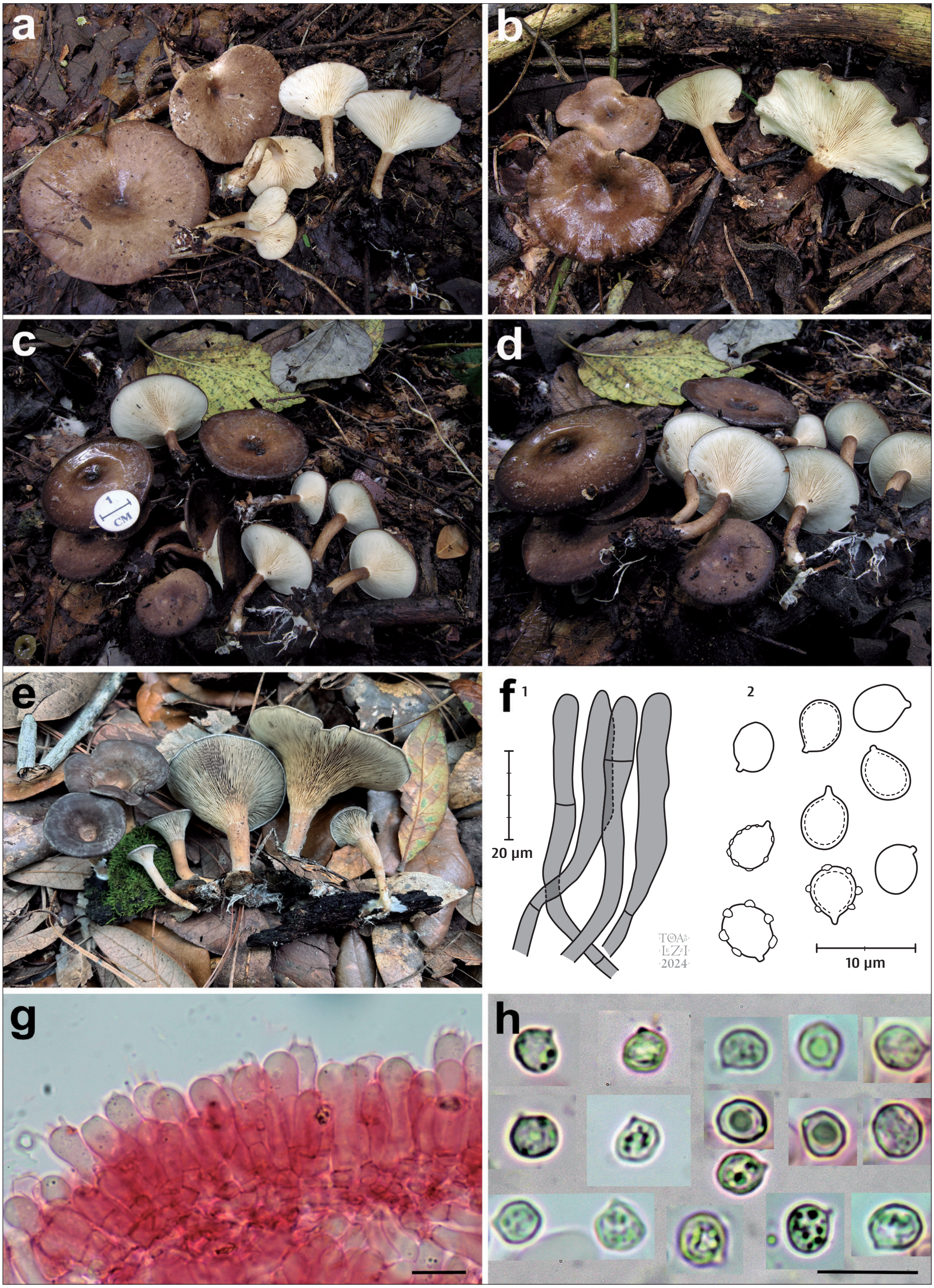

Fig. 3. *Lulesia densifolia*. Basidiomes. Photos: **a-b.** (ANGE1150); **c-d.** (JBSD125861, epitype). *Lulesia alachuana*. Photo (**e**) (FLAS:F-71949). *Lulesia densifolia*. Microscopic characters. **f.** Elements of the pileipellis (**f1**) (JBSD125861), spores (**f2**) (JBSD125861). **g.** Hymenium (basidia) and subhymenium (JBSD125861). **h.** Spores (JBSD125861). Photos (**a-d**, **g-h**) by C. Angelini; photo (**e**) by M. Wilson. Drawings (**f**) by T. Lezzi (from Angelini & Contu, 2012). Bars: **f1** = 20 µm; **f2**, **g-h** = 10 µm.

Discussion

The holotype collections of *Armillariella densifolia* (Argentina, Singer T. 367, 02/04/1949, LIL) and *Clitocybe alachuana* (Florida, FLAS-F-17903, 15/07/1938) are old and in poor conservation conditions, and therefore not usable for sequencing. Consequently, a sequenced collection of *Lulesia densifolia* from the Dominican Republic (JBSD125861) and a sequenced collection of *L. alachuana* from Florida (FLAS-F-71949), whose morphological features (Angelini & Contu 2012; Baroni https://www.mycoportal.org/portal/collections/individual/index.php?occid=7960428, and pers. observations) fit well those of the original descriptions (Singer in Singer & Digilio 1951; Singer 1970; Murrill 1944, respectively), were above designated as epitypes to preserve current usage of the names and to serve as reference specimens.

The fact that the *Lulesia densifolia* spores have been reported by various authors (Singer & Digilio 1951; Singer 1970; Angelini & Contu 2012) as appearing slightly, obscurely rounded-angular and nodulose or slightly undulate only in certain media, has misled them from understanding the real phylogenetic affinities of the species, placing it in *Tricholomataceae* rather than in *Entolomataceae*. Our observations under optical microscopy on the collection analyzed by Angelini & Contu (2012) and sequenced in the present work (JBSD125861, epitype), revealed clearly angular spores (**Fig. 3h**), which were found also as angular in the same collection on scanning electron microscopy (SEM) by T. Baroni (pers. comm.). Therefore, *L. densifolia* shares with the *Clitocella* species the clitocyboid habit (depressed pileus and decurrent lamellae), crowded, narrow, long-decurrent lamellae, a quite bitter taste, absence of clamp connections, and thin-walled, obscurely pustulate spores (Kühner & Lamoure 1971; Kluting *et al*. 2014; Vizzini *et al*. 2023). *Lulesia densifolia* differs from all the *Clitocella* species so far known (Vizzini *et al*. 2023) by the strictly trichodermic/subpalisadic structure of its pileipellis rather than a cutis, a dark-coloured stipe concolorous with the pileus, and whitish to cream spore deposit. Most species of *Lulesia* subgen. *Lulesia* (= *Clitocella* subgen. *Clitocella*) are distinguished by an irregular hymenophoral trama and a red reaction of the pileus surface to KOH (Vizzini *et al*. 2023); *L. densifolia* shows a regular hymenophoral trama (Singer & Digilio 1951; Singer 1970, 1986; Angelini & Contu 2012) and the reaction of its pileus surface to KOH (which was proved to be very important for distinguishing species within the genus "*Clitocella*" by Baroni 1981 and Vizzini *et al*. 2023) is unknown.

Lulesia lignicola from Argentina, recently described based only on morphology (Lechner *et al.* 2006), differs from *L. densifolia* mainly by smaller 1-2 spored basidia (14-20 × 4.2-5.2 µm versus 26-29 × 5.8-6.5 µm in Singer & Digilio 1951; Singer 1970; 15-30 × 6-7.5 µm in Angelini & Contu 2012), smaller spores (3.5-4.7 × 3.6-5 µm versus 4.7-5.8 × 3.5-5 µm in Singer & Digilio 1951; Singer 1970; 4.5-6 × 3.5-4.5 µm in Angelini & Contu 2012), and lignicolous versus terricolous habitat.

Lulesia alachuana, so far known only from Florida, due to its greyish pileus (**Fig. 3e**), pileipellis as a cutis, subglobose, slightly angular, undulate pustulate or nearly smooth spores, a hymenophoral trama of interwoven hyphae, and bitter taste (Murrill 1944; Bigelow 1982) is morphologically a good member of *Lulesia* subgen. *Lulesia*, as molecularly supported in the analysis (**Fig. 2**) where it is sister to a strongly supported clade consisting of *L. mundula*, *L. popinalis* and *L. obscura* (all with greyish colours, irregular hymenophoral trama and red reaction to KOH). Because of its subglobose spores 5.5-6 × 5 µm, and growth on forest litter *L. alachuana* seems quite close to *L. mundula* and in fact it was considered a later synonym of the latter by some authors [T. Baroni's handwritten notes (1978) accompanying the holotype of *C. alachuana*, https://www.mycoportal.org/portal/collections/individual/indephp?occid=604249; Baroni (1981); Bigelow (1982, 1985); Singer (1986)]. It morphologically seems to differ mainly by a non-blackening context and different rDNA sequences (**Fig. 2**). The reaction of its pileus surface to KOH is unknown.

Lulesia termitophila (T.J. Baroni & Angelini) T.J. Baroni & Angelini (ITS, LSU and *RPB2* sequences) from the Dominican Republic, seems sister (0.60 PP, 52 BP) to the core of *Lulesia* (*L*. subgen. *Lulesia* + *L*. subgen. *Paraclitopilus*, **Fig. 1-2**) in our analysis, and represents an independent evolutive line (*Lulesia* subgen. *Rhodopleurella*). This species occupied a position outside the core of the "*Clitocella*" species already in the phylogenetic analyses by Baroni *et al*. (2020), Mao *et al*. (2022) and Vizzini *et al*. (2023) based only on a *RPB2* sequence. The thin-walled basidiospores with obscure, rounded angularity in polar view and an obscurely pustulate-bumpy surface are typical features also of species placed in "*Clitocella*" (Kluting *et al.* 2014; Baroni *et al.* 2020). However, the ellipsoid basidiospores, the eccentric stipe (pleurotoid habit), and the habit of growing on decaying woody materials of an arboreal termite nest are diagnostic features (Baroni *et al*. 2020).

Further investigations could demonstrate in the future whether or not this taxon deserves the rank of independent genus.

Table 1. Taxa, vouchers, and GenBank accessions numbers of the DNA sequences used in the *Entolomataceae*-wide phylogenetic analysis inferred from a three-gene dataset (LSU, *RPB2*, and *TEF-1α*). Sequences in bold were generated in this study.

Species (revised name)	Label (GenBank)	Voucher	GenBank Accession No.			Reference
			nrLSU	*RPB2*	*TEF-1α*	
Clitopilopsis albida	*Clitopilopsis albida*	KUN-HKAS:104519	MN065730	MN148167	MN166278	Jian *et al.* 2020
Clitopilopsis hirneola	*Clitopilopsis hirneola*	CBS:577.87	AF223163	–	–	Moncalvo *et al.* 2002
Clitopilus aff. *hobsonii*	*Clitopilus* aff. *hobsonii*	DLL9586	KJ021698	–	–	Largent *et al.* 2014
Clitopilus apalus	*Clitopilus apalus*	M536, WAT26394	AF261287	–	–	Moncalvo *et al.* 2002
Clitopilus brunneiceps	*Clitopilus brunneiceps*	HKAS:104510 (HOLOTYPE)	NG_068895	MN148123	MN166234	Jian *et al.* 2020
Clitopilus cystidiatus	*Clitopilus cystidiatus*	ME Noordeloos 200350 isolate 26	GQ289147	GQ289220	–	Co-David *et al.* 2009
Clitopilus cystidiatus	*Clitopilus cystidiatus*	TO:AV131	HM623133	–	–	Vizzini *et al.* 2011
Clitopilus fusiformis	*Clitopilus fusiformis*	KUN-HKAS:115920	MZ853556	MZ826360	MZ826358	He *et al.* 2022
Clitopilus prunulus	*Clitopilus prunulus*	ME Noordeloos 2003-09-14 isolate 2	GQ289149	GQ289221	–	Co-David *et al.* 2009
Clitopilus prunulus	*Clitopilus prunulus*	TB8229	GU384615	GU384650	–	Baroni et al. 2011
Clitopilus prunulus	*Clitopilus prunulus*	TB9663	GU384614	GU384648	–	Baroni *et al.* 2011
Clitopilus prunulus	*Clitopilus prunulus*	ZRL20151516	KY418853	KY419000	KY419056	Zhao *et al.* 2017
Clitopilus scyphoides	*Clitopilus scyphoides*	T777	AF261288	–	–	Moncalvo *et al.* 2002

Species (revised name)	Label (GenBank)	Voucher	GenBank Accession No.			Reference
			nrLSU	*RPB2*	*TEF-1α*	
Clitopilus reticulosporus	*Clitopilus* sp.	WU 27150/DC-2010 isolate Co-David 266 (HOLOTYPE)	NG_064318	HM164416	–	Morgado *et al.* 2016
Clitopilus sp.	*Clitopilus* sp.	TB8024	GU384613	GU384647	–	Baroni *et al.* 2011
Clitopilus sp.	*Clitopilus* sp.	TB8067	AF261286	GU384649	–	Baroni *et al.* 2011
Clitopilus sp.	*Clitopilus* sp.	VHAs07/2	EF421092	DQ825408	EF421086	Hofstetter *et al.*, unpublished
Clitopilus yunnanensis	*Clitopilus yunnanensis*	KUN-HKAS:104518 (JSP223) (HOLOTYPE)	MN065698	MN148136	MN166247	Jian *et al.* 2020
Entocybe nitida	*Entoloma nitidum*	TB7526	GU384626	GU384655	–	Baroni *et al.* 2011
Entocybe trachyospora	*Rhodocybe trachyospora*	TB5856	GU384629	GU384658	–	Baroni *et al.* 2011
Entocybe turbida	*Entoloma turbidum*	TB6949	GU384630	GU384656	–	Baroni *et al.* 2011
Entoloma abortivum	*Entoloma abortivum*	GDGM:27313	JQ320117	–	–	He *et al.* 2013
Entoloma argillaceum	*Entoloma argillaceum*	LE:311861 (HOLOTYPE)	OL338531	OL405237	OL405537	Reschke *et al.* 2022
Entoloma borbonicum	*Entoloma borbonicum*	WU:21097 (HOLOTYPE)	NG_067819	MH190131	MH190166	Karstedt *et al.* 2019
Entoloma cornicolor	*Entoloma cornicolor*	LE:311854 (HOLOTYPE)	OL338535	OL405243	OL405536	Reschke *et al.* 2022
Entoloma flavoconicum	*Entoloma flavoconicum*	KaiR628 (HOLOTYPE)	MZ611667	OL405244	OL405507	Reschke *et al.* 2022
Entoloma fragilum	*Entoloma fragilum*	BRGAime2415 (HOLOTYPE)	NG_059244	KJ021694	MG702622	Largent *et al.* 2014
Entoloma maheense	*Entoloma maheense*	WU27126 (HOLOTYPE)	NG_153985	OL405255	OL405553	Reschke *et al.* 2022
Entoloma prunuloides	*Entoloma prunuloides*	AFTOL-ID 523, TJB4765	AY700180	DQ385883	DQ457633	Matheny et al. 2007
Entoloma sinuatum	*Entoloma sinuatum*	AFTOL-ID 524, TJB5349	AY691891	KJ424375	–	Sánchez-García *et al.* 2014
Infundibulicybe geotropa	*Infundibulicybe geotropa*	ALV4344 + AMB:18861	KT122793	OQ672601	**PP001700**	Vizzini *et al.* 2023, **this study**
Leptonia serrulata	*Leptonia serrulata*	VHAs0102 + LE:254361	GU384624	GU384634	–	Baroni *et al.* 2011

Species (revised name)	Label (GenBank)	Voucher	GenBank Accession No.			Reference
			nrLSU	*RPB2*	*TEF-1α*	
Lulesia blancii	*Clitocella blancii*	AMB:18360 (EPITYPE)	NG_228964	ON524537	ON524566	Vizzini *et al.* 2023
Lulesia blancii	*Clitocella blancii*	AMB:18372	ON502628	ON524539	ON524568	Vizzini *et al.* 2023
Lulesia borealichinensis	*Clitocella* sp.	BJTC:FM1618	–	OL989912	–	Mao *et al.*2022
Lulesia borealichinensis	*Lulesia borealichinensis*	BJTC:FM1781 (HOLOTYPE)	NG_088314	OL989913	OL989917	Mao *et al.* 2022
Lulesia colorata	*Clitocella colorata*	BJTC:FM1891 (HOLOTYPE)	NG_088313	OL989914	OL989918	Mao *et al.* 2022
Lulesia densifolia	*Lulesia densifolia*	JBSD125861, ANGE236 (EPITYPE)	**OR994620**	**PP001698**	**PP001699**	**This study**
Lulesia densifolia	*Lulesia densifolia*	ANGE-236, G1411	MK278305	–	–	Varga *et al.* 2019
Lulesia fallax	*Clitocella fallax*	AMB:18364 (EPITYPE)	ON502634	ON524546	ON524573	Vizzini et al. 2023
Lulesia fallax	*Clitocella fallax*	AMB:18376	ON502633	ON524544	ON524571	Vizzini *et al.* 2023
Lulesia fallax	*Rhodocybe fallax*	CBS:129.63	AF223166	–	–	Moncalvo *et al.* 2002
Lulesia aff. *"fallax"*	*Clitocella fallax*	CORT:25668OKM	–	KC816937	KC816846	Kluting *et al.* 2014
Lulesia fallax	*Clitocella fallax*	K:116541	–	KC816938	KC816847	Kluting *et al.* 2014
Lulesia fallax	*Clitopilus fallax*	ME Noordeloos 1997173 isolate 262	GQ289209	GQ289275	–	Co-David *et al.* 2009
Lulesia blancii	*Clitopilus fallax*	ME Noordeloos 200367 isolate 37	GQ289210	GQ289276	–	Co-David *et al.* 2009
Lulesia fallax	*Clitocella fallax*	O:F88953	–	KC816936	KC816845	Kluting *et al.* 2014
Lulesia colorata	*Rhodocybe mundula*	CORT:7599, AFTOL-521	AY700182	DQ474128	–	Matheny *et al.* 2007
Lulesia mundula	*Clitocella mundula*	AMB:18368 (NEOTYPE)	ON502636	ON524548	–	Vizzini *et al.* 2023
Lulesia colorata	*Clitocella mundula*	G0093, NL-5175	MK278567	–	–	Varga *et al.* 2019
Lulesia colorata	*Rhodocybe mundula*	TB4698	AF261284	–	–	Moncalvo *et al.* 2002
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18366 (EPITYPE)	–	ON524553	ON524576	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18388	ON502642	ON524556	–	Vizzini *et al.* 2023

Species (revised name)	Label (GenBank)	Voucher	GenBank Accession No.			Reference
			nrLSU	*RPB2*	*TEF-1α*	
Lulesia obscura	*Clitocella obscura*	ANT150, HRL2111	ON923665	ON934195	–	Vizzini *et al.* 2023
Lulesia obscura	*Clitocella obscura*	PRM:899231 (EPITYPE)	ON502645	ON524559	–	Vizzini *et al.* 2023
Lulesia orientalis	*Clitocella orientalis*	HKAS:78763 (HOLOTYPE)	NG_068897	MN148165	MN166276	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:75548 (Cai794)	MN065727	MN148164	MN166275	Jian *et al.* 2020
Lulesia popinalis	*Clitocella popinalis*	AMB:18369 (NEOTYPE)	ON502649	ON524563	–	Vizzini *et al.* 2023
Lulesia mundula	*Clitopilus popinalis*	ME Noordeloos 9867	GQ289213	GQ289280	–	Co-David *et al.* 2009
Lulesia popinalis	*Clitocella popinalis*	O:F252975	ON502647	ON524561	–	Vizzini *et al.* 2023
Lulesia solaris	*Clitocella solaris*	LUG:19882 (HOLOTYPE)	ON923666	ON934197	–	Vizzini *et al.* 2023
Lulesia sp.	*Clitocella* sp.	WL-2023a HKAS:128152	OR067883	OR077302	–	Lu *et al.*, unpublished
Lulesia termitophila	*Clitocella termitophila*	JBSD 127398 ANGE264 (HOLOTYPE), CORT014751 (ISOTYPE)	**PP028781**	MN893319	–	**This study**, Baroni *et al.* 2011
Rhodocybe lateritia	*Clitopilus lateritius / Rhodocybe lateritia*	Co-David418 + CORT:E1589	HM164410	KC816942	KC816852	Kluting *et al.* 2014
Rhodocybe pallidogrisea	*Clitopilus pallidogriseus / Rhodocybe pallidogrisea*	ME Noordeloos 2004032 + CORT:E652	GQ289216	KC816968	KC816875	Kluting *et al.* 2014
Rhodocybe paurii	*Rhodocybe paurii*	CORT:JM99/233	AY286004	KC816969	KC816876	Kluting *et al.* 2014
Rhodocybe roseiavellanea	*Rhodocybe roseiavellanea*	CORT:8130 TJB	KR869930	KC816982	KC816889	Kluting *et al.* 2014
Rhodocybe tugrulii	*Rhodocybe tugrulii*	WU:MYC0022202	OP363999	OP381082	OP381084	Vizzini *et al.* 2023
Rhodophana aff. *nitellina*	*Rhodophana* aff. *nitellina*	CORT:5528, TJB5528	–	KC816962	KC816869	Kluting *et al.* 2014
Rhodophana aff. *nitellina*	*Rhodophana* aff. *nitellina*	DLL10199	–	KC816967	KC816874	Kluting *et al.* 2014
Rhodophana flavipes	*Rhodophana flavipes*	COFC:5029 434 HAMA	–	KC816984	KC816891	Kluting *et al.* 2014

Species (revised name)	Label (GenBank)	Voucher	GenBank Accession No.			Reference
			nrLSU	*RPB2*	*TEF-1α*	
Rhodophana melleopallens	*Rhodophana melleopallens*	K:M143160	–	KC816945	KC816855	Kluting *et al.* 2014
Rhodophana melleopallens	*Rhodophana melleopallens*	O:172919	–	KC816946	KC816856	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	CORT:11CA025	–	KC816965	KC816872	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	CORT:6404	–	KC816963	KC816870	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	CORT:6740	–	KC816964	KC816871	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	CORT:7861	–	KC816959	KC816866	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	CORT:MC3-CAR	–	KC816955	–	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	K:(M)132700	–	KC816960	KC816867	Kluting *et al.* 2014
Rhodophana nitellina	*Clitopilus nitellinus*	ME Noordeloos 2002021 isolate 265	GQ289214	GQ289281	–	Co-David *et al.* 2009
Rhodophana nitellina	*Clitopilus nitellinus*	ME Noordeloos 200435 isolate 400	GQ289215	GQ289282	–	Co-David *et al.* 2009
Rhodophana nitellina	*Rhodophana nitellina*	O:Artsobs1541959	–	KC816961	KC816868	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	O:Artsobs1553208	–	KC816966	KC816873	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	O:F285851	–	KC816956	–	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	O:F291457	–	KC816957	–	Kluting *et al.* 2014
Rhodophana nitellina	*Rhodophana nitellina*	O:F293352 HH74/10	–	KC816958	KC816865	Kluting *et al.* 2014
Rhodophana sp.	*Rhodophana* sp.	CORT:6167	–	KC816983	KC816890	Kluting *et al.* 2014
Rhodophana sp.	*Rhodophana* sp.	G0967, NL-5401	MK278565	–	–	Varga *et al.* 2019
Rhodophana squamulosa	*Rhodophana squamulosa*	CAL:1262 (HOLOTYPE)	NG_060152	KT180331	–	Anil Raj *et al.* 2016
Rhodophana stangliana	*Rhodophana stangliana*	CORT:2073TL	–	KC816992	KC816899	Kluting *et al.* 2014
Rhodophana stangliana	isolate 503 *Clitopilus stanglianus*	N. Dam 05094	GQ289218	GQ289285	–	Co-David *et al.* 2009

Table 2. Taxa, vouchers, countries, and GenBank accessions numbers of the DNA sequences used in the *Clitocella*-wide phylogenetic analysis inferred from a five-gene dataset (ITS, LSU, *RPB2*, *TEF-1α* and *ATP6*). Sequences in bold were generated in this study.

Species (revised name)	Label (GenBank-UNITE)	Voucher	Country	GenBank Accession No.					Reference
				nrITS	nrLSU	*RPB2*	*TEF-1α*	*ATP6*	
Clitopilus prunulus	*Clitopilus prunulus*	KUN-HKAS: 96158 (EPITYPE)	Austria	NR_172770	MN065691	MN148129	MN166240	MN133745	Jian *et al.* 2020
Lulesia alachuana	*Lulesia alachuana*	FLAS:F-61088 (EPITYPE)	USA: Florida	MH399861	–	–	–	–	Kaminsky *et al.* 2019, unpublished
Lulesia alachuana	*Clitocella* sp.	FLAS:F-71949 -iNaturalist-183000711	USA: Florida	OR664077	–	–	–	–	Sheffer & Smith 2023, unpublished
Lulesia blancii	*Clitocella blancii*	AMB:18360 (EPITYPE)	Italy	ON502686	ON502626	ON524537	ON524566	–	Vizzini *et al.* 2023
Lulesia blancii	*Clitocella blancii*	AMB:18371	Italy	ON502687	ON502627	ON524538	ON524567	–	Vizzini *et al.* 2023
Lulesia blancii	*Clitocella blancii*	AMB:18372	Italy	ON502688	ON502628	ON524539	ON524568	–	Vizzini *et al.* 2023
Lulesia blancii	*Clitocella blancii*	AMB:18373	Italy	–	–	ON524540	ON524569	–	Vizzini *et al.* 2023
Lulesia blancii	*Clitocella blancii*	AMB:18855	Spain	ON502689	ON502629	–	–	–	Vizzini *et al.* 2023
Lulesia blancii	*Clitopilus fallax*	ME Noordeloos 200367	Slovakia	–	GQ289210	GQ289276	–	–	Co-David *et al.* 2009
Lulesia blancii	*Rhodocybe amarella*	MCVE:1003 (HOLOTYPE of *Rhodocybe amarella*)	Italy	ON502690	–	–	–	–	Vizzini *et al.* 2023
Lulesia blancii	*Rhodocybe ochraceopallida*	FP402	Italy	ON502691	–	–	–	–	Vizzini *et al.* 2023
Lulesia borealichinensis	*Clitocella borealichinensis*	BJTC:FM1618	China	OL966942	OL966946	OL989912	–	OL989922	Mao *et al.* 2022
Lulesia orealichinensis	*Clitocella borealichinensis*	BJTC:FM1781 (HOLOTYPE)	China	OL966943	OL966957	OL989913	OL989917	OL989923	Mao *et al.* 2022
Lulesia colorata	*Rhodocybe obscura*	AMB:18391	Italy	ON502692	ON502630	ON524541	–	–	Vizzini *et al.* 2023
Lulesia colorata	*Clitocella colorata*	BJTC:FM1593	China	OL966940	–	–	–	–	Mao *et al.* 2022
Lulesia colorata	*Clitocella colorata*	BJTC:FM1594	China	OL966941	–	–	–	–	Mao *et al.* 2022
Lulesia colorata	*Clitocella colorata*	BJTC:FM1891 (HOLOTYPE)	China	OL966944	OL966955	OL989914	OL989918	OL989924	Mao *et al.* 2022
Lulesia colorata	*Clitocella colorata*	BJTC:FM1892	China	OL966945	OL966956	OL989915	OL989919	OL989925	Mao *et al.* 2022
Lulesia colorata	*Clitocella colorata*	BJTC:FM1952	China	–	OL966958	OL989916	OL989920	OL989926	Mao *et al.* 2022
Lulesia colorata	*Clitocella popinalis*	CBS:481.50	France	FJ770397	–	–	–	–	Hartley *et al.* 2009

Species (revised name)	Label (GenBank)	Voucher	Country	GenBank Accession No.					Reference
				nrITS	nrLSU	*RPB2*	*TEF-1α*	*ATP6*	
Lulesia colorata	*Clitocella* sp.	FLAS:F-70982	USA	OP932049	OP932040	–	–	–	Lemmond 2022, unpublished
Lulesia colorata	*Clitocella popinalis*	HBJU-550	India	KU561066	–	–	–	–	Kour *et al.* 2016
Lulesia colorata	*Clitocella popinalis*	KA12-1717	South Korea	KR673647	–	–	–	–	Kim *et al.* 2015
Lulesia colorata	*Clitocella popinalis*	RA802-3b	USA: Arkansas	MK217434	–	–	–	–	Alanbagi *et al.* 2020, unpublished
Lulesia colorata	*Clitocella mundula*	TENN:074481	USA: Tennessee	MT237519	–	–	–	–	Matheny *et al.* 2020, unpublished
Lulesia colorata	*Clitocybe* sp.	S.D. Russell MycoMap 7768	USA: Indiana	MK532767	–	–	–	–	Russell 2019, unpublished
Lulesia colorata	*Clitocella popinalis*	Smith-2018 iNaturalist # 17340579	USA: Wisconsin	MK573922	–	–	–	–	Russell 2019, unpublished
Lulesia colorata	*Clitocella mundula*	TJB7599 (AFTOL-ID 521)	USA: New York	–	–	KC816953	KC816863	KC816783	Kluting *et al.* 2014
Lulesia colorata	*Clitocella colorata*	TUF:106376	Estonia	UDB011645	–	–	–	–	UNITE
Lulesia colorata	*Clitocella colorata*	TUF:120607a	Estonia	ON502693	ON502631	ON524542	–	–	Vizzini *et al.* 2023
Lulesia colorata	*Clitocella colorata*	TUF:120607b	Estonia	UDB031317	–	–	–	–	UNITE
Lulesia densifolia	*Lulesia densifolia*	JBSD125861 (EPITYPE) ANGE-236	Dominican Republic	**OR994620**	**OR994669**	**PP001698**	**PP001699**	–	**This study**
Lulesia densifolia	*Lulesia densifolia*	ANGE-236	Dominican Republic	–	MK278305	–	–	–	Varga *et al.* 2019
Lulesia fallax	*Clitocella fallax*	AMB:18364 (EPITYPE)	Italy	ON502696	ON502634	ON524546	ON524573	ON934200	Vizzini *et al.* 2023
Lulesia fallax	*Clitocella fallax*	AMB:18375	Italy	ON502694	ON502632	ON524543	ON524570	–	Vizzini *et al.* 2023
Lulesia fallax	*Clitocella fallax*	AMB:18376	Italy	ON502695	ON502633	ON524544	ON524571	ON934199	Vizzini *et al.* 2023
Lulesia fallax	*Clitocella fallax*	TO:AV5201320	Italy	ON502697	–	–	–	–	Vizzini *et al.* 2023
Lulesia fallax	*Clitocella fallax*	AMB:18377	Italy	–	–	ON524545	ON524572	ON934198	Vizzini *et al.* 2023
Lulesia fallax	*Rhodocybe fallax*	CBS:605.79	France	AF357018	–	–	–	–	Hofstetter *et al.* 2002
Lulesia fallax	*Clitopilus amarus*	A. d. Haan 98031	Belgium	KC885963	–	–	–	–	Morgado *et al.* 2016
Lulesia fallax	*Clitopilus amarus*	BR A. d. Haan 96-121 (HOLOTYPE)	Belgium	OP002024	OP002025	OP021856	–	–	Vizzini *et al.* 2023
Lulesia fallax	*Clitopilus fallax*	ME Noordeloos 1997173	Italy	–	GQ289209	GQ289275	–	–	Co-David *et al.* 2009

Species (revised name)	Label (GenBank)	Voucher	Country	GenBank Accession No.					Reference
				nrITS	nrLSU	*RPB2*	*TEF-1α*	*ATP6*	
Lulesia fallax	*Clitopilus scyphoides*	WU-MYC 0016359	Austria	ON922913	–	ON934196	–	–	Vizzini *et al.* 2023
Lulesia fallax	*Rhodocybe fallax*	CBS:129.63	France	AF357017	AF223166	EF421018	–	–	Hofstetter *et al.* 2002
Lulesia fallax	*Clitocella fallax*	O:F-88953	Norway	–	–	KC816936	KC816845	KC816767	Kluting *et al.* 2014
Lulesia fallax	*Clitocella fallax*	K:(M) 116541	Spain	–	–	KC816938	KC816847	KC816769	Kluting *et al.* 2014
Lulesia mundula	*Clitocella mundula*	HMJAU:27014	China	–	MN065722	MN148159	MN166270	MN133779	Jian *et al.* 2020
Lulesia mundula	*Clitocella mundula*	HMJAU:7275	China	–	MN065723	MN148160	MN166271	MN133780	Jian *et al.* 2020
Lulesia mundula	*Clitocella mundula*	HMJAU:7274	China	–	MN065724	MN148161	MN166272	MN133781	Jian *et al.* 2020
Lulesia mundula	*Clitocella mundula*	AMB:18367	Italy	ON502698	ON502635	ON524547	–	–	Vizzini *et al.* 2023
Lulesia mundula	*Clitopilus popinalis*	ME Noordeloos 9867	Austria	–	GQ289213	GQ289280	–	–	Co-David *et al.* 2009
Lulesia mundula	*Clitocella mundula*	AMB:18370	Italy	ON502700	ON502637	ON524549	–	–	Vizzini *et al.* 2023
Lulesia mundula	*Clitocella mundula*	AMB:18368 (NEOTYPE)	Italy	ON502699	ON502636	ON524548	–	–	Vizzini *et al.* 2023
Lulesia mundula	*Clitocella mundula*	AMB:18853	Italy	ON502701	ON502638	ON524550	ON524574	–	Vizzini *et al.* 2023
Lulesia mundula	*Clitocella mundula*	O:F-71544	Norway	–	–	KC816950	KC816860	KC816780	Kluting *et al.* 2014
Lulesia mundula	*Clitocella mundula*	TJB7115	USA: New York	–	–	KC816951	KC816861	KC816781	Kluting *et al.* 2014
Lulesia mundula	*Clitocella mundula*	TJB7161	USA: New York	–	–	KC816952	KC816862	KC816782	Kluting *et al.* 2014
Lulesia mundula	*Clitocella popinalis*	CORT:MC2-TRENT	Italy	–	–	KC816973	–	KC816798	Kluting *et al.* 2014
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18366 (EPITYPE)	Italy	ON502704		ON524553	ON524576	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18387	Italy	ON502705	ON502640	ON524554	–	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	AH:54311	Spain	ON502703	ON502639	ON524551	–	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	GM:081227-1	Spain	ON502706	ON502641	ON524555	–	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18392	Italy	ON502709	ON502643	ON524557	–	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	LIP:94112502	France	ON502702	–	–	–	–	Vizzini *et al.* 2023

Species (revised name)	Label (GenBank)	Voucher	Country	GenBank Accession No.					Reference
				nrITS	nrLSU	*RPB2*	*TEF-1α*	*ATP6*	
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18365	Italy	–	–	ON524552	ON524575	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Clitocella nigrescens*	AMB:18388	France	ON502707	ON502642	ON524556	–	–	Vizzini *et al.* 2023
Lulesia nigrescens	*Rhodocybe cupressicola*	MCVE:15200 (HOLOTYPE of *Rhodocybe cupressicola*)	Italy	ON502708	–	–	–	–	Vizzini *et al.* 2023
Lulesia obscura	*Clitocella obscura*	BRNM 666712	Czech Republic	ON502710	ON502644	ON524558	–	–	Vizzini *et al.* 2023
Lulesia obscura	*Clitocella obscura*	MK09051302 -BRNM:666712	Czech Republic	KX271753	–	–	–	–	Vizzini *et al.* 2016
Lulesia obscura	*Clitocella obscura*	PRM:899231	Czech Republic	ON502711	ON502645	ON524559	–	–	Vizzini *et al.* 2023
Lulesia obscura	*Clitocella obscura*	AMB:18856	Italy	ON502712	ON502646	ON524560	ON524577	–	Vizzini *et al.* 2023
Lulesia obscura	*Clitocella mundula*	O:F-19454	Norway	–	–	KC816954	KC816864	KC816784	Kluting *et al.* 2014
Lulesia obscura	*Clitocella mundula*	ANT150-HRL2111	Canada	MN992316	ON923665	ON934195	–	–	Vizzini *et al.* 2023
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:75548	China	MN061333	MN065727	MN148164	MN166275	MN133784	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:75664	China	MN061332	MN065726	MN148163	MN166274	MN133783	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:77899	China	–	MN065725	MN148162	MN166273	MN133782	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:78763 (HOLOTYPE)	China	–	MN065728	MN148165	MN166276	MN133785	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	KUN-HKAS:78876	China	MN061334	MN065729	MN148166	MN166277	MN133786	Jian *et al.* 2020
Lulesia orientalis	*Clitocella orientalis*	BJTC:FM1539	China	–	OL966947	OL989911	OL989921	–	Mao *et al.* 2022
Lulesia popinalis	*Clitocella popinalis*	O:F-252975a	Norway	ON502713	ON502647	ON524561	–	–	Vizzini *et al.* 2023
Lulesia popinalis	*Rhodocybe popinalis*	O:F-253176a	Norway	UDB017726	–	–	–	–	UNITE
Lulesia popinalis	*Rhodocybe popinalis*	O:F-252975b	Norway	UDB037336	–	–	–	–	UNITE
Lulesia popinalis	*Clitocella popinalis*	AMB:18369 (NEOTYPE)	Italy	ON502715	ON502649	ON524563	–	–	Vizzini *et al.* 2023
Lulesia popinalis	*Clitocella popinalis*	O:F-253176b	Norway	ON502714	ON502648	ON524562	–	–	Vizzini *et al.* 2023
Lulesia popinalis	*Clitocella mundula*	K:(M) 49620	United Kingdom	–	–	KC816948	KC816858	KC816778	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	K:(M) 143166	United Kingdom	–	–	KC816971	KC816878	KC816796	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	K:(M) 146162	United Kingdom	–	–	KC816970	KC816877	KC816795	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella mundula*	K:(M) 164736	United Kingdom	–	–	KC816949	KC816859	KC816779	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	K:(M) 167017	United Kingdom	–	–	KC816972	KC816879	KC816797	Kluting *et al.* 2014

Species (revised name)	**Label (GenBank)**	**Voucher**	**Country**	**GenBank Accession No.**					**Reference**
				nrITS	nrLSU	*RPB2*	*TEF-1α*	*ATP6*	
Lulesia popinalis	*Clitocella popinalis*	O:F-63376	Norway	–	–	KC816974	KC816880	KC816799	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	O:F-105360	Norway	–	–	KC816975	KC816881	KC816800	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	TJB6378	Switzerland	–	–	KC816976	KC816882	KC816801	Kluting *et al.* 2014
Lulesia popinalis	*Clitocella popinalis*	TB6378	Switzerland	–	AF261285	GU384654	–	–	Moncalvo *et al.* 2002, Baroni *et al.* 2011
Lulesia popinalis	*Clitocella popinalis*	AMB:18389	Italy	ON502716	ON502650	ON524564	–	–	Vizzini *et al.* 2023
Lulesia popinalis	*Clitocella popinalis*	AMB:18390	Italy	ON502717	ON502651	–	–	–	Vizzini *et al.* 2023
Lulesia popinalis	*Clitocella popinalis*	CL:911012-34	Switzerland	ON502718	ON502652	ON524565	–	–	Vizzini *et al.* 2023
Lulesia solaris	*Clitocella solaris*	LUG:19882 (HOLOTYPE)	Switzerland	ON922914	ON923666	ON934197	–	–	Vizzini *et al.* 2023
Lulesia sp.	*Clitocella fallax*	OKM:25668	USA: Oregon	–	–	KC816937	KC816846	KC816768	Kluting *et al.* 2014
Lulesia termitophila	*Clitocella termitophila*	JBSD 127398 ANGE264 (HOLOTYPE), CORT014751 (ISOTYPE)	Dominican Republic	**PP028782**	**PP028781**	MN893319	–	–	**This study**, Baroni *et al.* 2020

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