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ORIGINAL ARTICLE

Subsessila turbinata gen. et. sp. nov. (Beltraniaceae), a *Beltrania*-like fungus from Thailand

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Abstract A new monotypic *Beltrania*-like genus, *Subsessila*, with its type species *S. turbinata*, is described, illustrated and compared with similar genera. The new genus is introduced in the family Beltraniaceae based on phylogenetic analysis and morphological characters. *Subsessila* can be easily distinguished from other *Beltrania*-like genera by dark setae arising from radially lobed basal cells, mostly lacking macronematous conidiophores. Conidiogenous cells are ampulliform or doliiform and produce turbinate to clavate conidia with rostrate proximal end and rounded distal end. Evidence for establishment of the new genus is provided based on morphological comparison and DNA sequence data analyses.

Keywords *Beltrania* complex · Phylogeny · Taxonomy · Xylariales

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Introduction

Xylariales is a large order of perithecial ascomycetes with eight-spored unitunicate asci, usually with a J+ apical ring and ascospores with a prominent germ pore or germ slit and is accommodated in the subclass Xylariomycetidae (Smith et al. 2003; Senanayake et al. 2015; Maharachchikumbura et al. 2016). Asexual morphs of the Xylariales are usually hyphomycetous, with holoblastic conidiogenesis (Maharachchikumbura et al. 2015, 2016). Presently, there are 22 accepted families in the Xylariales, viz. Amphisphaeriaceae, Apiosporaceae, Bartaliniaceae, Beltraniaceae, Cainiaceae, Clypeosphaeriaceae, Coniocessiaceae, Diatrypaceae, Hyponectriaceae, Iodosphaeriaceae, Lopadostomaceae, Melogrammataceae, Microdochiaceae, Myelospermataceae, Pestalotiopsidaceae, Phlogicylindriaceae, Pseudomassariaceae, Requienellaceae, Robillardaceae, Sporocadaceae, Vialaeaceae and Xylariaceae (Maharachchikumbura et al. 2015, 2016).

A fungal tribe named Beltranieae Sacc. was established by Saccardo (1886) to accommodate a single genus *Beltrania* Penzig. Nannizzi (1934) introduced Beltraniaceae Nann. to accommodate *Beltrania* and some similar genera, and the tribe Beltranieae was treated as a synonym of this family. Crous et al. (2015b) emended the family Beltraniaceae and accepted *Beltrania*, *Beltraniella* Subram., *Beltraniopsis* Bat. & J.L. Bezerra, *Parapleurotheciopsis* P.M. Kirk and *Pseudobeltrania* Henn. They provided DNA sequence data to support the family. Crous et al. (2015b) proposed that three more genera, *Beltraniomyces* Manohar., D.K. Agarwal & Rao, *Porobeltraniella* Gusmão and *Subramaniomyces* Varghese & V.G. Rao, should be accepted in this family. Due to the lack of reliable strains and sequence data, they could not confirm the familial relationships of these genera within the Beltraniaceae. Maharachchikumbura et al. (2016)

accepted the genus *Subramaniomyces* within the family Beltraniaceae based on phylogenetic analysis. Rajeshkumar et al. (2016a) accepted the genera *Hemibeltrania* and *Porobeltraniella* and preliminarily confirmed the monophyly of all of the recognised genera based on phylogenetic analysis.

The asexual morphs in Beltraniaceae are hyphomycetous (Seifert et al. 2011; Crous et al. 2015b). Stromata are usually present. Setae are present or absent, branched or unbranched and usually with a radially lobed basal cell. The conidiophores are branched or unbranched, arising from the base of setae or separate, sometimes arising from radially lobed basal cells. The conidiogenous cells are monoblastic or polyblastic, sympodial, integrated or discrete and denticulate. Separating cells are present or absent, oval to subglobose, also with one to several denticles. Conidia are biconic, lageniform to navicular, hyaline to red-brown, generally with a lightly pigmented transverse band at the widest part of the conidium, rounded or 1-denticulate or rostrate at the base and spicate or apiculate or truncate at the apex (Crous et al. 2015b).

During a survey of hyphomycetes in Karst areas of Thailand, a *Beltrania*-like species was collected. It was shown to belong to a new genus in Beltraniaceae based on morphology and analyses of ITS and LSU sequence data. The natural classification of this new taxon is determined based on phylogenetic analysis and morphology.

The new taxon is morphologically similar to *Beltrania* and some similar genera, but its conidiophores and conidiogenous cells differ from all previously described genera of this group. We propose a new genus to accommodate the new fungus which is introduced here.

Materials and methods

Collection and isolation of fungi

Dead materials (stem, wood and leaves) from a variety of plants were randomly collected during July to August 2015 from Karst areas at Khao Lom Muak (11°47′3.96″–11.24″N, 99°48′49.13″–49′0.63″E), Prachuap Khiri Khan in Thailand. Samples were taken to the laboratory in zip-lock plastic bags for examination. The specimens were incubated in sterile moist chambers and examined using a Motic SMZ-168 series microscope (Speed Fair Co., China). Fungi were removed with a needle and placed in a drop of distilled water on a slide for morphological study. Photomicrographs of fungal structures were captured using a Nikon Eclipse 80i compound microscope (Nikon Co., Japan) with a Canon 450D digital camera (Canon Co., Japan). All measurements were made by the Tarosoft® Image FrameWork program (Tarosoft, Thailand). Photo-plates were made with Adobe Photoshop CS6 Extended version 13.0.1 (Adobe Systems, USA). Isolation onto potato dextrose agar (PDA) or malt extract agar (MEA) was performed by the single spore isolation method (Chomnunti et al. 2014; Dai et al. 2017). The herbarium material is deposited in the herbarium of Mae Fah Luang University (MFLU), Chiang Rai, Thailand and the herbarium of Kunming Institute of Botany, Chinese Academy of Sciences (HKAS), Kunming, China. Cultures are deposited at the Mae Fah Luang University Culture Collection (MFLUCC), Chiang Rai, Thailand and Kunming Institute of Botany, Chinese Academy of Sciences (KUMCC), Kunming, China. Faces of Fungi and Index Fungorum numbers are registered (Jayasiri et al. 2015; Index Fungorum 2016). Colours and colour codes were determined according to Kornerup and Wanscher (1978).

DNA extraction, PCR amplification and sequencing

Genomic DNA was extracted from fungal mycelium grown on PDA or MEA at room temperature with the Fungal gDNA Kit (BioMIGA, USA), according to the manufacturer's instructions. The internal transcribed spacer region of ribosomal DNA (ITS) and large subunit nuclear ribosomal DNA (LSU) genes were amplified via polymerase chain reaction (PCR) using the following primers: ITS5 and ITS4 (White et al. 1990) for ITS and LROR and LR5 (Vilgalys and Hester 1990) for LSU. The PCR products were sequenced with the same primers.

Phylogenetic analyses

Original sequences were checked using BioEdit version 7.0.5.3 (Hall 1999) and most reference sequences originated from previous publications, viz. Crous and Groenewald (2013), Crous et al. (2014, 2015a, b) and Maharachchikumbura et al. (2015). The remaining homologous sequences were obtained by BLAST searches (Altschul et al. 1990) from GenBank. All sequences used in this study are listed in Table 1. Alignments for each locus were done in MAFFT v7.212 (Katoh and Standley 2013) and manually verified in MEGA 6.06 (Tamura et al. 2013). Conserved blocks were selected from the initial alignments with Gblocks 0.91b (Castresana 2000). The interleaved NEXUS files were formatted with PAUP*4.0b10 (Swofford 2002) and manually formatted for Bayesian inference analyses. Bayesian inference (BI), maximum parsimony (MP) and maximum likelihood (ML) were used in this study for phylogenetic analyses. For Bayesian inference analysis, the best model of evolution was determined using MrModeltest v2 (Nylander 2004). Bayesian inference analysis was done with MrBayes v3.2.5 (Ronquist et al. 2012). Maximum parsimony analysis was performed in PAUP*4.0b10 (Swofford 2002). Maximum likelihood analysis was performed in raxmlGUI v1.3.1 (Silvestro and Michalak 2012). Phylogenetic trees were drawn with TreeView 1.6.6 (Page 1996).

Table 1 GenBank accession numbers of isolates used in this study

Families	Species	Culture accession no.	LSU	ITS	References
Amphisphaeriaceae	***Seimatosporium botan***	**NBRC 104200T**[a]	**AB593731**	**AB594799**	Tanaka et al. (2011)
	Seimatosporium discosioides	NBRC 104201	AB593732	AB594800	Tanaka et al. (2011)
	Seimatosporium lichenicola	NBRC 32625	AB593726	AB594794	Tanaka et al. (2011)
Apiosporaceae	*Apiospora tintinnabula*	ICMP 7019-96	DQ810216	–[b]	Unknown
	Arthrinium aureum	**CBS 244.83**[a]	**KF144935**	**AB220251**	Crous and Groenewald (2013)
	Arthrinium gutiae	**CBS 135835**[a]	**KR149063**	–[b]	Crous and Groenewald (2013)
	Arthrinium hydei	**CBS 114990**[a]	**KF144936**	**KF144890**	Crous and Groenewald (2013)
	Arthrinium kogelbergense	CBS 113332	KF144937	KF144891	Crous and Groenewald (2013)
	Arthrinium kogelbergense	**CBS 113333**[a]	**KF144938**	**KF144892**	Crous and Groenewald (2013)
Beltraniaceae	***Beltrania pseudorhombica***	**CBS 138003**[a]	**KJ869215**	**KJ869158**	Crous et al. (2014)
	Beltrania querna	ICMP 15825	–[b]	EF029240	Unknown
	Beltrania querna	BCRC 34620	–[b]	GU905994	Unknown
	Beltrania rhombica	Strain 10353	AB496423	–[b]	Shirouzu et al. (2010)
	Beltrania rhombica	CPC 27482	KX519521	KX519515	Rajeshkumar et al. (2016a)
	Beltraniella botryospora	**TUFC 10083**[a]	**AB496426**	–[b]	Shirouzu et al. (2010)
	Beltraniella carolinensis	IFO 9502	DQ810233	–[b]	Unknown
	Beltraniella endiandrae	**CBS 137976**[a]	**KJ869185**	**KJ869128**	Crous et al. (2014)
	Beltraniella portoricensis	BCRC 34590	–[b]	GU905993	Unknown
	Beltraniella portoricensis	NFCCI 3993	KX519522	KX519516	Rajeshkumar et al. (2016a)
	Beltraniopsis sp.	TUFC 10081	AB496424	–[b]	Shirouzu et al. (2010)
	Beltraniopsis neolitseae	**CBS 137974**[a]	**KJ869183**	**KJ869126**	Crous et al. (2014)
	Hemibeltrania cinnamomi	NFCCI 3695	KT119565	KT119564	Rajeshkumar et al. (2016b)
	Hemibeltrania cinnamomi	NFCCI 3997	KX519523	KX519517	Rajeshkumar et al. (2016a)
	Hemibeltrania sp.	CL12WA	–[b]	JQ621881	Unknown
	Porobeltraniella porosa	NFCCI 3994	KX519524	KX519518	Rajeshkumar et al. (2016a)
	Porobeltraniella porosa	NFCCI 3995	KX519525	KX519519	Rajeshkumar et al. (2016a)
	Porobeltraniella porosa	NFCCI 3996	KX519526	KX519520	Rajeshkumar et al. (2016a)
	Pseudobeltrania ocoteae	**CBS 140664**[a]	**KT950870**	**KT950856**	Crous et al. (2015b)
	Subramaniomyces fusisaprophyticus	CBS 418.95	EU040241	EU040241	Crous et al. (2007)
	Subsessila turbinata	**MFLUCC 15-0831**[a]	**KX762289**	**KX762288**	This study
Pestalotiopsidaceae	***Neopestalotiopsis aotearoa***	**CBS 367.54**[a]	**KM116247**	**KM199369**	Maharachchikumbura et al. (2014)
	Neopestalotiopsis eucalypticola	**CBS 264.37**[a]	**KM116256**	**KM199376**	Maharachchikumbura et al. (2014)
	Pestalotiopsis arceuthobii	**CBS 434.65**[a]	**KM116243**	**KM199341**	Maharachchikumbura et al. (2014)
	Pestalotiopsis arengae	**CBS 331.92**[a]	**KM116207**	**KM199340**	Maharachchikumbura et al. (2014)
	Pestalotiopsis camelliae	CBS 443.62	KM116225	KM199336	Maharachchikumbura et al. (2014)
	Pestalotiopsis chamaeropis	**CBS 186.71**[a]	**KM116210**	**KM199326**	Maharachchikumbura et al. (2014)
	Pseudopestalotiopsis cocos	**CBS 272.29**[a]	**KM116276**	**KM199378**	Maharachchikumbura et al. (2014)
Robillardaceae	***Robillarda africana***	**CBS 122.75**[a]	**KR873281**	**KR873253**	Crous et al. (2015a)
	Robillarda sessilis	CBS 101440	KR873283	KR873255	Crous et al. (2015a)
	Robillarda sessilis	**CBS 114312**[a]	**KR873284**	**KR873256**	Crous et al. (2015a)
Outgroup	*Anthostomella leucospermi*	CBS 110126	EU552100	EU552100	Marincowitz et al. (2008)

BCRC Bioresource Collection and Research Center, Taiwan, China; *CBS* CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands; *CPC* culture collection of Pedro Crous, housed at CBS; *ICMP* International Collection of Microorganisms from Plants, New Zealand; *IFO* Institute for Fermentation Culture Collection, Osaka, Japan; *MFLUCC* Mae Fah Luang University Culture Collection, Chiang Rai, Thailand; *NBRC* Distribution and Deposit of Biological Resources, Japan; *TUFC* Tottori University Fungal Culture Collection, Fungus/Mushroom Resource and Research Center, Tottori, Japan

[a] The ex-type and ex-epitype cultures are in **bold**

[b] No data in GenBank

Results

Molecular phylogeny

The aligned sequence matrix comprises LSU (848 bp) and ITS (633 bp) sequence data for 40 taxa and one outgroup taxon for a total of 1481 characters, of which 267 were parsimony-informative, 100 were parsimony-uninformative and 1114 characters were constant. The result of maximum likelihood (ML) analysis based on combined LSU and ITS sequence data consisting of five families (Amphisphaeriaceae, Apiosporaceae, Beltraniaceae, Pestalotiopsidaceae and Robillardaceae) within the order Xylariales is shown in Fig. 1.

In the present study, we found that the strain of *Subsessila turbinata* (MFLUCC 15-0831) grouped together with *Hemibeltrania* sp. (CL12WA) and *Hemibeltrania cinnamomi*

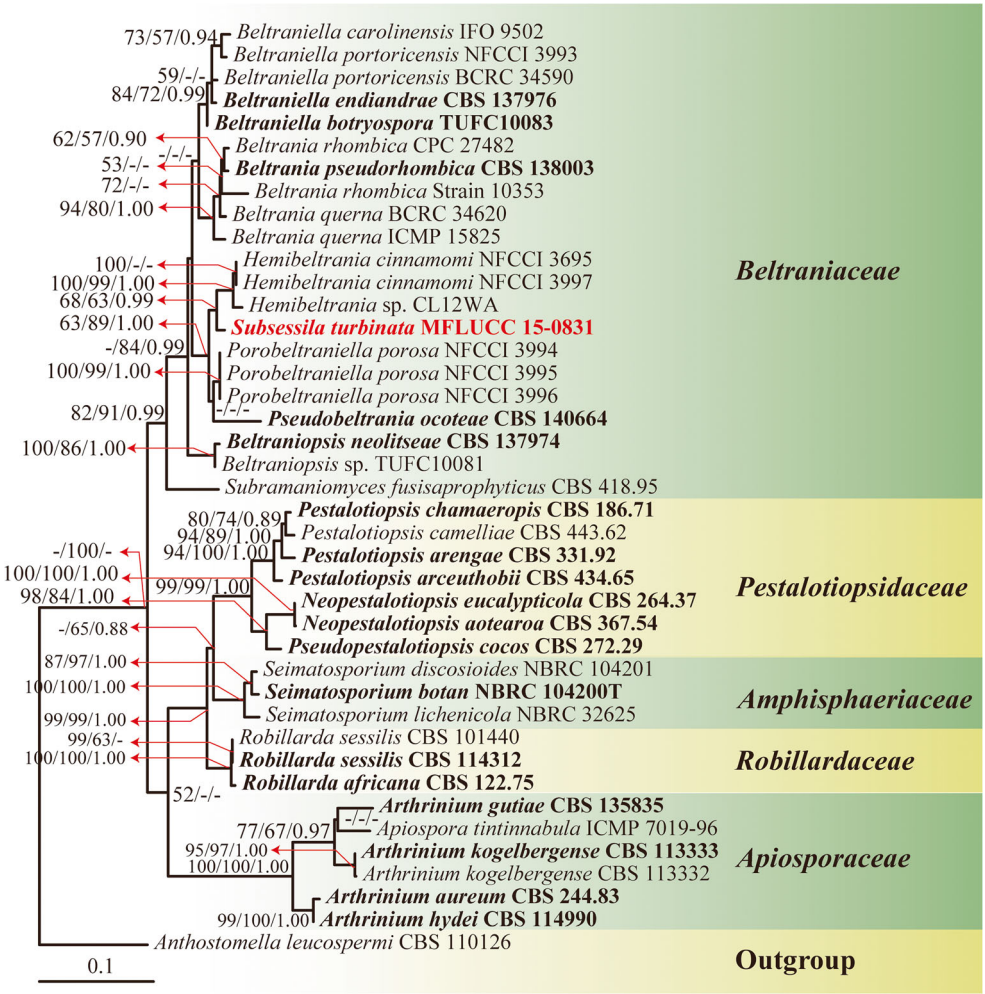

Fig. 1 Phylogenetic tree generated from maximum likelihood (ML) analysis based on combined LSU and ITS sequence data for some selected families within the order Xylariales. Bootstrap support values for maximum likelihood (ML) and maximum parsimony (MP) greater than 50% and Bayesian posterior probabilities greater than 0.8 are indicated above or below the nodes as MLBS/MPBS/PP. The ex-type strains are in **bold** and the new isolate is in **bold and red**. The tree is rooted with *Anthostomella leucospermi* (CBS 110126)

(NFCCI 3695 and NFCCI 3997) with 68% ML bootstrap support, 63% MP bootstrap support and 99% Bayesian posterior probabilities within the family Beltraniaceae (Fig. 1). The genera *Hemibeltrania*, *Porobeltraniella*, *Pseudobeltrania* and *Subsessila* clustered together with 63% ML bootstrap support, 89% MP bootstrap support and 100% Bayesian posterior probabilities.

Taxonomy

Subsessila C.G. Lin & K.D. Hyde, ***gen. nov.***

Index Fungorum number: IF552504; *Facesoffungi number*: FoF 02613

Etymology: In reference to the conidiophores which are mostly absent or reduced to conidiogenous cells.

Type species: *Subsessila turbinata* C.G. Lin & K.D. Hyde

Saprobic on plant host. **Asexual morph:** *Colonies* on plant substrate effuse, pale brown, hairy, velvety. *Mycelium* partly superficial and partly immersed. *Stroma* absent. *Setae* numerous, erect, arising from radially lobed basal cells, straight or slightly flexuous, unbranched, 2–4-septate, thick-walled, verrucose, pale to dark brown, swollen at the base, tapering towards the apex. *Conidiophores* mostly absent or reduced to conidiogenous cells; when present, arising from the basal cells of setae, simple, aseptate, subcylindrical, pale- to mid-brown, smooth. *Conidiogenous cells* polyblastic, discrete, determinate, ampulliform, doliiform, hyaline. *Separating cells* absent. *Conidia* aggregated, acrogenous, simple, dry, straight, smooth, thin-walled, turbinate to clavate, rostrate at proximal end, rounded at distal end, hyaline. **Sexual morph**: Undetermined.

Subsessila turbinata C.G. Lin & K.D. Hyde, ***sp. nov.*** (Fig. 2)

Index Fungorum number: IF552503; *Facesoffungi number*: FoF 02614

Etymology: In reference to the turbinate conidia.

Holotype: MFLU 15-3271

Saprobic on plant host. **Asexual morph:** *Colonies* on plant substrate effuse, pale brown (6C2), hairy, velvety. *Mycelium* partly superficial and partly immersed. *Stroma* absent. *Setae* numerous, erect, arising from radially lobed basal cells, straight or slightly flexuous, unbranched, 2–4-septate, thick-walled, verrucose, medium to dark brown (6C4 to 6F8), 50–280 μm long, swollen at the base and 4.5–13 μm wide, 2–

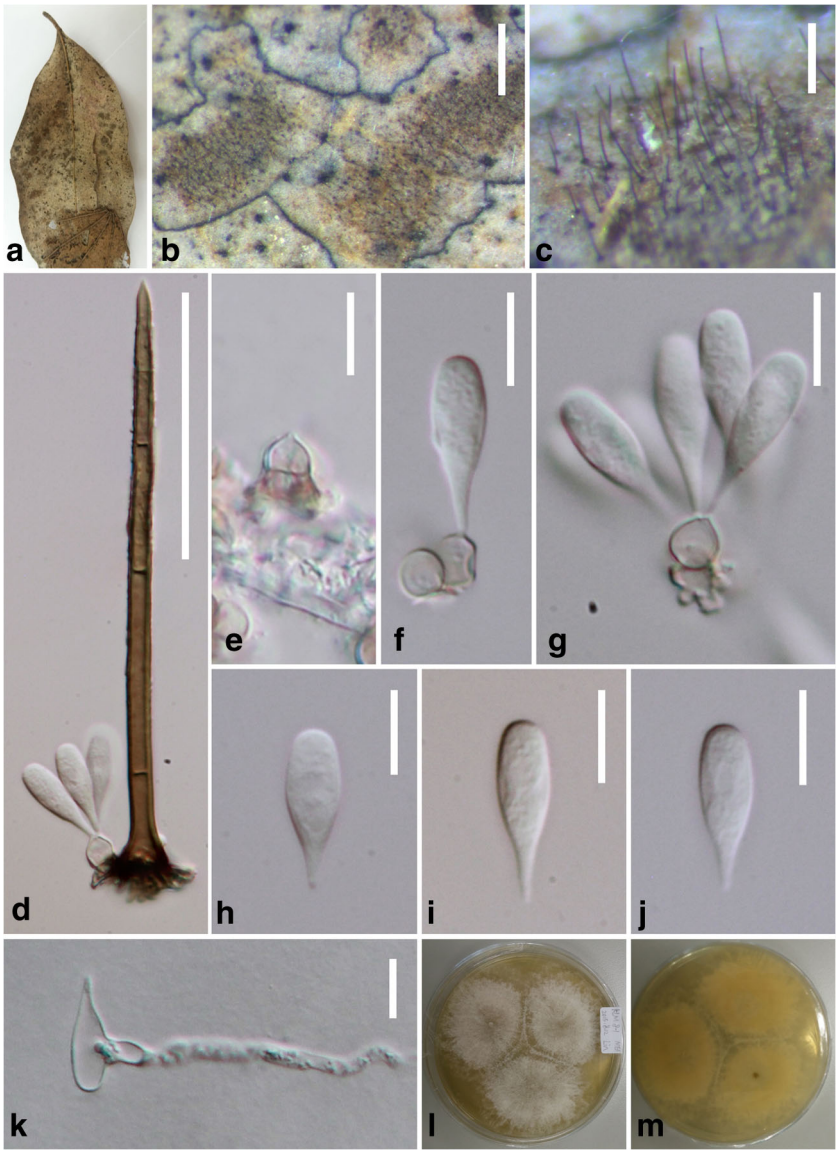

Fig. 2 *Subsessila turbinata* (holotype MFLU 15-3271). **a** Leaf material. **b**, **c** Conidiophores on the host surface. **d** Conidiophores, seta and conidia. **e** Short conidiophores with conidiogenous cell. **f**, **g** Conidiogenous cell and conidia. **h**–**j** Conidia. **k** Germinating conidium. **l**, **m** Colonies on MEA culture, **l** from above, **m** from below. Scale bars: **b** = 500 μm, **c** = 200 μm, **d** = 50 μm, **e**–**k** = 10 μm

7 μm wide just above the swollen base, tapering to a pointed apex. *Conidiophores* mostly absent and reduced to conidiogenous cells; if present, arising from basal cells of setae, simple, aseptate, subcylindrical, pale- to mid-brown (6C2 to 6C4), up to 6.5 μm long, 3–7.5 μm wide. *Conidiogenous cells* polyblastic, discrete, determinate, ampulliform, doliiform, hyaline, smooth, 4.5–6.5 μm ($\bar{x}$ = 5.5 μm, n = 30) long, 4–6 μm ($\bar{x}$ = 5.1 μm, n = 30) wide in the broadest part. *Separating cells* absent. *Conidia* aggregated, acrogenous, simple, dry, straight, smooth, thin-walled, turbinate to clavate, rostrate to pointed at proximal end, broadly rounded at distal end, hyaline, 14.5–20.5 μm ($\bar{x}$ = 17.70 μm, n = 50) long, 4.5–6.5 μm ($\bar{x}$ = 5.50 μm, n = 50) wide in the broadest part. **Sexual morph:** Undetermined.

Culture characteristics: Conidia germinating on MEA within 12 h. Colonies on MEA effuse, greyish white (−B1) from above, greyish yellow (2B5) from below, reaching a diam. of 2–3 cm in 20 days at 25 °C.

Material examined: THAILAND, Prachuap Khiri Khan, Khao Lom Muak, 11°47′3.96″–11.24″N, 99°48′49.13″–49′0.63″E, on unidentified decaying leaf, 29 July 2015, Chuan-Gen Lin, KLM 8-1 (MFLU 15-3271, **holotype**; HKAS 96229, **isotype**), ex-type living culture MFLUCC 15-0831, KUMCC 16-0126.

Discussion

In the tree generated from the maximum likelihood (ML) analysis based on combined ITS and LSU sequence data for the order Xylariales, *Subsessila turbinata* (MFLUCC 15-0831) grouped together with *Hemibeltrania* sp. (CL12WA)

Table 2 Synopsis of *Beltrania* and some similar genera [updated from Manoharachary et al. (2003) and Dubey et al. (2011)]

Genera	Setae	Conidiophores	Conidiogenous cells	Separating cells	Conidia
Beltrania	Mostly unbranched, next to conidiophores, arising from radially lobed cells	Unbranched, arising from basal cells of setae or from radially lobed cells	Polyblastic, sympodial, terminal and intercalary in conidiophores, clavate or cylindrical, denticulate	When present swollen	Acropleurogenous, biconic, spicate or apiculate, hyaline transverse band not median
Beltraniella	Sterile extensions of conidiophores or among conidiophores or absent, unbranched, arising from radially lobed basal cells	Branched, often with setiform apex, arising from radially lobed basal cells	Polyblastic, sympodial, on branches or discrete, arranged penicillately, denticulate	When present swollen	Acropleurogenous, turbinate or biconic, often caudate, distinct hyaline transverse band
Beltraniomyces	Absent	Unbranched, geniculate, not arising from radially lobed basal cells	Polyblastic, integrated, sympodial, denticles absent	Absent	Acrogenous and acropleurogenous, almost symmetrical biconic, non-spicate, median transverse hyaline band
Beltraniopsis	Unbranched, part of conidiophores or beside conidiophores, arising from radially lobed basal cells	Branched, often with a setiform apex, arising from radially lobed basal cells	Polyblastic, integrated, terminal on branches, sympodial, doliiform, denticulate	Swollen	Acropleurogenous, biconic, not symmetrical, rostrate, hyaline transverse band not median
Beltramono	Absent	Unbranched or rarely branched, usually geniculate or flexuous sometimes straight, arising singly and directly from the cells of superficial mycelium	Monoblastic, terminal, integrated, determinate, non-denticulate	Swollen, ellipsoidal to spherical	Acrogenous, simple biconic, asymmetrical apiculate smooth with hyaline transverse bands, one in the widest part and another just above the widest part, bands sometimes in the form of annular ring
Hemibeltrania	Absent or present	Unbranched or sparingly branched, straight or flexuous, rather pale olivaceous brown, smooth, arising from radially lobed basal cells	Monoblastic and polyblastic, integrated, terminal becoming intercalary, sympodial, cylindrical, denticulate; denticles conical to cylindrical	Absent	Acropleurogenous, broadly ellipsoidal, limoniform, ovoid, obovoid, cymbiform, navicular, biconic or fusiform, pale olivaceous, smooth, 0-septate. Without transverse band
Kiliophora	Absent extension of conidiophores	Unbranched or sparingly branched, setiform, not arising from radially lobed basal cells	?Polytretic, formed about midway up the conidiophore, discrete	Absent	Acropleurogenous, subhyaline to pale brown, fusiform to broadly spindle-shaped, without transverse band
Maxibeltrania	Arising from a radially lobed base	Unbranched, arising from the setae basal cells	Monoblastic, integrated, elongating laterally of the previous fertile apical locus, endowed with cicatrised locus	Absent	Acropleurogenous, biconic, the apex acute rostrate, with subhyaline transverse band just above the middle part
Parabeltrania	None or unbranched extension of conidiophores	Unbranched, brown, arising from radially lobed basal cells	Sympodial, ?tretic, scars, intercalary in conidiophores, brown	Absent	Conical, brown, with a subapical hyaline band
Porobeltraniella	Pale brown extensions of conidiophores, arising from radially lobed basal cells	Unbranched or verticillate, setiform, erect, arising from radially lobed basal cells	Polyblastic, continuous, discrete, terminal and intercalary in conidiophores, denticulate, subhyaline to pale brown	Present or absent	Solitary or continuous, proximate end rostrate, distal end truncate, turbinate, smooth or finely verrucose with circular pores near the broadest part
Pseudobeltrania	Absent	Unbranched, arising from radially lobed basal cells	Polyblastic, sometimes monoblastic in a whorl, cylindrical or clavate, denticles large	Absent	Acropleurogenous, or acrogenous, biconic, apiculate, median transverse hyaline band

Table 2 (continued)

Genera	Setae	Conidiophores	Conidiogenous cells	Separating cells	Conidia
Rhombostilbella	Absent	Sparingly branched, hyaline, not arising from radially lobed basal cells	Polyblastic, sympodial, conspicuous denticles, hyaline	Absent	Biconic or rhomboid, hyaline, without transverse band
Scolecobeltrania	With or without radially lobed basal cell	Mononematous, branched, not arising from radially lobed basal cells	Monoblastic and polyblastic, discrete, sympodial, denticulate	Absent	Scolecosporous, sigmoid, vermiform to long cylindrical, curved or sinuate, brown to olivaceous, always with several hyaline or subhyaline transverse bands, smooth or verruculose
Subsessila	Numerous, erect, arising from radially lobed basal cells	Mostly absent or reduced to conidiogenous cells; when present, arising from the basal cells of setae, simple, aseptate, subcylindrical, pale- to mid-brown, smooth, short	Polyblastic, discrete, determinate, terminal, ampulliform, doliiform, hyaline	Absent	Aggregated, acrogenous, simple, dry, straight, smooth, thin-walled, turbinate to clavate, rostrate at proximal end, rounded at distal end, hyaline

and *Hemibeltrania cinnamomi* (NFCCI 3695 and NFCCI 3997) with 100% ML bootstrap support, 99% MP bootstrap support and 100% Bayesian posterior probabilities within the family Beltraniaceae (Fig. 1). *Subsessila* differs from *Hemibeltrania* and *Pseudobeltrania* by the absence of distinct conidiophores, which, whenever present, are very short and arise from the basal cells of setae; terminal, ampulliform, doliiform, hyaline conidiogenous cells and turbinate to clavate, subhyaline, smooth conidia which are rostrate to pointed at the proximal end and broadly rounded at the rostrate distal end. In addition, *Subsessila* has numerous, unbranched setae arising from radially lobed basal cells. Stroma and separating cells are not observed in these three genera.

Morphologically, *Subsessila* is similar to several genera within the family Beltraniaceae, viz. *Beltrania*, *Beltraniella*, *Beltraniopsis* and *Porobeltraniella*, in having dark setae and conidiophores arising from radially lobed basal cells (Fig. 2). However, *Beltrania*, *Beltraniella*, *Beltraniopsis* and *Porobeltraniella* have distinct, swollen separating cells, and conidia of these four genera are turbinate or biconic, with a hyaline transverse band or several equatorial hyaline pores, whereas separating cells are not present in *Subsessila* and the conidia are turbinate to clavate, with a rostrate to pointed proximal end and rounded distal end. The most distinguishable characters that separate *Subsessila* from *Beltrania* and other similar genera are the absence of distinct conidiophores and conidia without a hyaline transverse band in the new genus.

With the above combination of morphological features and phylogenetic analysis, we place the new genus *Subsessila* within the family Beltraniaceae.

Presently, 14 genera, including our new genus, have some similar characters that are present in the "*Beltrania* complex", viz. *Beltrania* Penzig, *Beltraniella* Subram., *Beltraniomyces* Manohar., D.K. Agarwal & Rao, *Beltraniopsis* Bat. & J.L. Bezerra, *Beltramono* Dubey, Pandey & Manohar., *Hemibeltrania* Piroz., *Kiliophora* Kuthub. & Nawawi, *Maxibeltrania* Rambelli, *Parabeltrania* Rambelli, *Porobeltraniella* Gusmão, *Pseudobeltrania* Henn., *Rhombostilbella* Zimm., *Scolecobeltrania* Iturr., R.F. Castañeda & R. Fernández and *Subsessila*. A synopsis of *Beltrania* and similar genera is provided in Table 2. These genera have unbranched or branched conidiophores and/or setae arising from radially lobed basal cells, with or without swollen separating cells, and biconic conidia with or without a hyaline equatorial or sub- or supraequatorial band. Presently, six of them, viz. *Beltrania*, *Beltraniella*, *Beltraniopsis*, *Hemibeltrania*, *Porobeltraniella* and *Pseudobeltrania*, are accepted in the family Beltraniaceae.

Kendrick (1980) proposed that the genera in the *Beltrania* complex must possess any three of the five following features: (1) dark setae; (2) setae or conidiophores with radially lobed bases; (3) swollen separating cells; (4) biconic conidia; (5) conidia

Table 3 Salient features of *Beltrania* and some similar genera [updated from Kendrick (1980)]

	Dark setae	Setae or conidiophores with radially lobed bases	Swollen separating cells	Biconic conidia	Conidia with a hyaline equatorial band
Beltrania	√	√	√	√	√
Beltraniella	√	√	√	√	√
Beltraniomyces	×	×	×	√	√
Beltraniopsis	√	√	√	√	√
Beltramono	×	×	√	√	√
Hemibeltrania	×	√	×	×	×
Kiliophora	√	×	×	×	×
Maxibeltrania	√	√	×	√	√
Parabeltrania	√	√	×	×	√
Porobeltraniella	√	√	√	×	×
Pseudobeltrania	×	√	×	√	√
Rhombostilbella	×	×	×	√	×
Scolecobeltrania	√	√	×	×	√
Subsessila	√	√	×	×	×

with a hyaline equatorial band. There are nine genera showing *Beltrania*-like morphological features (Table 3), viz. *Beltrania*, *Beltraniella*, *Beltraniopsis*, *Beltramono*, *Maxibeltrania*, *Parabeltrania*, *Porobeltraniella*, *Pseudobeltrania* and *Scolecobeltrania*. Within this, *Beltraniomyces*, *Hemibeltrania*, *Kiliophora*, *Rhombostilbella* and *Subsessila* show some differences in that *Beltraniomyces* and *Subsessila* have only two of those characteristics, whereas *Hemibeltrania*, *Kiliophora* and *Rhombostilbella* have only one of those characteristics.

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