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Two new thermophilic species of *Myceliophthora* from soil and compost piles

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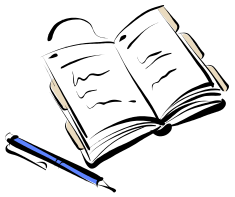
Summary



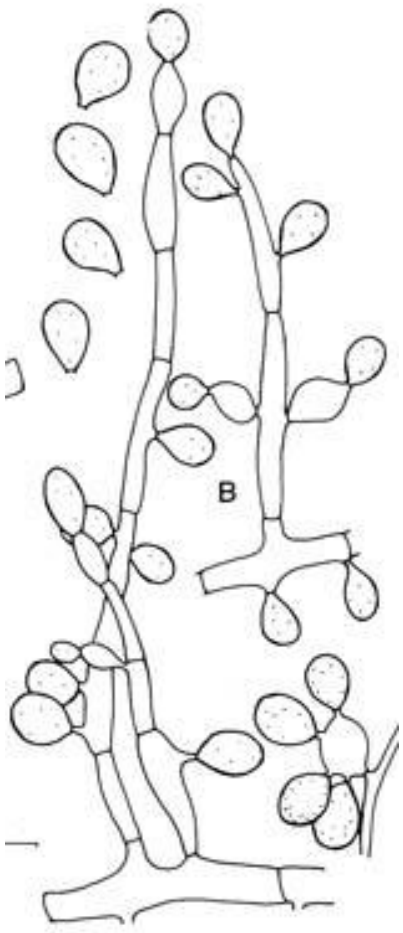
- The genus *Myceliophthora*
- Our study...
- Methods
- Results and discussion

The genus *Myceliophthora*

- Type:

Costantin (1892): *Myceliophthora lutea*

Mat disease of mushrooms
(Vert-de-gris)

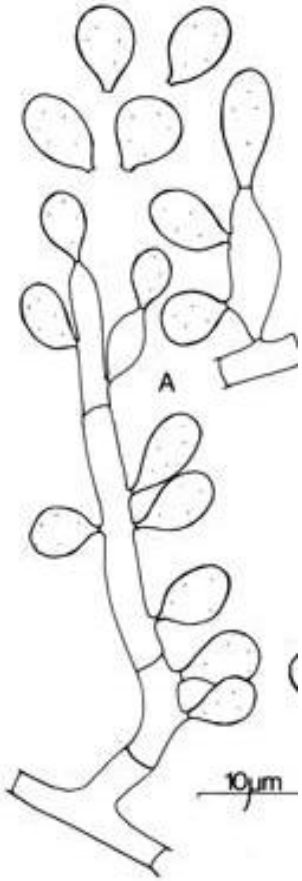


van Oorschot (1980)

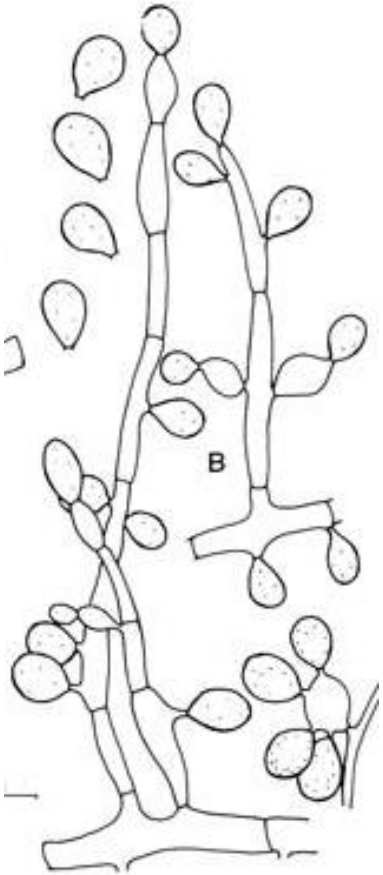
- Carmichael (1962): transferred to *Chrysosporium* sp.

The genus *Myceliophthora*

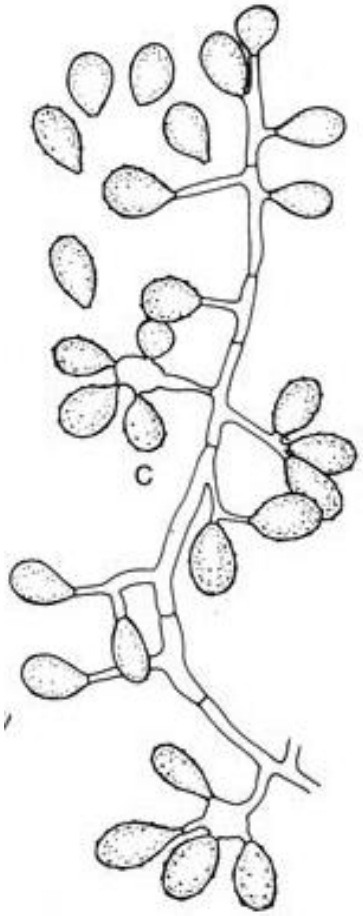
- van Oorschot (1977): reintroduced the genus



M. fergusii



M. lutea



M. thermophila

The genus *Myceliophthora*

van Oorschot (1980): revision

Myceliophthora spp.	Teleomorph	Source
M. thermophila	*Corynascus heterothallicus*	soil
M. fergusii	*Corynascus thermophilus*	compost pile
M. lutea	unknown	cultivated mushrooms
M. vellera	unknown	soil
Myceliophthora anamorph	*Corynascus sepedonium*	soil, seeds
Myceliophthora anamorph	*Corynascus novoguineensis*	soil
Myceliophthora anamorph	*Arthroderma tuberculatum*	soil, feathers
Myceliophthora anamorph	*Ctenomyces serratus*	soil

The genus *Myceliophthora*

McGinnis et al. (1992), Siegler et al. (1998), Vidal et al. (2000)

1. anamorphs of Sordariales
2. Conidia with narrow basal attachments, borne directly on hyphae or pedicels or ampulliform swellings
3. Cellulolytic
4. Thermotorelant and thermophilic

The genus *Myceliophthora*

Currently:

4 species and several unnamed anamorphs

Myceliophthora spp.	Teleomorph	Source
M. thermophila	*Corynascus heterothallicus*	soil
M. fergusii	*Corynascus thermophilus*	compost pile
M. lutea	unknown	cultivated mushrooms
M. hinnulea	unknown	soil
Myceliophthora anamorph	*Corynascus sepedonium*	soil, seeds
Myceliophthora anamorph	*Corynascus novoguineensis*	soil
unknown	*Corynascus sexualis*	soil
Myceliophthora anamorph	*Corynascus similis*	soil
Myceliophthora anamorph	*Corynascus verrucosus*	soil

Summary

- The genus *Myceliophthora*

- Our study…

- Methods

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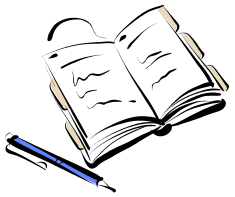
Our study

- During a survey of thermophilic fungi for biotechnological applications, four isolates exhibited high **cellulolytic** (Moretti 2010) and proteolytic (Zanphorlin et al. 2010) activities

- Here, we propose two new species to accommodate these isolates

Summary



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Methods

Compost piles
Site: Olímpia, SP

Cultivated soil
Site: Ubarana, SP

Isolation

Characterization

Methods

Morphological

Macro and micromorphology: were observed of cultures grown on MA 2% and PDA at 45° C.

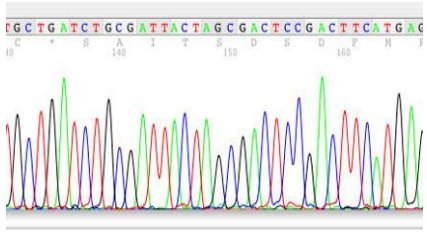
Radial growth: was determined on MEA, OA, PCA and PDA at 25, 36 and 45° C.

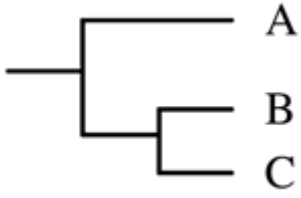
Methods

Molecular

Amplification of ITS rDNA and D1/D2 26S rDNA

DNA sequencing (Sanger method)



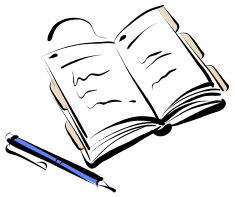


BLAST$_N$ NCBI – GenBank

Phylogenetic analysis - NJ

PAUP software v.4.b10

Summary



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$BLAST_N$ NCBI – GenBank results

Isolate	D1/D2 26S rDNA			ITS rDNA		
	length	%	GenBank closest relative	length	%	GenBank closest relative
M7.7	462	100	*Corynascus sepedonium* FMR9123 (FJ666364)	457	99	*Myceliophthora* sp. T41 (FJ548836)
F.2.1.1	508	98	*Corynascus sepedonium* FMR9123 (FJ666364)	477	99	*Myceliophthora* sp. T31 (FJ548837)
F.2.1.3	518	98	*Corynascus sepedonium* FMR9123 (FJ666364)	415	100	*Myceliophthora* sp. T31 (FJ548837)
F.2.1.4	491	99	*Corynascus sepedonium* FMR9123 (FJ666364)	492	99	*Myceliophthora* sp. T31 (FJ548837)

compost pile

soil

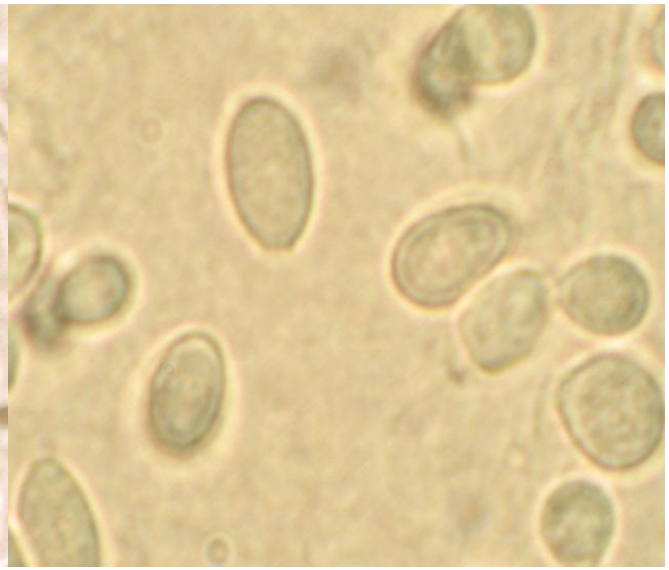
Myceliophthora olimpiensis sp. nov.

Teleomorph: unknown
Type: **Brasil**: Olímpia-SP, ex compost pile, 04/24/09, Moretti (M.7.7.)

Remarks: colonies plane, pale brown. Conidia clavate or obovoid, with narrow truncate base, sessile or on ampulliform swellings (sometimes in chains), smooth walled, 5.65-7.91 x 3.39-4.52 µm.

culture on PDA

conidiophores



conidia

Myceliophthora olimpiensis sp. nov.

Radial growth (mm) after 3 days of incubation

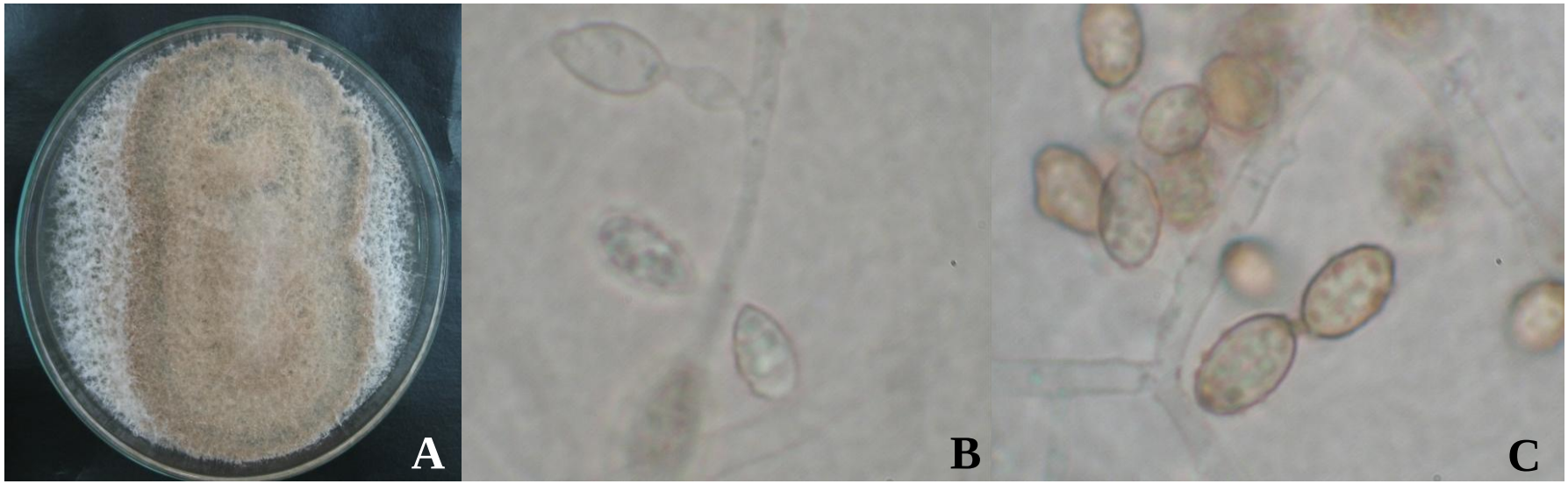
Media	Temperature (º C)		
	25	36	45
MEA	6,83 ± 0,40	34,81 ± 1,94	78,16 ± 2,22
OA	6,16 ± 0,75	26,83 ± 1,32	75,16 ± 1,94
PCA	5,33 ± 1,21	30,00 ± 0,63	90,00 ± 0,00
PDA	3,83 ± 0,75	30,66 ± 0,81	70,50 ± 5,08

Myceliophthora ubaranaensis sp. nov.

Teleomorph: unknown

Type: **Brasil**: Ubarana-SP, ex cultivated soil, 05/14/09, Moretti (F.2.1.4.)

Remarks: colonies floccose, pale brown, reverse uncolored. Conidia ellipsoid or obovoid, with truncate base, sessile or on ampulliform swellings (sometimes in chains), rough walled, 5.0-6.41 x 3.39-4.52 µm.



culture on PDA conidiophores conidia

Myceliophthora ubaranaensis sp. nov.

Radial growth (mm) after 3 days of incubation

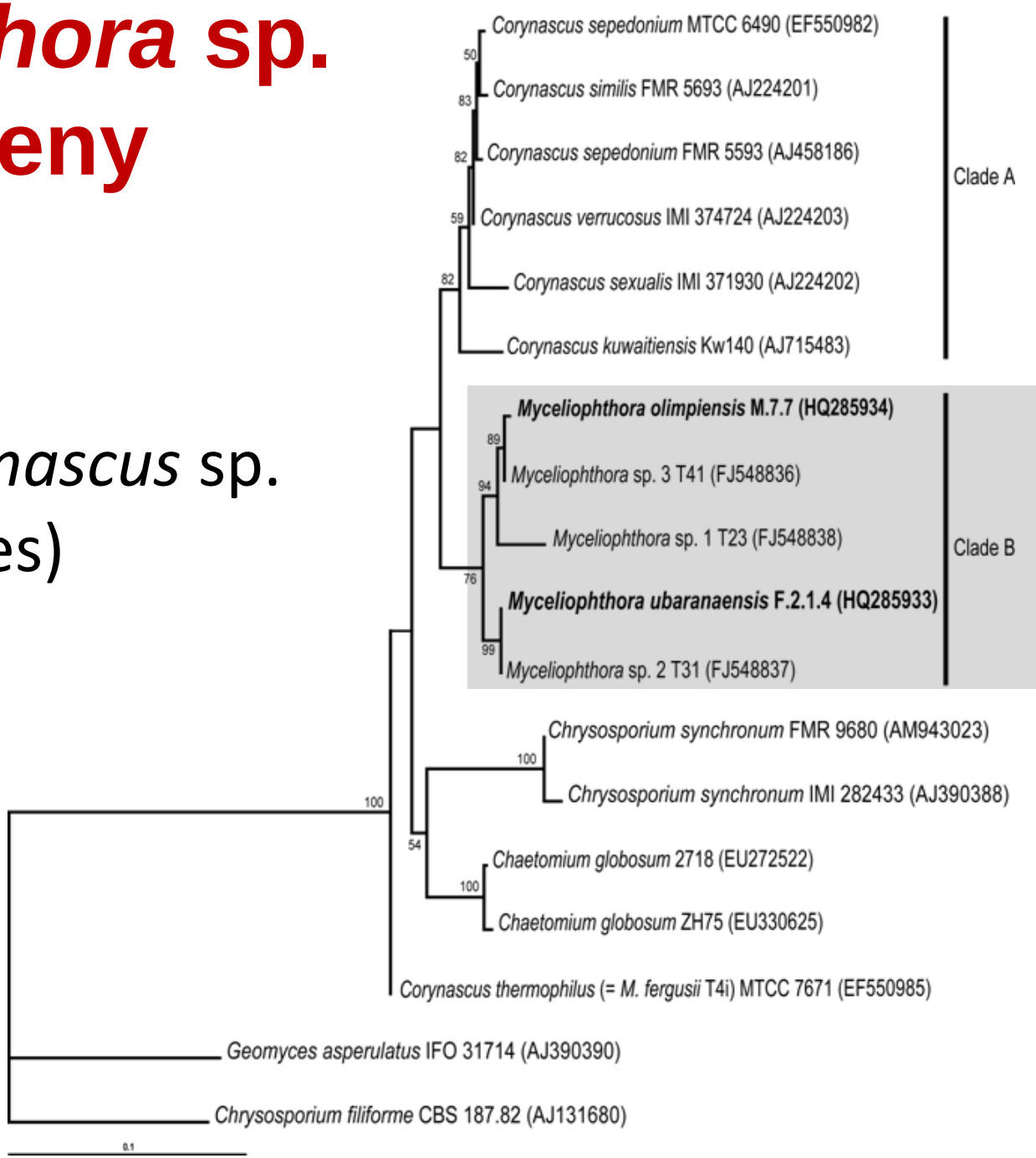
Media	Temperature (º C)		
	25	36	45
MEA	5,16 ± 0,75	32,00 ± 1,89	90,00 ± 0,00
OA	5,00 ± 1,54	25,83 ± 1,60	75,00 ± 7,64
PCA	4,50 ± 0,54	21,33 ± 1,03	62,33 ± 2,06
PDA	3,16 ± 1,16	25,16 ± 0,75	71,83 ±3,60

Morphological comparisons

Myceliophthora	Optimum growth (° C)	Colony aspect	Conidia	Teleomorph
M. olimpiensis	45	plane, pale brown	obovoid-ellipsoid, smooth-walled, 5.65-7.91 x 3.39-4.52 µm	unknown
M. ubaranaensis	45	floccose, pale brown	obovoid-ellipsoid, rough-walled, 5-6.4 x 3.39-4.52 µm	unknown
M. fergusii	45	floccose, pinkish-cream	pyriform-clavate, smooth, 4.8-12 x 2.8-5.2 µm	*C. thermophilus*
M. hinnulea	40	Plane, red	pyriform-ovate, verrucose, 8-9 x 6-7.5 µm	unknown
M. lutea	33	Felty, pale yellow	pyriform-globose, smooth, 3.8-9 X 3-6 µm	unknown
M. thermophila	33 - 36	Woolly, pale brown	pyriform-obovoid, smooth, 4.5-11 x 3-4.5 µm	*C. heterothallicus*

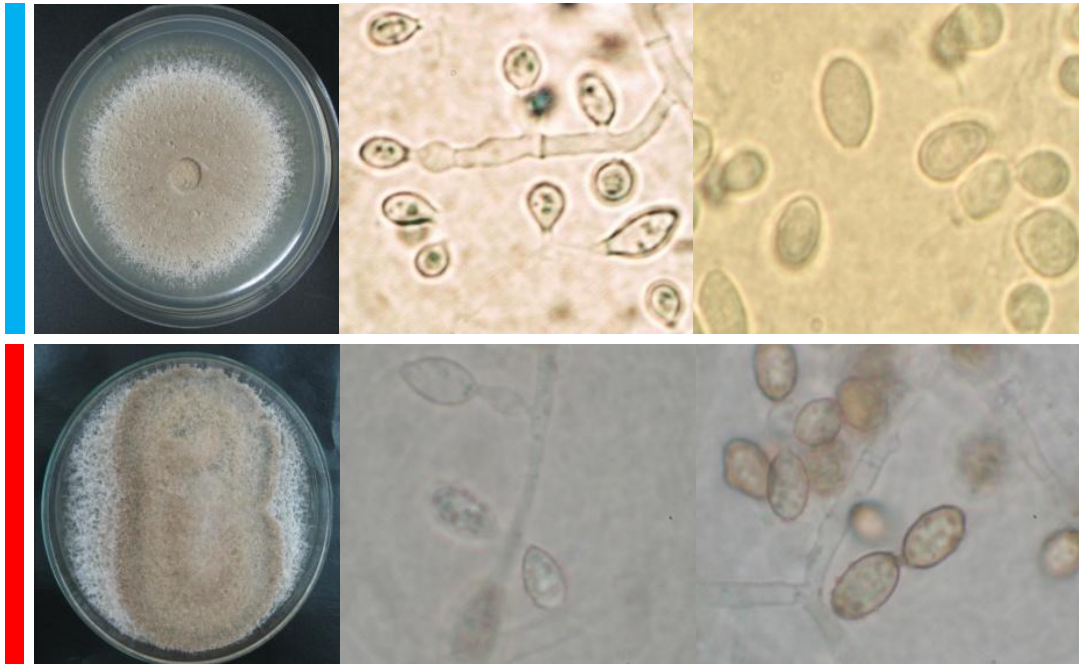
Myceliophthora sp. phylogeny

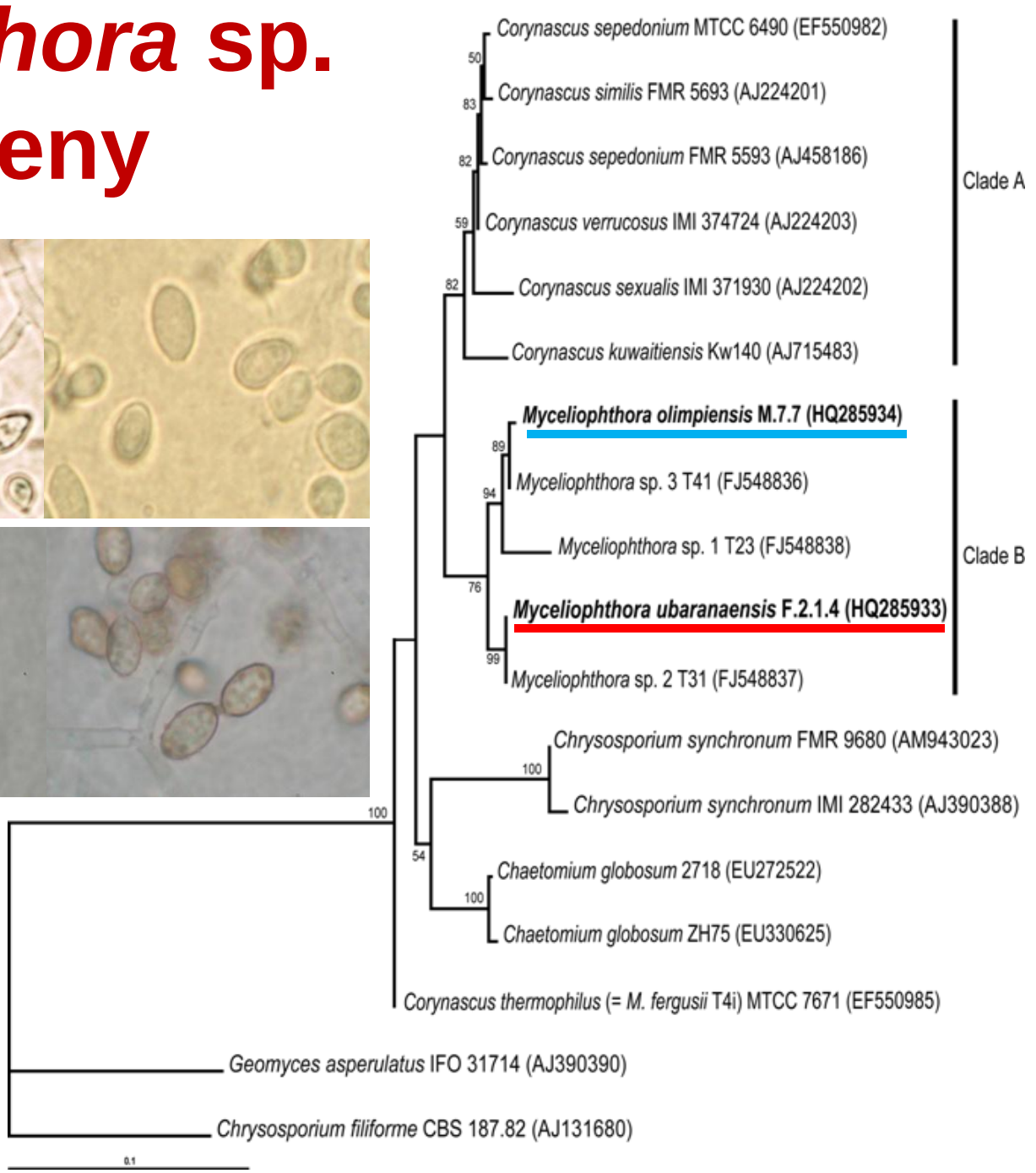
Affinity with *Corynascus* sp. (Sordariales)



Neighbor-joining tree of *Myceliophthora* isolates inferred from a 476-base-pair fragment of ITS-rDNA. Numbers on branches are bootstrap support values derived from 1000 pseudoreplicates.

Myceliophthora sp. phylogeny





Neighbor-joining tree of *Myceliophthora* isolates inferred from a 476-base-pair fragment of ITS-rDNA. Numbers on branches are bootstrap support values derived from 1000 pseudoreplicates.

Summary

- *M. olimpiensis* sp. nov. – compost piles

- *M. ubaranaensis* sp. nov. – soil samples

- Thermophilic with distinct morphological and molecular markers

- Both are cellulolytic as well as proteolytic strains (data not shown).

Acknowledgments

Thank you!