

Table S1. Accession Numbers of TPPPs shown in Figures 2-4

Name on Figures	Species	Class (in Chytridiomycota)	NCBI Accession Number
Chytriomycesc1	<i>Chytriomyces confervae</i>	Chytridiales	TPX65513
Chytriomycesc3	<i>Chytriomyces confervae</i>	Chytridiales	TPX72533
Chytriomycesh1	<i>Chytriomyces hyalinus</i>	Chytridiales	KAJ3402877
Chytriomycesh3	<i>Chytriomyces hyalinus</i>	Chytridiales	KAJ3228515
Chytriomycesh4	<i>Chytriomyces hyalinus</i>	Chytridiales	KAJ3261263
CHYTRIOMYCESH7	<i>Chytriomyces hyalinus</i>	Chytridiales	KAJ3249223
Chytriomycescf1	<i>Chytriomyces cf. hyalinus</i> JEL632	Chytridiales	KAI8832920
Chytriomycescf3	<i>Chytriomyces cf. hyalinus</i> JEL632	Chytridiales	KAI8842263
CHYTRIOMYCESCF4	<i>Chytriomyces cf. hyalinus</i> JEL632	Chytridiales	KAI8827812
Chytriomycessp1	<i>Chytriomyces sp.</i> MP71	Chytridiales	KAI8614413
Chytriomycessp2	<i>Chytriomyces sp.</i> MP71	Chytridiales	KAI8607417
CHYTRIOMYCESSP3	<i>Chytriomyces sp.</i> MP71	Chytridiales	KAI8613955
Chytridium1	<i>Chytridium lagenaria</i>	Chytridiales	KAI8852913
Chytridium2	<i>Chytridium lagenaria</i>	Chytridiales	KAI8844202
Chytridium3	<i>Chytridium lagenaria</i>	Chytridiales	KAI8846486
Chytridialesp1	<i>Chytridiales sp.</i> JEL 0842	Chytridiales	KAJ3413833
Chytridialesp2A	<i>Chytridiales sp.</i> JEL 0842	Chytridiales	KAJ3407993
Chytridialesp2B	<i>Chytridiales sp.</i> JEL 0842	Chytridiales	KAJ3407993
Siphonaria1	<i>Siphonaria sp.</i> JEL0065	Chytridiales	KAJ3031065
Siphonaria2	<i>Siphonaria sp.</i> JEL0065	Chytridiales	KAJ3007381
Siphonaria3	<i>Siphonaria sp.</i> JEL0065	Chytridiales	KAJ3006724
Podochytrium1	<i>Podochytrium sp.</i> JEL0797	Chytridiales	KAJ3066530
Podochytrium2	<i>Podochytrium sp.</i> JEL0797	Chytridiales	KAJ3077393
Obelidium1	<i>Obelidium mucronatum</i>	Chytridiales	KAI9351240
Obelidium2	<i>Obelidium mucronatum</i>	Chytridiales	KAI9342285
OBELIDIUM3	<i>Obelidium mucronatum</i>	Chytridiales	KAI9342551
Physocladia1	<i>Physocladia obscura</i>	Chytridiales	KAJ3142486
Physocladia2	<i>Physocladia obscura</i>	Chytridiales	KAJ3129104
Entophlyctissp1	<i>Entophlyctis sp.</i> JEL0112	Chytridiales	KAJ3379674
Entophlyctissp2	<i>Entophlyctis sp.</i> JEL0112	Chytridiales	KAJ3379779
Entophlyctissp3	<i>Entophlyctis sp.</i> JEL0112	Chytridiales	KAJ3385504.1
Entophlyctisl1	<i>Entophlyctis luteolus</i>	Chytridiales	KAJ3345323
Entophlyctisl2	<i>Entophlyctis luteolus</i>	Chytridiales	KAJ3356088
Entophlyctisl5	<i>Entophlyctis luteolus</i>	Chytridiales	KAJ3203053
Entophlyctisl6	<i>Entophlyctis luteolus</i>	Chytridiales	KAJ3346555
Entophlyctish	<i>Entophlyctis helioformis</i>	Rhizophydiales	KAI8924042
Zopfochytrium1	<i>Zopfochytrium polystomum</i>	Chytridiales	KAI9357369
Zopfochytrium2	<i>Zopfochytrium polystomum</i>	Chytridiales	KAI9325442
RHIZOCLOSMATIUMG1	<i>Rhizoclosmatium globosum</i>	Chytridiales	ORY49990
Rhizoclosmatiumg2	<i>Rhizoclosmatium globosum</i>	Chytridiales	ORY45507
RHIZOCLOSMATIUMh	<i>Rhizoclosmatium hyalinum</i>	Chytridiales	KAJ3081290
Rhizoclosmatiumsp	<i>Rhizoclosmatium sp.</i> JEL0117	Chytridiales	KAJ3292619
Phlyctochytriumb	<i>Phlyctochytrium bullatum</i>	Chytridiales	KAJ3113561

Phlyctochytriuma	<i>Phlyctochytrium arcticum</i> (<i>Triparticalcar arcticum</i>)	Spizellomycetales	KAI9095929
Irineochytrium	<i>Irineochytrium annulatum</i>	Chytridiales	KAJ3192112
Dinochytrium1	<i>Dinochytrium kinnereticum</i>	Chytridiales	KAJ3213605
DINOCHYTRIUM2	<i>Dinochytrium kinnereticum</i>	Chytridiales	KAJ3212964
Cladochytriumt1	<i>Cladochytrium tenue</i>	Chytridiales	KAJ1546407
Cladochytriumt2	<i>Cladochytrium tenue</i>	Chytridiales	KAJ1546407
Cladochytriumr	<i>Cladochytrium replicatum</i>	Cladochytriales	KAI8806435
Blyttiomycessp1	<i>Blyttiomycetes</i> sp. JEL0837	Chytridiales	KAJ3309247
Blyttiomycessp2	<i>Blyttiomycetes</i> sp. JEL0837	Chytridiales	KAJ3303044
Blyttiomyceshelicus	<i>Blyttiomycetes helicus</i>		RKO89614
Fimicolochytrium	<i>Fimicolochytrium jonesii</i>	Spizellomycetales	XP_052926454
Gaertneriomycetes	<i>Gaertneriomycetes semiglobifer</i>	Spizellomycetales	KAI9004733
Geranomyces	<i>Geranomyces variabilis</i>	Spizellomycetales	KAJ3178317
Powellomyces	<i>Powellomyces hirtus</i>	Spizellomycetales	KAI8908161
Spizellomycesp	<i>Spizellomyces punctatus</i>	Spizellomycetales	XP_016604112
Thoreauomyces	<i>Thoreauomyces humboldtii</i>	Spizellomycetales	KAJ3017344
Caulochytrium	<i>Caulochytrium protostelioides</i>	Caulochytriales	RKP02545
Rhizophlyctis1	<i>Rhizophlyctis rosea</i>	Rhizophlyctidales	KAJ3031848
Rhizophlyctis2	<i>Rhizophlyctis rosea</i>	Rhizophlyctidales	KAJ3039857
Borealophlyctis	<i>Borealophlyctis nickersoniae</i>	Rhizophlyctidales	KAJ3275176
NowakowskiellaA	<i>Nowakowskiella</i> sp. JEL0407	Cladochytriales	KAJ3124115
NowakowskiellaB	<i>Nowakowskiella</i> sp. JEL0078	Cladochytriales	KAJ1552692
Quaeritorhiza	<i>Quaeritorhiza haematococci</i>		KAJ3085108
Lobulomycetalessp	<i>Lobulomycetales</i> sp.	Lobulomycetales	KAL3900861
Lobulomycesa	<i>Lobulomyces angularis</i>	Lobulomycetales	KAJ3376329
Clydaea	<i>Clydaea vesicula</i>	Lobulomycetales	KAJ3199475
Clydaea2	<i>Clydaea vesicula</i>	Lobulomycetales	KAJ3223392
Polychytrium1	<i>Polychytrium aggregatum</i>	Polychytriales	XP_052963844
Synchytriumm	<i>Synchytrium microbalum</i>	Synchytriales	XP_031024160
Synchytriume	<i>Synchytrium endobioticum</i>	Synchytriales	TPX44587
Batrachochytrium	<i>Batrachochytrium dendrobatidis</i> JAM81	Rhizophydiales	XP_006680205
Gorgonomyces1	<i>Gorgonomyces haynaldii</i>	Rhizophydiales	KAI8912588
GORGONOMYCES2	<i>Gorgonomyces haynaldii</i>	Rhizophydiales	KAI8906053
GORGONOMYCES3	<i>Gorgonomyces haynaldii</i>	Rhizophydiales	KAI8912823
Globomyces1	<i>Globomyces pollinis-pini</i>	Rhizophydiales	KAI8893030
GLOBOMYCES2	<i>Globomyces pollinis-pini</i>	Rhizophydiales	KAI8895260
Boothiomycessp1	<i>Boothiomycetes</i> sp. JEL0866	Rhizophydiales	KAJ3325333
BOOTHIOMYCESSP2	<i>Boothiomycetes</i> sp. JEL0866	Rhizophydiales	KAJ3261172
Boothiomycesmm1	<i>Boothiomycetes macroporosus</i>	Rhizophydiales	KAJ3260982
BOOTHIOMYCESM2	<i>Boothiomycetes macroporosus</i>	Rhizophydiales	KAJ3260982
Polyrhizophydium	<i>Polyrhizophydium stewartii</i>	Rhizophydiales	KAL2918498
Terramyces	<i>Terramyces</i> sp. JEL0728	Rhizophydiales	KAJ3269403
Kappamyces1	<i>Kappamyces</i> sp. JEL0829	Rhizophydiales	KAJ3301689
KAPPAMYCES2	<i>Kappamyces</i> sp. JEL0829	Rhizophydiales	KAJ3306366
Phylum			
AMOEOAPHELIDIUM	<i>Amoebaphelidium protococcarum</i>	Aphelidiomycota	KAI3631655
Aphelidiumi	<i>Aphelidium insulamus</i>	Aphelidiomycota	From Ref. 18 ^a

Aphelidiumt	<i>Aphelidium tribonematis</i>	Aphelidiomycota	From Ref. 18 ^b
Paraphelidium	<i>Paraphelidium tribonematis</i>	Aphelidiomycota	From Ref. 16 ^c
AMOEBORADIX	<i>Amoeboradix gromovi</i>	Sanchytriomycota	From Ref. 17 ^d
SANCHYTRIUM	<i>Sanchytrium tribonematis</i>	Sanchytriomycota	From Ref. 17 ^e
Olpidium	<i>Olpidium bornovanus</i>	Olpidiomycota	KAG5460860+ KAG5458366
Gonapodya	<i>Gonapodya</i> sp. JEL0774	Monoblepharomycota	KAJ3339789
Allomyces	<i>Allomyces javanicus</i>	Blastocladiomycota	KAJ3364041
Blastocladiellab	<i>Blastocladiella britannica</i>	Blastocladiomycota	KAI9222437
Blastocladiellae	<i>Blastocladiella emersonii</i>	Blastocladiomycota	KAI9187572
Catenaria	<i>Catenaria anguillulae</i>	Blastocladiomycota	ORZ35986
Catenaria2	<i>Catenaria anguillulae</i>	Blastocladiomycota	ORZ33943
Coelomomyces	<i>Coelomomyces lativittatus</i>	Blastocladiomycota	KAJ1503501
Paraphysoderma	<i>Paraphysoderma sedebokerense</i>	Blastocladiomycota	KAI9140125
Sorochytrium	<i>Sorochytrium milnesiophthora</i>	Blastocladiomycota	KAL7746217

^a*Aphelidium insulamus*

O14_transcripts_NODE_21726.p1

MSLAHAFESFATFGAPNTQGPVTMDNAHFAKLCRDAHIVDKRVTAVDVIDITFKQVLTKGSRITFDQFQ
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 SIGARGTVSASAQSLAKPRQANVTGSSTMAAKSVSGSGSVYDRLTDSKGYTGTHKHFDDTGKGRGM
 LGRDHPTTSQILRST

^b*Aphelidiumt tribonematis*

P2_transcripts_NODE_21635.p1

MSLSHAFAEFATFGAPSTQGPVTMDNAHFAKLCRDARIVDKRVTSDVDITFKQVLTKGARRITDAQFQ
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 GLGLAGRETHVRTANLSMDVDRSLKPAAPQKRTVTLMEEMNQQRSSAGQRVVKPASTPKKNAAF
 AAKSKVGSQSLAKPRQTNVSASANSLSAKSQGGSGNVYDRLTDSKQYTGTHKHFDDTGKGRGLA
 GRDQPTSSQILRS

^c*Paraphelidium tribonematis*

TRINITY_DN24782_c0_g1_i2|m.37417

MSAQLQDSFEQFAQFGSSKNLSQGTMDNAHFAKMCRAKVLGKSVTTVDVLDLKFVLIKGERRIN
 FDQFKAALMLAAQKYPDDASASEKVFSLIAAATPAQNGTQADASGIYSKLTDTSLYTGSHKLRFDADG
 KGRGIEGRDQPVQTSQIVNRKSGTAAATTGGKRSPTASMEKINGSKAANTATSNKNLSGKSTGNLV
 KSNKNLSASPAGQVQKSNKNLSVENSLSAAPKSKSGDVYDRLTNTSGYTGSHKERFDANGNGKGLAGR
 T

^d*Amoeboradix gromovi*

NODE_950_length_2826_cov_0.272094.p2

MREYSIFLLQRMSNYRQYILDFQFSFVLKLRKATQSSKNMEEELRDRFNAFCSFGSSRAVVSVEIDNSK
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 PKVRKEVGSSGNLKSISLSDVRSSESNTKQSSDSVFDRLTDHTKYTGSHKERFDEDEGKKGLEGRITGE
 VHHISQILRK

^e*Sanchytrium tribonematis*

NODE_130_length_16779_cov_1.687410.p13

MEDELLKRFSAFCSFGSSRAINAVIDNFKFSKLCCKDSLILDKKLTDDVDIVFNKAKKEKTDRKLDQFQ
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 TGSHKERFDDDGKKGGLDGRDDGQVNHISEILRK