Putative Fusion 1

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|SPBC29A302c unnamed protein product
MALLPFFDLTNFESDASEELGWLKYVGRVQTRVFPQHFKDNLEKVRKISETIDVIVDTTA
ELGPEACVNLLNAGALAILVNEEMLNELADISPNRLVLKTDTTDIGKIEKLSQVAGSIQW
IGSAENYPPDFFERASKIIHKAVMPEGGGRTLYLEFPEQPSMEVLKSFSVHSVVPVLSSS
FLTVKPAEEPKKLSLADLILISANTDREDGLFSTLVVNELGIALGLVYSSKESVAESLKT
GTGVYQSRKRGLWYKGASSGAVQHLIHIDVDCDEDCLRFVVVYQTGKGFCHLDTLHCFGQA
SGLCQLEKTLIDRKNNAPEGSYTARLFSDPKLLRAKIMEEAEELCDATTKENVIWEMADL
MYFAITRCVGSGVSLNDISRHLDLKHRKVTRRKGDAKVAWQEKLKDKGGVANTSYTA
>lcl|SPBC171113 unnamed protein product
MPEYEIQVPSYRAAALTAEERTRLLARPIQNTQKIRTIVQPIIEDVKSRGEASLIDYASK
FEKVQLKSAVLKAPFDDDLMKISPMIKEDIDIAFNNIFAFHSSQLRPTIAVQTMRGVVCQ
RMSRPINRVGLYIPGGTAVLPSTALMLGVPAKVAGCPHVVISTPVRKDGTVAPEIVYIAN
KIGAEAIILAGGAQAIAAMAYGISGVPKVNKIFGPGNQFVTAAKMHVQNDYGALVAIDLP
AGPSEVLVIADETCNPESVALDLLSQAEHGLDSQIILLTVSLSPEMFDRIQKAINDHALR
LSRSYIIKHAIKKSVIVQVDNVDQAFEWSNLYGPEHLVLHLKNASSYIPKIDNAGSVFVG
PWSPVSMGDYASGTNHTLPTYGYASSYSGVSTDSFLKYITTQELTEEGIQRLGPTVIRLA
ELEGLTAHADAVRVRGVRL
```

2 Annotated Phylograms

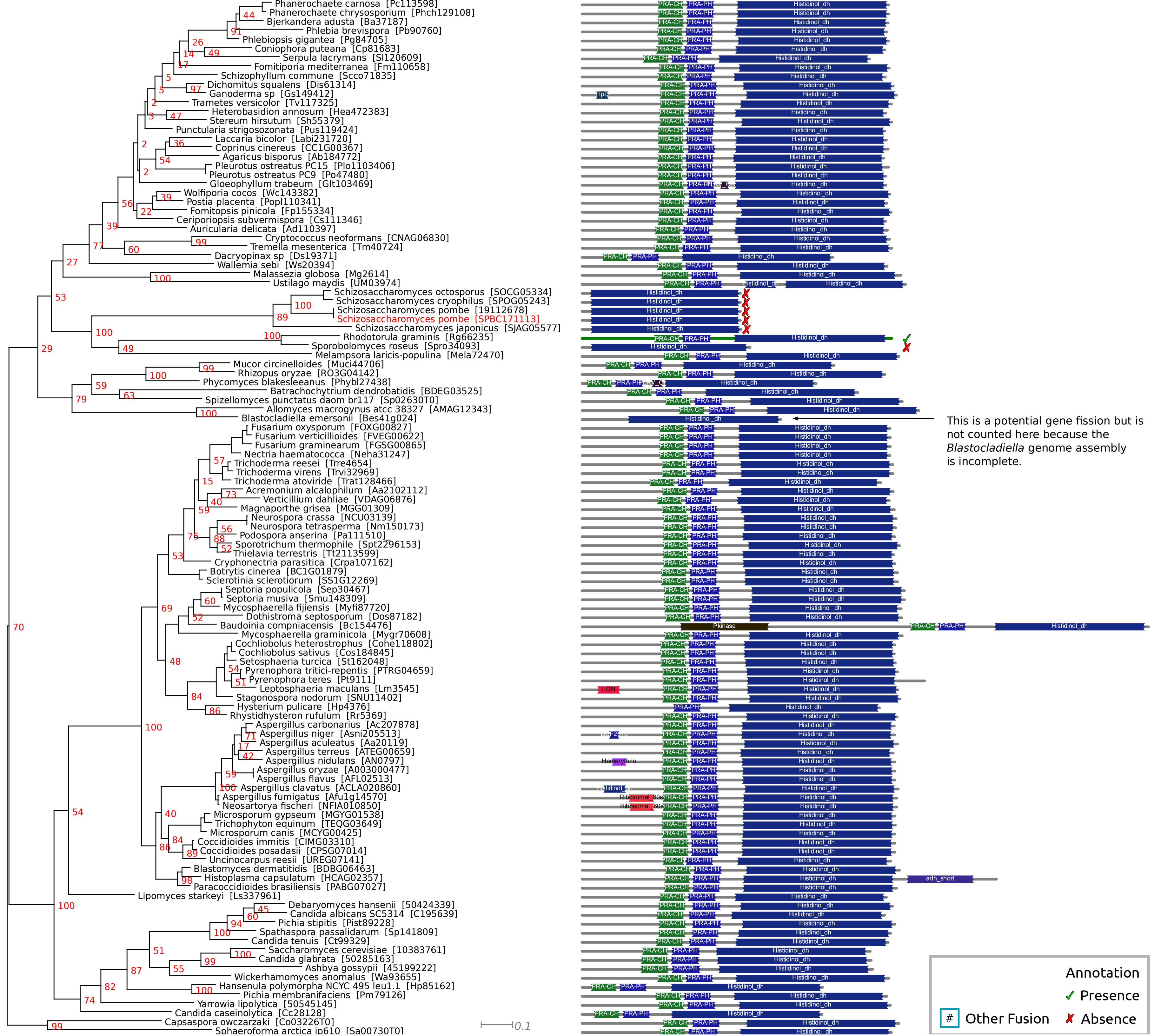
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

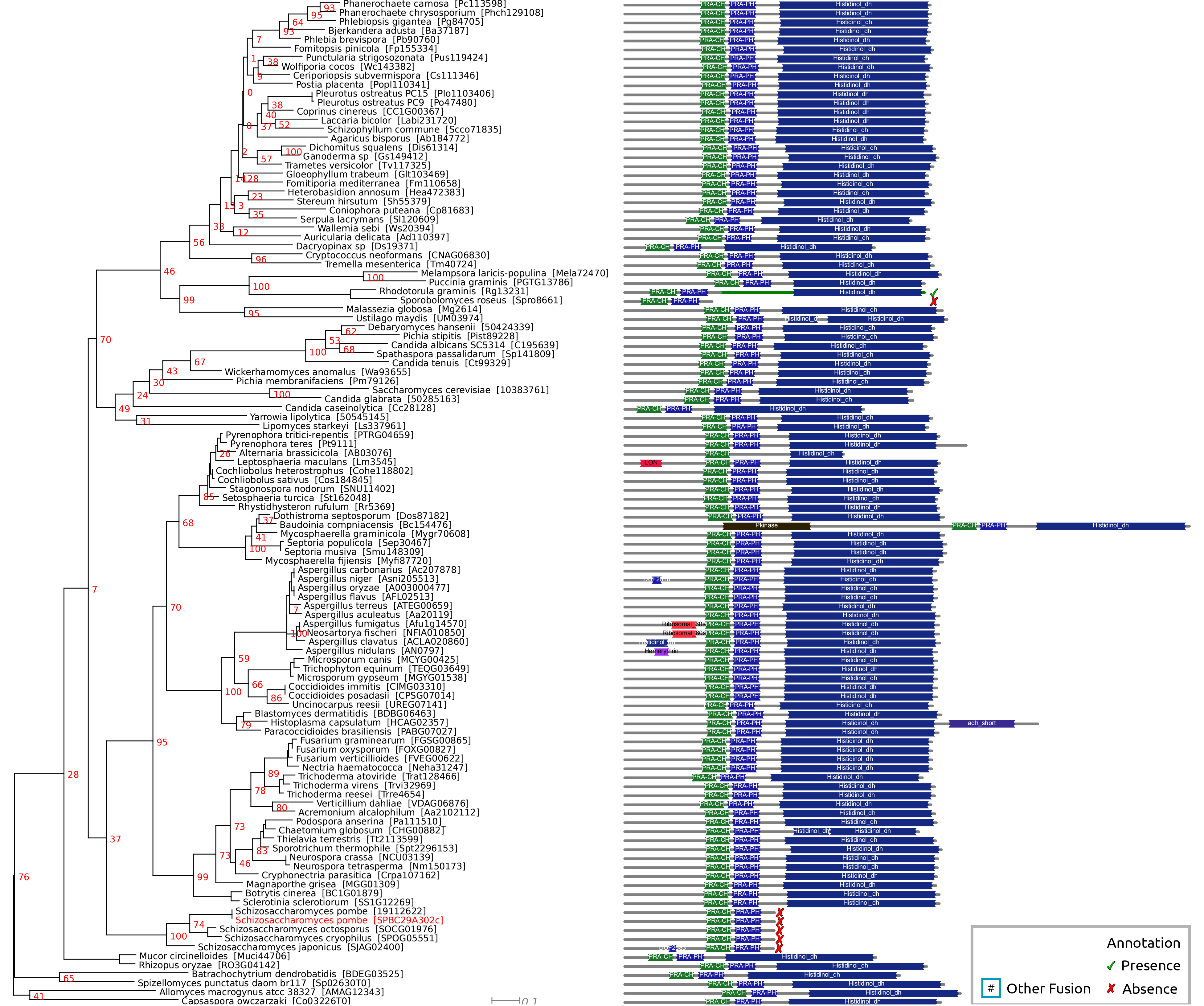
Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



This is a potential gene fission but is not counted here because the *Blastocladiella* genome assembly is incomplete.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Phlebiopsis gigantea [Pg84705]
Bjerkandera adusta [Ba37187]
Phlebia brevispora [Pb90760]
Fomitopsis pinicola [Fp155334]
Punctularia strigosozonata [Pus119424]
Wolfiporia cocos [Wc143382]
Ceriporiopsis subvermispora [Cs111346]
Postia placenta [Popl110341]
Pleurotus ostreatus PC15 [Plo1103406]
Pleurotus ostreatus PC9 [Po47480]
Coprinus cinereus [CC1G00367]
Laccaria bicolor [Labi231720]
Schizophyllum commune [Scco71835]
Agaricus bisporus [Ab184772]
Dichomitus squalens [Dis61314]
Ganoderma sp [Gs149412]
Trametes versicolor [Tv117325]
Gloeophyllum trabeum [Glt103469]
Fomitiporia mediterranea [Fm110658]
Heterobasidion annosum [Hea472383]
Stereum hirsutum [Sh55379]
Coniophora puteana [Cp81683]
Serpula lacrymans [Sl120609]
Wallemia sebi [Ws20394]
Auricularia delicata [Ad110397]
Dacryopinax sp [Ds19371]
Cryptococcus neoformans [CNAG06830]
Tremella mesenterica [Tm40724]
Melampsora laricis-populina [Mela72470]
Puccinia graminis [PGTG13786]
Rhodotorula graminis [Rg13231]
Sporobolomyces roseus [Spro8661]
Malassezia globosa [Mg2614]
Ustilago maydis [UM03974]
Debaryomyces hansenii [50424339]
Pichia stipitis [Pist89228]
Candida albicans SC5314 [C195639]
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Candida tenuis [Ct99329]
Wickerhamomyces anomalus [Wa93655]
Pichia membranifaciens [Pm79126]
Saccharomyces cerevisiae [10383761]
Candida glabrata [50285163]
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Yarrowia lipolytica [50545145]
Lipomyces starkeyi [Ls337961]
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Alternaria brassicicola [AB03076]
Leptosphaeria maculans [Lm3545]
Cochliobolus heterostrophus [Cohe118802]
Cochliobolus sativus [Cos184845]
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Setosphaeria turcica [St162048]
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Dothistroma septosporum [Dos87182]
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Mycosphaerella graminicola [Mygr70608]
Septoria populicola [Sep30467]
Septoria musiva [Smu148309]
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Aspergillus aculeatus [Aa20119]
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Histoplasma capsulatum [HCAG02357]
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Fusarium graminearum [FGSG00865]
Fusarium oxysporum [FOXG00827]
Fusarium verticillioides [FVEG00622]
Nectria haematococca [Neha31247]
Trichoderma atoviride [Trat128466]
Trichoderma virens [Trvi32969]
Trichoderma reesei [Trre4654]
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Acremonium alcalophilum [Aa2102112]
Podospora anserina [Pa111510]
Chaetomium globosum [CHG00882]
Thielavia terrestris [Tt2113599]
Sporotrichum thermophile [Spt2296153]
Neurospora crassa [NCU03139]
Neurospora tetrasperma [Nm150173]
Cryphonectria parasitica [Crpa107162]
Magnaporthe grisea [MGG01309]
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Sclerotinia sclerotiorum [SS1G12269]
Schizosaccharomyces pombe [19112622]
Schizosaccharomyces pombe [SPBC29A302c]
Schizosaccharomyces octosporus [SOCG01976]
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Schizosaccharomyces japonicus [SJAG02400]
Mucor circinelloides [Muci44706]
Rhizopus oryzae [RO3G04142]
Batrachochytrium dendrobatidis [BDEG03525]
Spizellomyces punctatus daom br117 [Sp02630T0]
Allomyces macrogynus atcc 38327 [AMAG12343]
Capsaspora owczarzaki [Co03226T0]
0.1
PRA-CH
PRA-PH
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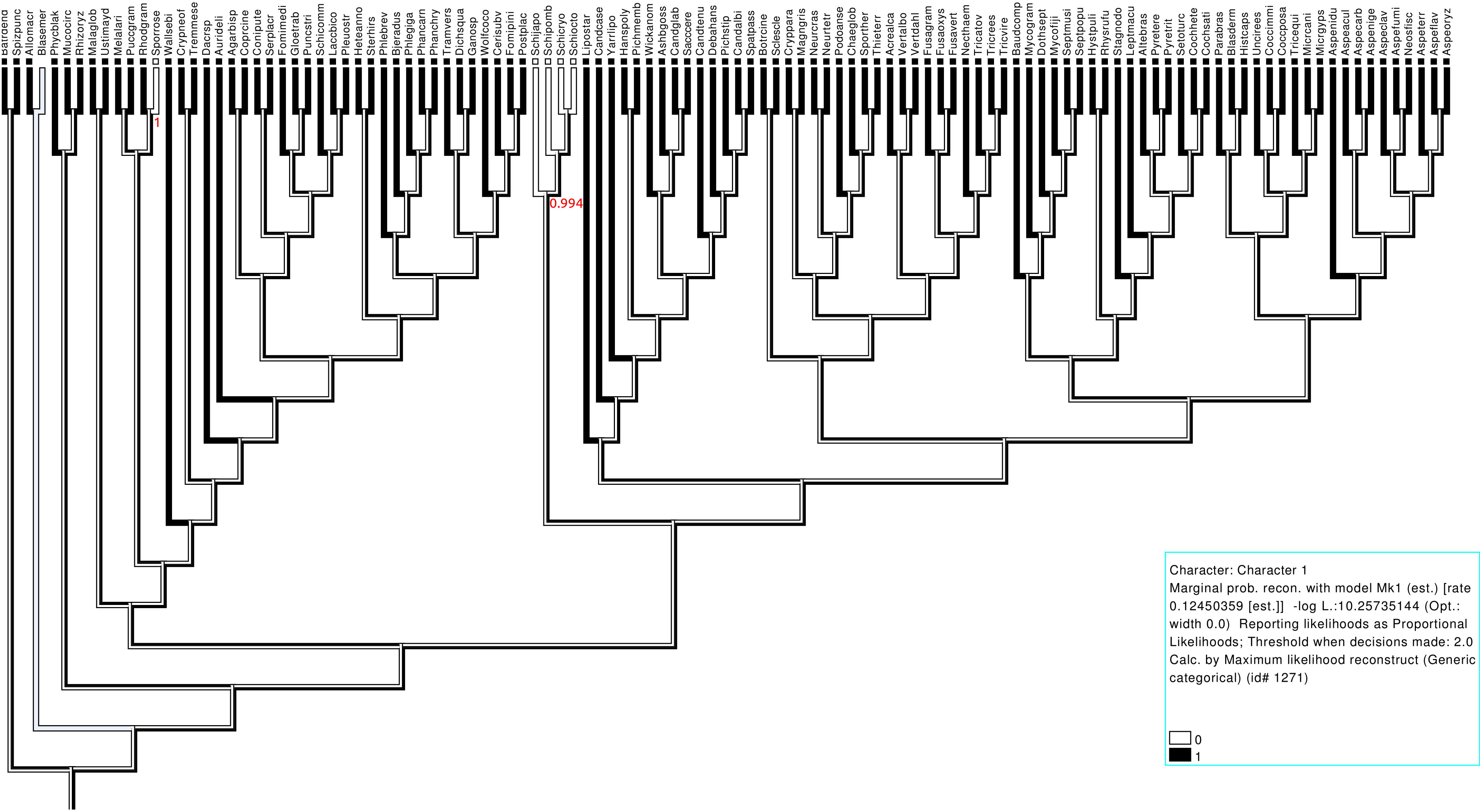
LON
Pkinase
Ribosomal_60s
Hemerythrin
adh_short
Annotation
✓ Presence
✗ Absence
Other Fusion



Character: Character 1
Marginal prob. recon. with model Mk1 (est.) [rate 0.12450359 [est.]] -log L.:10.25735144 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 2

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|Mc157403 unnamed protein product
MVQKAVLVTGGAGYIGSHTVIELLNAGREVVIYDNLYNASYEAVRRIEQISGKKPHFYKADILDKKALLEVFSRHPIDSV
IHFAGLKAVGESTQIPLDYYYNNITGTIVLLQAMKEANVKNIVFSSSATVYGEPPVIPIPETSPTDAKSPYGRTKLFVEH
IIRDLCTAEKDWNAALLRYFNPAGAHPSGILGENPTGVPNNLMPYFSQVAIGKREYLSVFGNDYPTRDGTCIRDYIHVVD
LAEGHLAALKKLEDNPGCVEYNLGTGVGSTVLEMVHAFQKAVGRELPYKIAPRRPGDVPDLTADPAKANKELGWKVKFSL
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YHATTDKDTVINLTNHSYFNLSGVELNPNILDHRVTMTDEVKAVLECDGDCLPTGKVLSWSEVPWMNFSGENAGKPIGAR
LENLQGTRGYDHPYVIHSDYKTDTAGLPLRKAAVVYSPDTGIELEFSTTEPAFQFYTGGWIASDKMTAKKDQAGAKIGPA
SGFCLEASRNPDSPNKPDWRSATLLQKDGVYSQKTVYAFHARLD
```

2 Annotated Phylograms

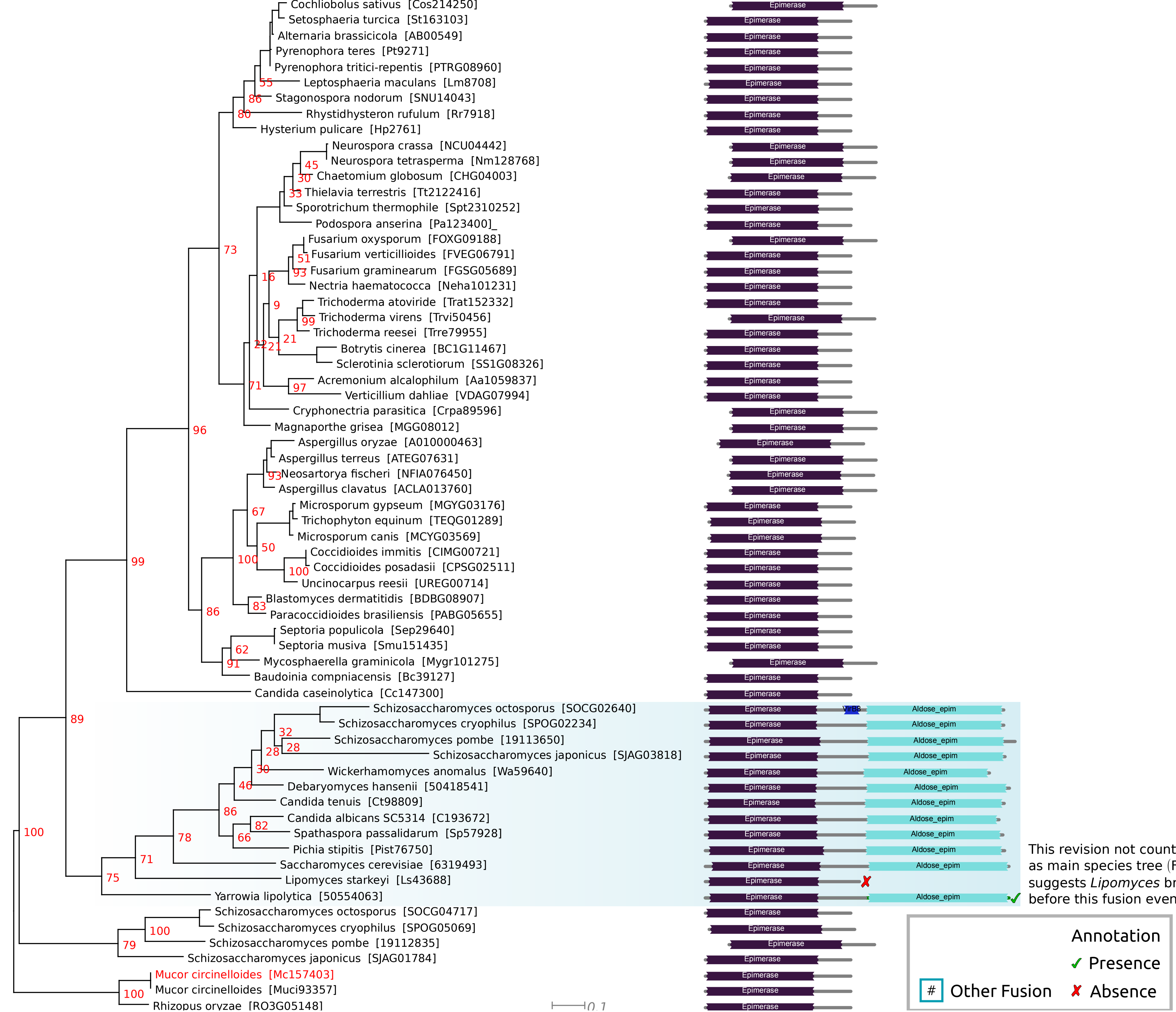
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

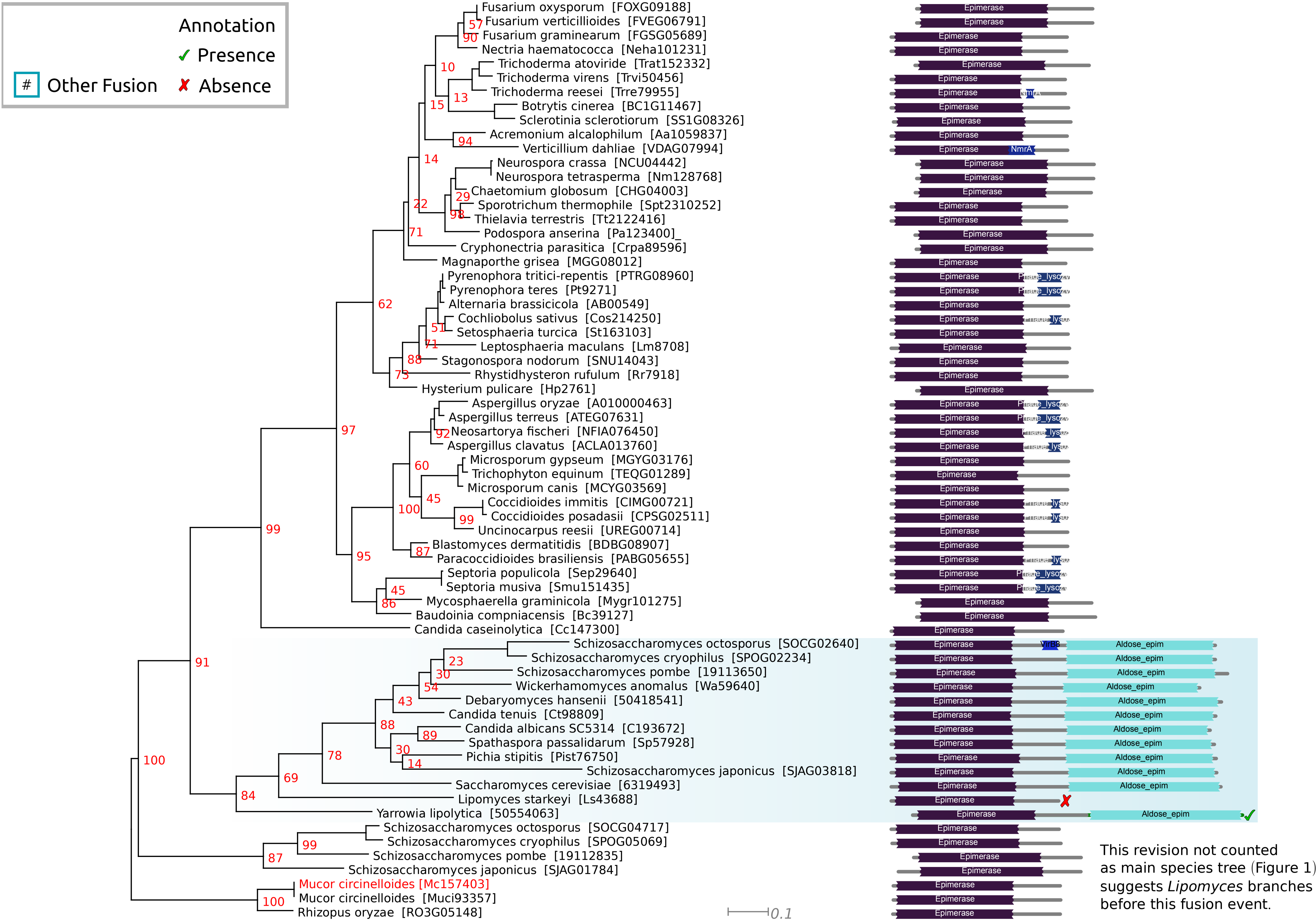
Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



This revision not counted as main species tree (Figure 1) suggests *Lipomyces* branches before this fusion event.



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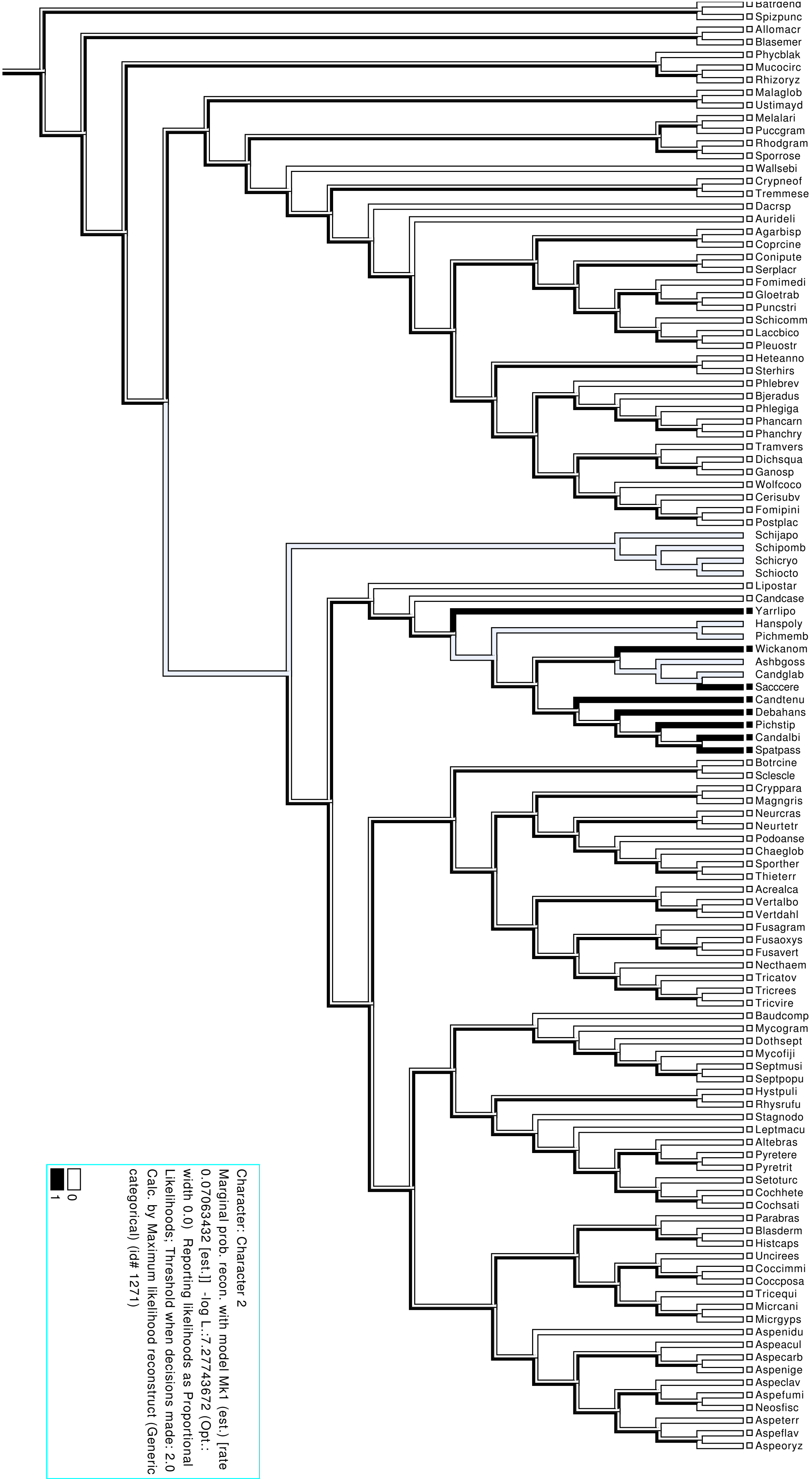
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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 2
Marginal prob. recon. with model Mk1 (est.) [rate 0.07063432 [est.]] -log L.:7.27743672 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 3

September 26, 2012

1 Fasta Sequences

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```
>lcl|CC1G06724 unnamed protein product
MSISVPTILLTNDDGPPHPKESPYVLGLYRHLTERLGWNVKVVLPSSQKSWIGRYFYPREDGNGEQSPKSRPLKPGELAE
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AHRIGCRIIQHLWHNWGSDDCGLRNGEVDLYSVNIPLIEDILSEEGLKVYWTTMWRNSYGRLFKDVSSRRKSIDGATVNP
AGPDAATSPQTAVKPIDEEGLLFKWAPEMRGLIQPLSDELPVGSDAYAIHTGSISVTALRACFAEPPTSVVDPVLRQIKL
>lcl|CC1G03660 unnamed protein product
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LSRIVHAYCIKNPDTILKTAFPLTYELEISFADELDEMWTDELWELGERLDSDDTWWILKPGMANRGMGIRLFDSKDQLQ
QIFEDFEEEDDTDDDDTKGNDTSVVTSQLRHFIIQEYIPDPLLFDPREVSQEKNLEINCLQGHKFHLRVYCVATGALKLY
LYDRILALFASLPYGPPTFEVIEPDEPPVINLQHHLTNTSLQAEKGEENVRLLDELDGCQILSGDGEHGKFTSADIKFLI
NQMGEVLSETFKAALENPIHFQAIPNAFELYGVDFLVSHSPNSPSPFSVKLLEINAEPAIELTGPRLTWILEDLFKSIAE
VSIKPFFAPNKENDWPVGETRHHLLKCLDVSVMRFD
```

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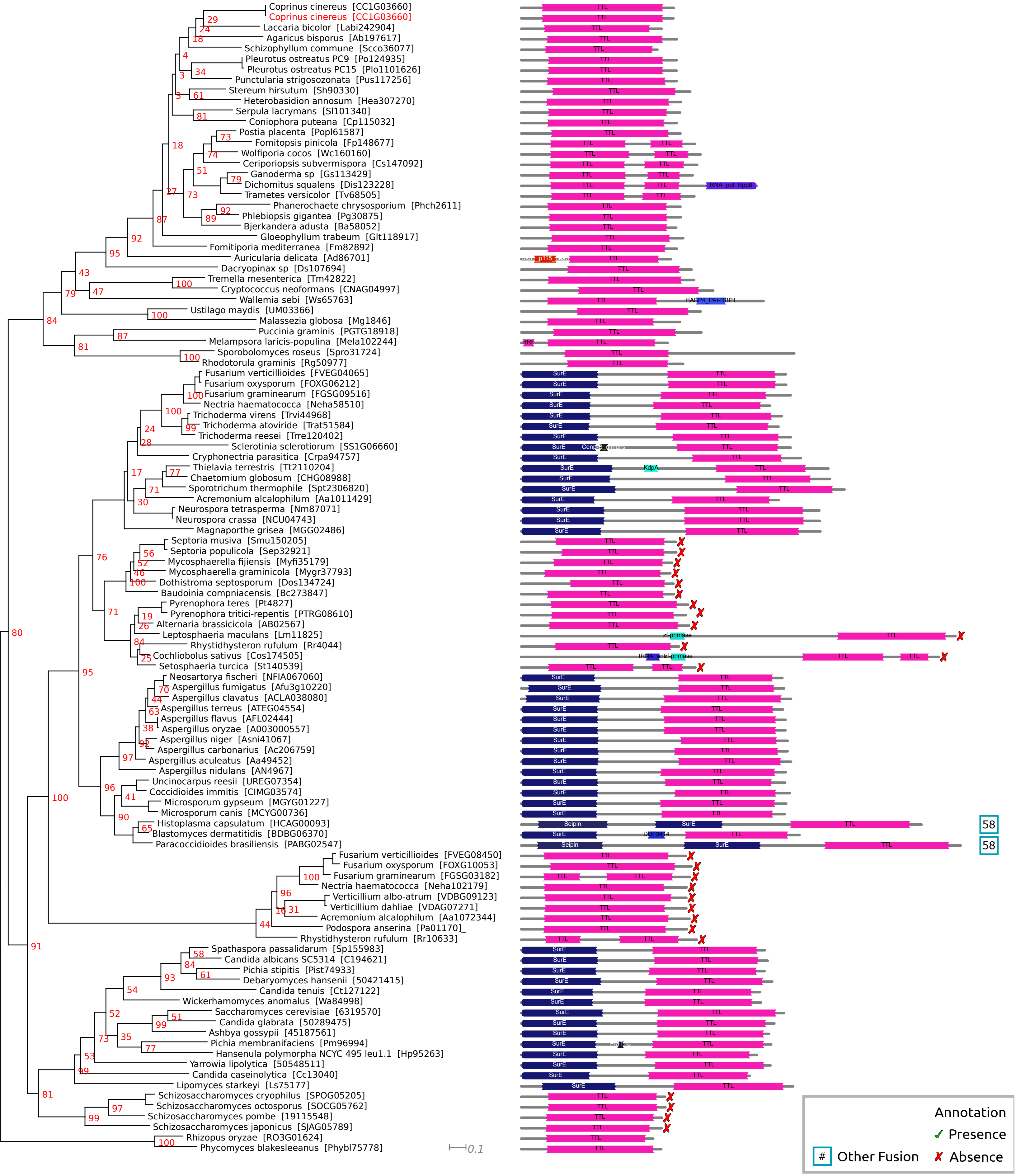
Coprinus cinereus [CC1G03660]
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Laccaria bicolor [Labi242904]
Agaricus bisporus [Ab197617]
Schizophyllum commune [Scco36077]
Pleurotus ostreatus PC9 [Po124935]
Pleurotus ostreatus PC15 [Plo1101626]
Punctularia strigosozonata [Pus117256]
Stereum hirsutum [Sh90330]
Heterobasidion annosum [Hea307270]
Serpula lacrymans [Sl101340]
Coniophora puteana [Cp115032]
Postia placenta [Popl61587]
Fomitopsis pinicola [Fp148677]
Wolfiporia cocos [Wc160160]
Ceriporiopsis subvermispora [Cs147092]
Ganoderma sp [Gs113429]
Dichomitus squalens [Dis123228]
Trametes versicolor [Tv68505]
Phanerochaete chrysosporium [Phch2611]
Phlebiopsis gigantea [Pg30875]
Bjerkandera adusta [Ba58052]
Gloeophyllum trabeum [Glt118917]
Fomitiporia mediterranea [Fm82892]
Auricularia delicata [Ad86701]
Dacryopinax sp [Ds107694]
Tremella mesenterica [Tm42822]
Cryptococcus neoformans [CNAG04997]
Wallemia sebi [Ws65763]
Ustilago maydis [UM03366]
Malassezia globosa [Mg1846]
Puccinia graminis [PGTG18918]
Melampsora laricis-populina [Mela102244]
Sporobolomyces roseus [Spro31724]
Rhodotorula graminis [Rg50977]
Fusarium verticillioides [FVEG04065]
Fusarium oxysporum [FOXG06212]
Fusarium graminearum [FGSG09516]
Nectria haematococca [Neha58510]
Trichoderma virens [Trvi44968]
Trichoderma atoviride [Trat51584]
Trichoderma reesei [Trre120402]
Sclerotinia sclerotiorum [SS1G06660]
Cryphonectria parasitica [Crpa94757]
Thielavia terrestris [Tt2110204]
Chaetomium globosum [CHG08988]
Sporotrichum thermophile [Spt2306820]
Acremonium alcalophilum [Aa1011429]
Neurospora tetrasperma [Nm87071]
Neurospora crassa [NCU04743]
Magnaporthe grisea [MGG02486]
Septoria musiva [Smu150205]
Septoria populicola [Sep32921]
Mycosphaerella fijiensis [Myfi35179]
Mycosphaerella graminicola [Mygr37793]
Dothistroma septosporum [Dos134724]
Baudoinia compniacensis [Bc273847]
Pyrenophora teres [Pt4827]
Pyrenophora tritici-repentis [PTRG08610]
Alternaria brassicicola [AB02567]
Leptosphaeria maculans [Lm11825]
Rhystidhysteron rufulum [Rr4044]
Cochliobolus sativus [Cos174505]
Setosphaeria turcica [St140539]
Neosartorya fischeri [NFIA067060]
Aspergillus fumigatus [Afu3g10220]
Aspergillus clavatus [ACLA038080]
Aspergillus terreus [ATEG04554]
Aspergillus flavus [AFL02444]
Aspergillus oryzae [A003000557]
Aspergillus niger [Asni41067]
Aspergillus carbonarius [Ac206759]
Aspergillus aculeatus [Aa49452]
Aspergillus nidulans [AN4967]
Uncinocarpus reesii [UREG07354]
Coccidioides immitis [CIMG03574]
Microsporum gypseum [MGYG01227]
Microsporum canis [MCYG00736]
Histoplasma capsulatum [HCAG00093]
Blastomyces dermatitidis [BDBG06370]
Paracoccidioides brasiliensis [PABG02547]
Fusarium verticillioides [FVEG08450]
Fusarium oxysporum [FOXG10053]
Fusarium graminearum [FGSG03182]
Nectria haematococca [Neha102179]
Verticillium albo-atrum [VDBG09123]
Verticillium dahliae [VDAG07271]
Acremonium alcalophilum [Aa1072344]
Podospora anserina [Pa01170]_
Rhystidhysteron rufulum [Rr10633]
Spathaspora passalidarum [Sp155983]
Candida albicans SC5314 [C194621]
Pichia stipitis [Pist74933]
Debaryomyces hansenii [50421415]
Candida tenuis [Ct127122]
Wickerhamomyces anomalus [Wa84998]
Saccharomyces cerevisiae [6319570]
Candida glabrata [50289475]
Ashbya gossypii [45187561]
Pichia membranifaciens [Pm96994]
Hansenula polymorpha NCYC 495 leu1.1 [Hp95263]
Yarrowia lipolytica [50548511]
Candida caseinolytica [Cc13040]
Lipomyces starkeyi [Ls75177]
Schizosaccharomyces cryophilus [SPOG05205]
Schizosaccharomyces octosporus [SOCG05762]
Schizosaccharomyces pombe [19115548]
Schizosaccharomyces japonicus [SJAG05789]
Rhizopus oryzae [RO3G01624]
Phycomyces blakesleeanus [Phybl75778]
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SurE
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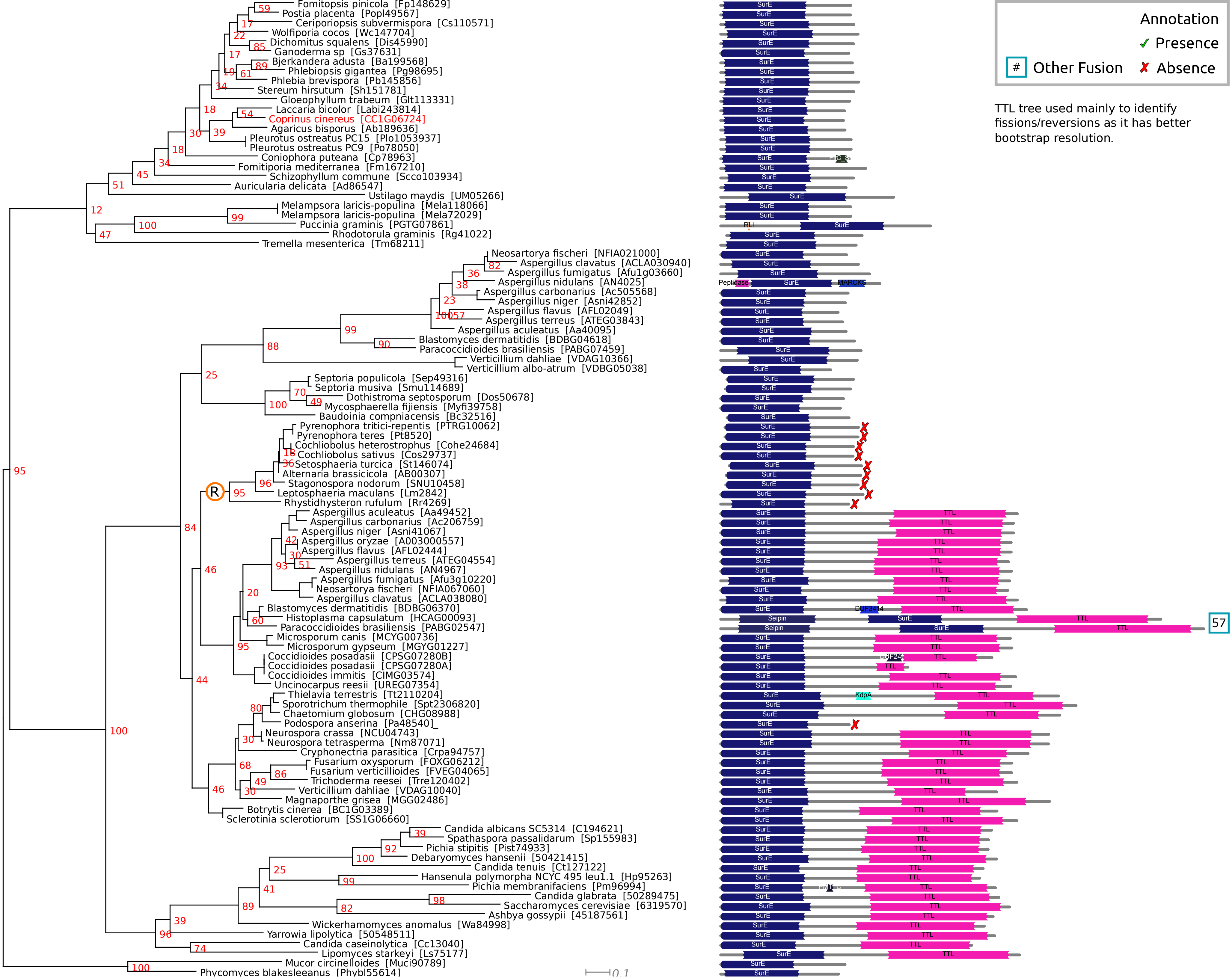
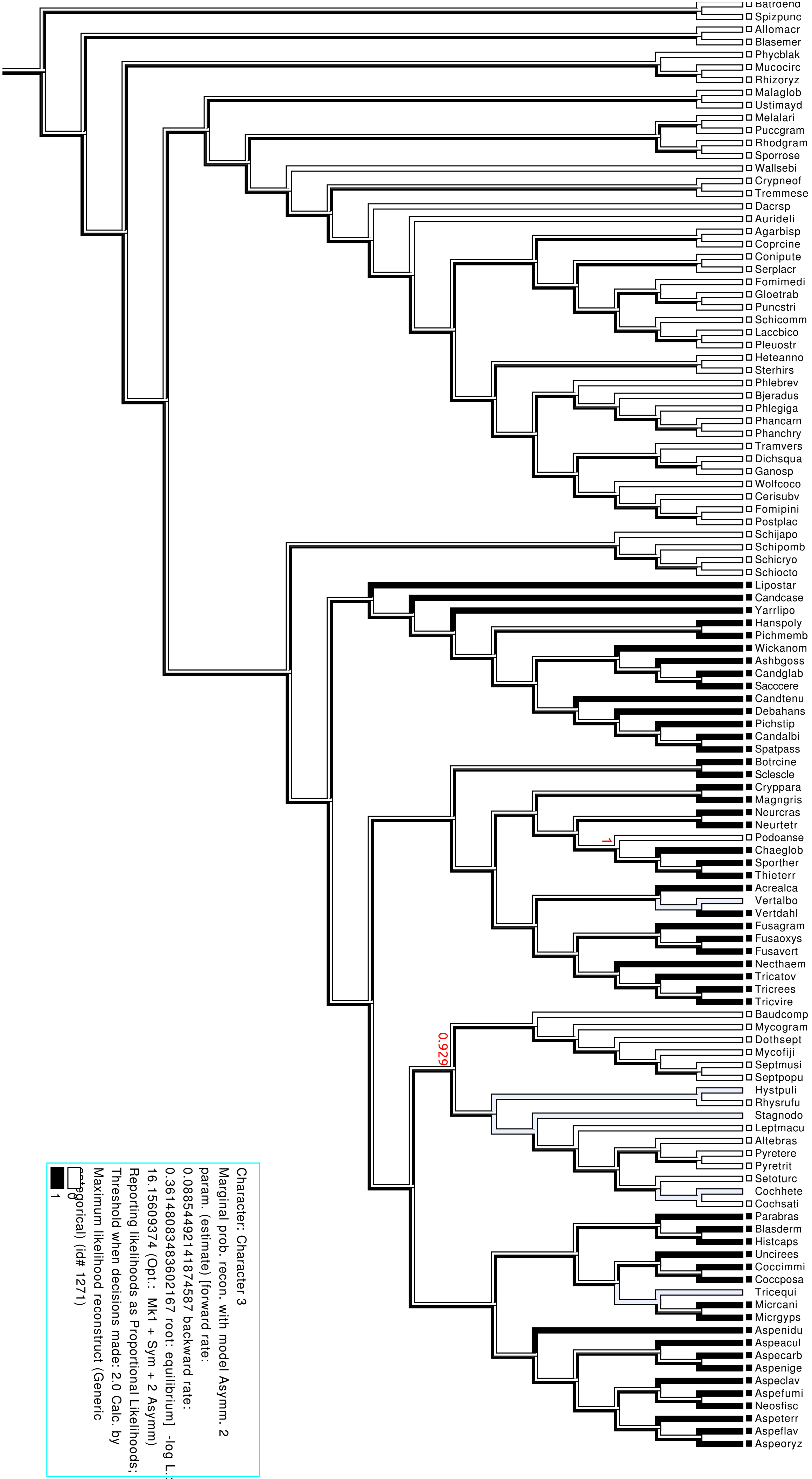
RRF
CenpB_CTerm
KdpA
zf-primase
tRNA_anti
Seipin
DUF3414
58
58
Annotation
✓ Presence
Other Fusion
✗ Absence



TTL tree used mainly to identify fissions/reversions as it has better bootstrap resolution.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Spizpunc
Allomacr
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Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
1
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
0.929
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 3
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.08854492141874587 backward rate:
0.3614808348360216 7 root: equilibrium] -log L.:
16.15609374 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
□ 0
■ 1

Putative Fusion 4

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|AMAG_11004 unnamed protein product
MSWTKTPVRLTLSTVFGSLADCCLPQTGLRRVTPYYYLYKTHAKQRWLGMELLAVFDKEFQDRQPGYYVRAHCRHRRRFP
RSIPLALTIPTNPLQKKAIDSGAIQVNHQSVPTTYLLKNNDLITHRNHRHEPPVTSAPITILARTPHFVVVNKPASIPVH
PSGRYRHNSVLHIVRRALGTSSTDLVGPPLYALHRLDRLTSGVLILCSDRARIGKLSKQFAAQVVGKSYLCVVAGEFPAG
TTTVDAPIMVVSHKLGLNSVHPDGKPSTTHFDLLATDGTRSLVRARPVTGRTHQIRVHLRHLGFPIANDPLYNNPNHRHV
KAEREKAAAAAVAESNSGEDATTDSAGAEGTPGATDDETAAWVAAVAAETASRDALTVTGQCTECGTDLYADPPHDHRLI
YLHAYEYAVRMSLGELDAPSEYITYDEATKTTTVRTPLPEWATDWPGFDPRVLDVVPSANVDEALQQS
>lcl|AMAG_02082 unnamed protein product
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EEVCLLKLPVGTDLAGCTMYTTMEPCSTRLSGRPSCTGRVLDAKVPRVVMGIVEPADLFVKCTGADTLRERGVEVVHIQG
LEEECWAPNRHLRERYDDGRNGAPRDSGAAADA
```

2 Annotated Phylograms

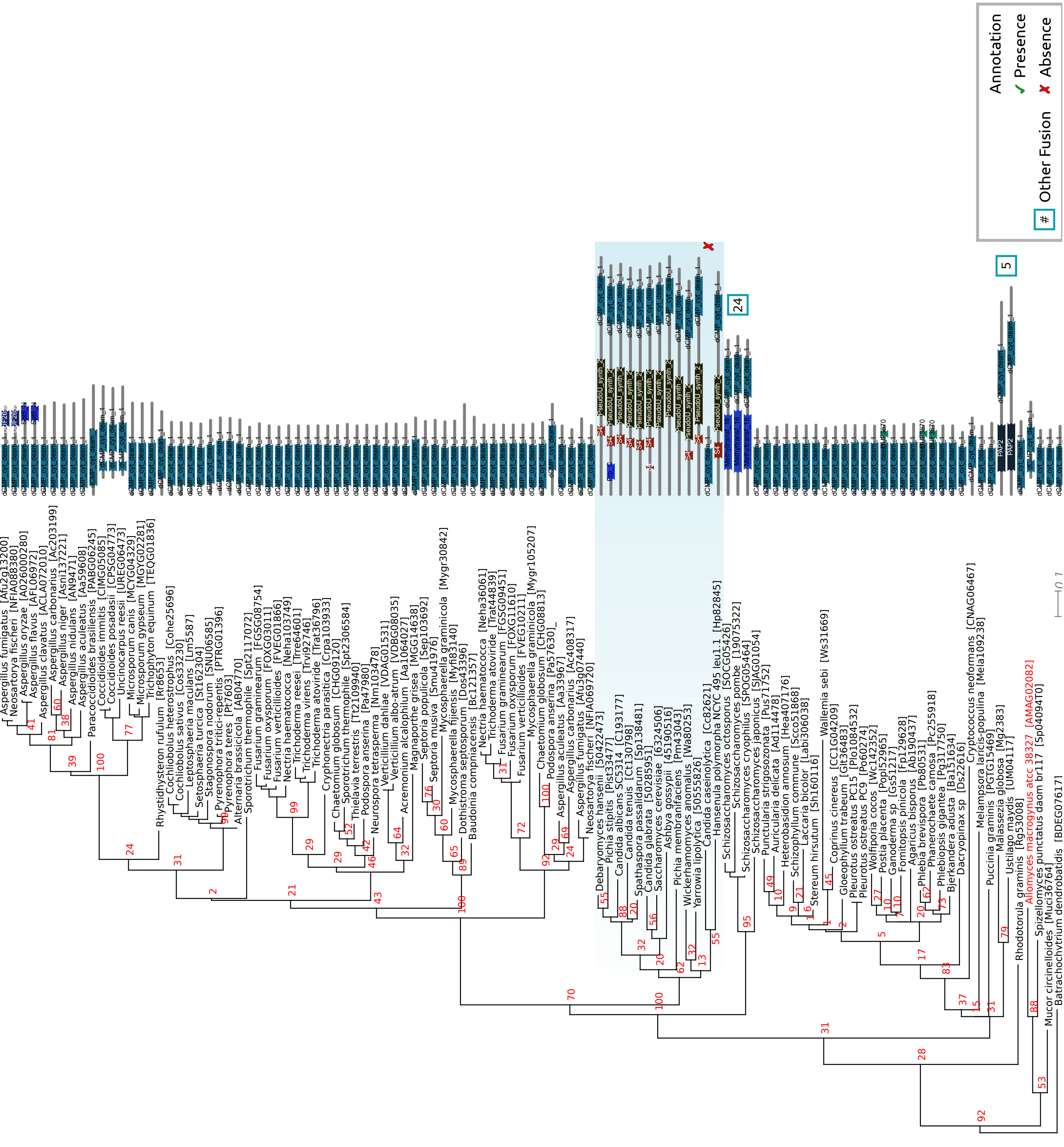
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a ”1/0/-” nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an ”Mk1” or ”Assym. 2 param model.” (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.

Annotation
✓ Presence
✗ Absence
Other Fusion
24
5
0.1
Aspergillus fumigatus [Afu2g13200]
Neosartorya fischeri [NFIA088380]
Aspergillus oryzae [AO26000280]
Aspergillus flavus [AFL06972]
Aspergillus clavatus [ACLA072010]
Aspergillus carbonarius [Ac203199]
Aspergillus niger [Asn137221]
Aspergillus nidulans [AN9471]
Aspergillus aculeatus [Aa59608]
Paracoccidioides brasiliensis [PABG06245]
Coccidioides immitis [CIMG05085]
Coccidioides posadasii [CPSG04773]
Uncinocarpus reesii [UREG06473]
Microsporum canis [MCYG04329]
Microsporum gypseum [MGYG02281]
Trichophyton equinum [TEQG01836]
Rhystidhysteron rufulum [Rr8653]
Cochliobolus heterostrophus [Cohe25696]
Cochliobolus sativus [Cos33230]
Leptosphaeria maculans [Lm5587]
Setosphaeria turcica [St162304]
Stagonospora nodorum [SNU06585]
Pyrenophora tritici-repentis [PTRG01396]
Pyrenophora teres [Pt7603]
Alternaria brassicicola [AB04770]
Sporotrichum thermophile [Spt2117072]
Fusarium graminearum [FGSG08754]
Fusarium oxysporum [FOXG03011]
Fusarium verticillioides [FVEG01866]
Nectria haematococca [Neha103749]
Trichoderma reesei [Tre64601]
Trichoderma virens [Trvi92746]
Trichoderma atoviride [Trat36796]
Cryphonectria parasitica [Crpa103933]
Chaetomium globosum [CHG09120]
Sporotrichum thermophile [Spt2306584]
Thielavia terrestris [Tt2109940]
Podospora anserina [Pa47980]
Neurospora tetrasperma [Nm103478]
Verticillium dahliae [VDAG01531]
Verticillium albo-atrum [VDBG08035]
Acremonium alcalophilum [Aa1064027]
Magnaporthe grisea [MGG14638]
Septoria populicola [Sep103692]
Septoria musiva [Smu41976]
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Mycosphaerella fijiensis [Myfi83140]
Dothistroma septosporum [Dos43396]
Baudoinia compniacensis [Bc121357]
Nectria haematococca [Neha36061]
Trichoderma atoviride [Trat44839]
Fusarium graminearum [FGSG09451]
Fusarium oxysporum [FOXG11610]
Fusarium verticillioides [FVEG10211]
Mycosphaerella graminicola [Mygr105207]
Chaetomium globosum [CHG08813]
Podospora anserina [Pa57630]
Aspergillus aculeatus [Aa33967]
Aspergillus carbonarius [Ac408317]
Aspergillus fumigatus [Afu3g07440]
Neosartorya fischeri [NFIA069720]
Debaryomyces hansenii [504224473]
Pichia stipitis [Pist33477]
Candida albicans SC5314 [C193177]
Candida tenuis [Ct130798]
Spathaspora passalidarum [Sp138481]
Candida glabrata [50285951]
Saccharomyces cerevisiae [6324506]
Ashbya gossypii [45190516]
Pichia membranifaciens [Pm43043]
Wickerhamomyces anomalus [Wa80253]
Yarrowia lipolytica [50555826]
Candida caseinolytica [Cc82621]
Hansenula polymorpha NCYC 495 leu1.1 [Hp82845]
Schizosaccharomyces octosporus [SOCG05426]
Schizosaccharomyces pombe [19075322]
Schizosaccharomyces cryophilus [SPOG05464]
Schizosaccharomyces japonicus [SJAG01054]
Punctularia strigosozonata [Pus71752]
Auricularia delicata [Ad114478]
Heterobasidion annosum [Hea407176]
Schizophyllum commune [Scco51868]
Laccaria bicolor [Labi306038]
Stereum hirsutum [Sh160116]
Wallemia sebi [Ws31669]
Coprinus cinereus [CC1G04209]
Gloeophyllum trabeum [Glt36483]
Pleurotus ostreatus PC15 [Plo1084532]
Pleurotus ostreatus PC9 [Po60274]
Wolfiporia cocos [Wc142352]
Postia placenta [Popl52965]
Ganoderma sp. [Gs51217]
Fomitopsis pinicola [Fp129628]
Agaricus bisporus [Ab190437]
Phlebia brevispora [Pb80531]
Phanerochaete carnosa [Pc255918]
Phlebiopsis gigantea [Pg317750]
Bjerkandera adusta [Ba151634]
Dacryopinax sp. [Ds22616]
Cryptococcus neoformans [CNAG06467]
Melampsora laricis-populina [Mela109238]
Puccinia graminis [PGTG15469]
Malassezia globosa [Mg2383]
Ustilago maydis [UM04117]
Rhodotorula graminis [Rg53008]
Allomyces macrogynus atcc 38327 [AMAG02082]
Spizellomyces punctatus daom br117 [Sp04094T0]
Mucor circinelloides [Muci36764]
Batrachochytrium dendrobatidis [BDEG07617]
dCMP_cyt_deam_1
PseudoU_synth_2
S4
Methyltransf_16
PAP2
41
60
81
38
39
100
77
24
31
2
90
99
29
21
64
32
52
42
46
29
43
76
30
60
65
89
100
31
72
100
92
29
69
24
70
55
88
20
32
56
20
62
32
13
55
100
95
49
10
21
9
16
45
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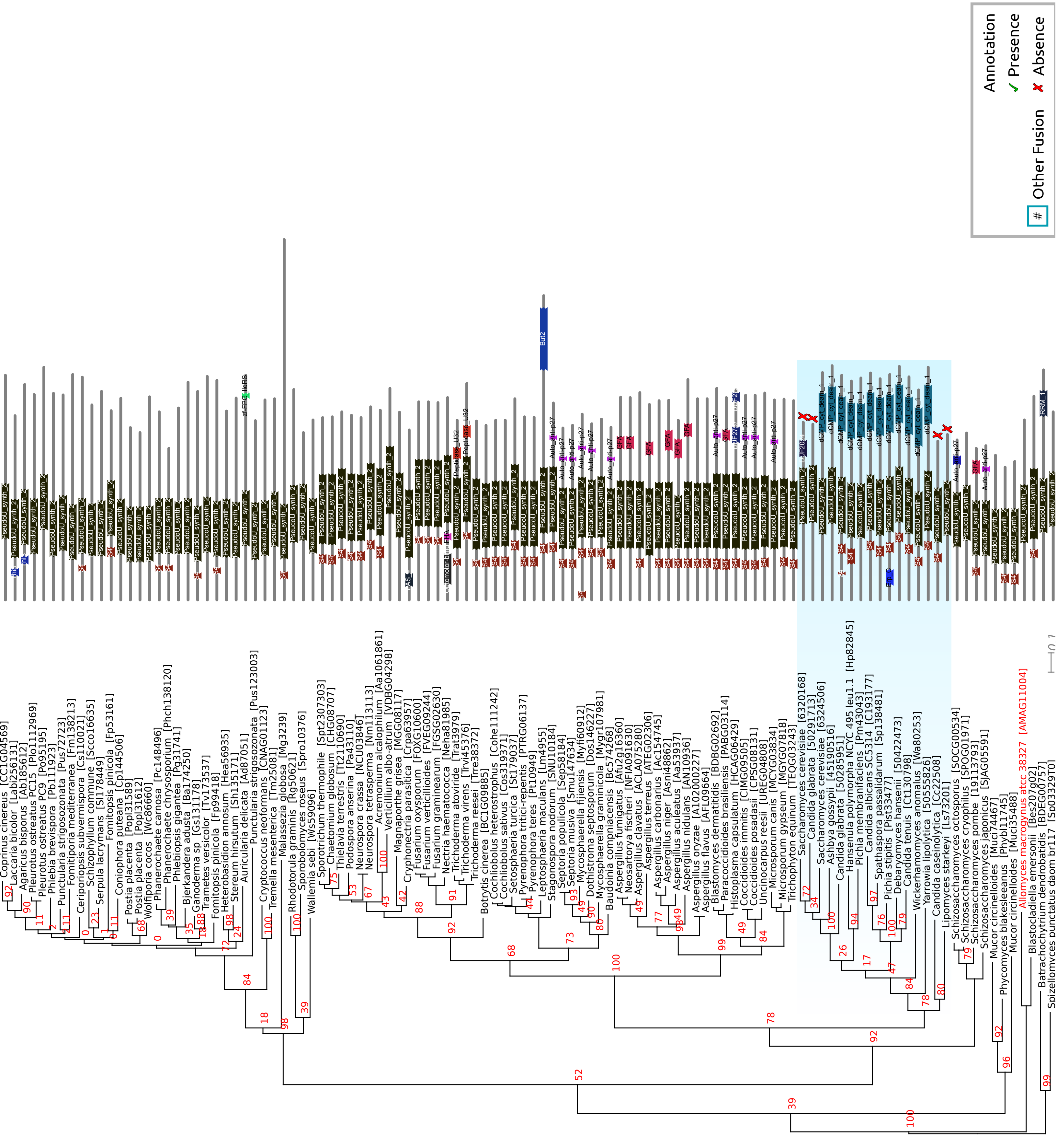
Annotation
✓ Presence
✗ Absence
Other Fusion
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dCMP_cyt_deam_1
Auto_anti-p27
GFA
Bcl2
Peptidase_U32
zf-FPG_IleRS
RRM_1
0.1
Coprinus cinereus [CC1G04569]
Laccaria bicolor [Labi256131]
Agaricus bisporus [Ab185612]
Pleurotus ostreatus PC15 [Plo1112969]
Pleurotus ostreatus PC9 [Po95195]
Phlebia brevispora [Pb111923]
Punctularia strigosozonata [Pus72723]
Fomitiporia mediterranea [Fm138213]
Ceriporiopsis subvermispora [Cs110021]
Schizophyllum commune [Scco16635]
Serpula lacrymans [Sl178449]
Fomitopsis pinicola [Fp53161]
Coniophora puteana [Cp144506]
Postia placenta [Popl31589]
Postia placenta [Popl31612]
Wolfiporia cocos [Wc86660]
Phanerochaete carnosa [Pc148496]
Phanerochaete chrysosporium [Phch138120]
Phlebiopsis gigantea [Pg31741]
Bjerkandera adusta [Ba174250]
Ganoderma sp [Gs1311178]
Trametes versicolor [Tv173537]
Fomitopsis pinicola [Fp99418]
Heterobasidion annosum [Hea56935]
Stereum hirsutum [Sh135171]
Auricularia delicata [Ad87051]
Punctularia strigosozonata [Pus123003]
Cryptococcus neoformans [CNAG01123]
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Malassezia globosa [Mg3239]
Rhodotorula graminis [Rg50621]
Sporobolomyces roseus [Spro10376]
Wallemia sebi [Ws59096]
Sporotrichum thermophile [Spt2307303]
Chaetomium globosum [CHG08707]
Thielavia terrestris [Tt2110690]
Podospora anserina [Pa43110]
Neurospora crassa [NCU03846]
Neurospora tetrasperma [Nm113113]
Acremonium alcalophilum [Aa1061861]
Verticillium albo-atrum [VDBG04298]
Magnaporthe grisea [MGG08117]
Cryphonectria parasitica [Crpa63957]
Fusarium oxysporum [FOXG10600]
Fusarium verticillioides [FVEG09244]
Fusarium graminearum [FGSG02630]
Nectria haematococca [Neha81985]
Trichoderma atoviride [Trat39797]
Trichoderma virens [Trvi45376]
Trichoderma reesei [Tre383372]
Botrytis cinerea [BC1G09885]
Cochliobolus heterostrophus [Cohe1111242]
Cochliobolus sativus [Cos319371]
Setosphaeria turcica [St179037]
Pyrenophora tritici-repentis [PTRG06137]
Pyrenophora teres [Pt10949]
Leptosphaeria maculans [Lm4955]
Stagonospora nodorum [SNU10184]
Septoria populicola [Sep58184]
Septoria musiva [Smu147634]
Mycosphaerella fijiensis [Myfi60912]
Dothistroma septosporum [Dos146227]
Mycosphaerella graminicola [Mygr107981]
Baudoinia compniacensis [Bc574268]
Aspergillus fumigatus [Afu2g16360]
Neosartorya fischeri [NFIA091630]
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Aspergillus terreus [ATEG02306]
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Aspergillus aculeatus [Aa53937]
Aspergillus nidulans [AN10936]
Aspergillus oryzae [A10200227]
Aspergillus flavus [AFL09664]
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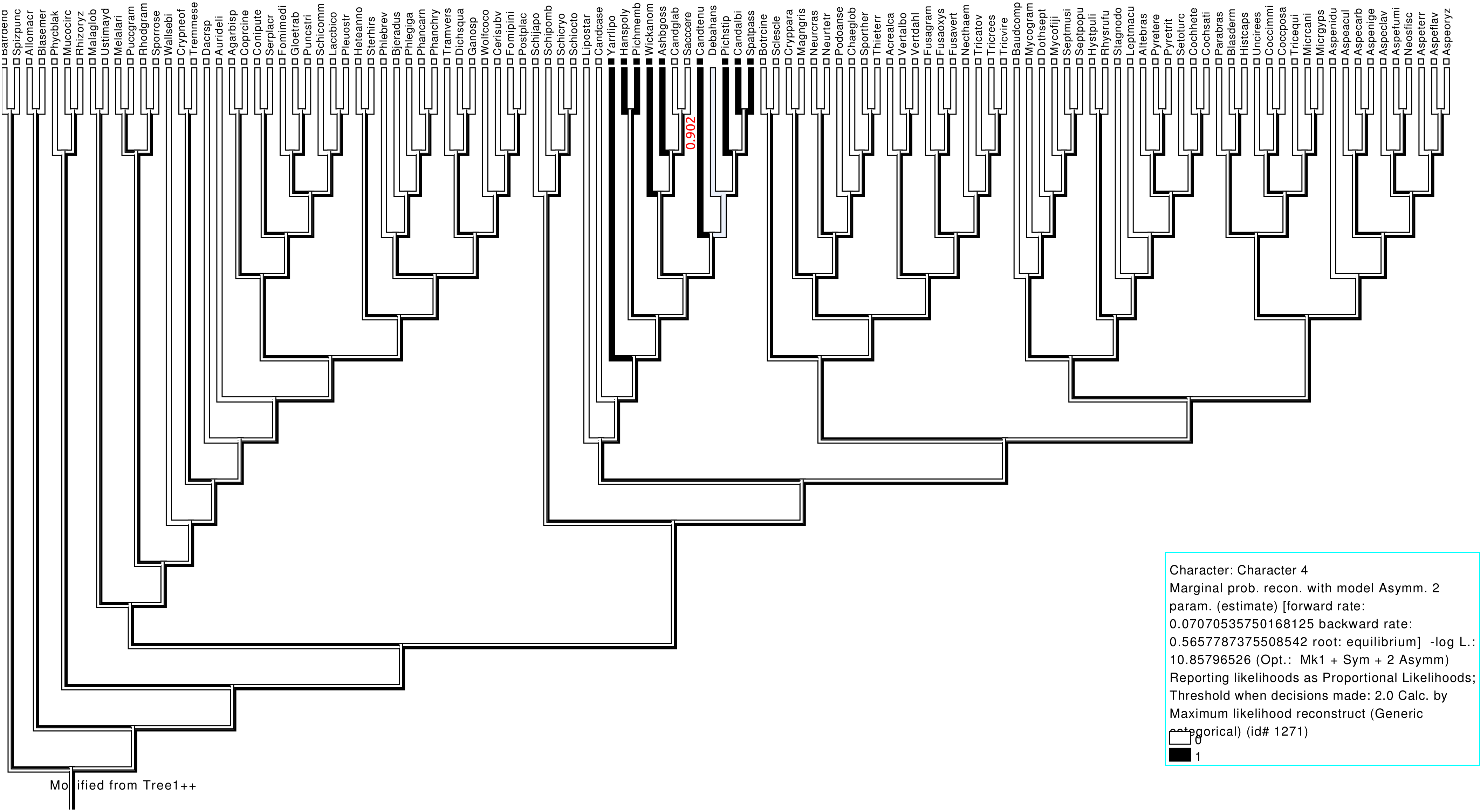
Paracoccidioides brasiliensis [PABG03114]
Histoplasma capsulatum [HCAG06429]
Coccidioides immitis [CIMG09505]
Coccidioides posadasii [CPSG08131]
Uncinocarpus reesii [UREG04808]
Microsporum canis [MCYG03834]
Microsporum gypseum [MGYG07818]
Trichophyton equinum [TEQG03243]
Saccharomyces cerevisiae [6320168]
Candida glabrata [50291713]
Saccharomyces cerevisiae [6324506]
Ashbya gossypii [45190516]
Candida glabrata [50285951]
Hansenula polymorpha NCYC 495 leu1.1 [Hp82845]
Pichia membranifaciens [Pm43043]
Candida albicans SC5314 [C1193177]
Spathaspora passalidarum [Sp138481]
Pichia stipitis [Pist33477]
Debaryomyces hansenii [50422473]
Candida tenuis [Ct130798]
Wickerhamomyces anomalus [Wa80253]
Yarrowia lipolytica [50555826]
Candida caseinolytica [Cc22508]
Lipomyces starkeyi [Ls73201]
Schizosaccharomyces octosporus [SOCG00534]
Schizosaccharomyces cryophilus [SPOG01971]
Schizosaccharomyces pombe [19113793]
Schizosaccharomyces japonicus [SJAG05591]
Mucor circinelloides [Muci74467]
Phycomyces blakesleeanus [Phybl11745]
Mucor circinelloides [Muci35488]
Allomyces macrogynus atcc 38327 [AMAG11004]
Blastocladiella emersonii [Bes207g02]
Batrachochytrium dendrobatidis [BDEG00757]
Spizellomyces punctatus daom br117 [Sp03329T0]


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
0.902
Character: Character 4
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.07070535750168125 backward rate: 0.5657787375508542 root: equilibrium] -log L.: 10.85796526 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1
Modified from Tree1++

Putative Fusion 5

September 26, 2012

1 Fasta Sequences

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>lcl|AMAG_11801 unnamed protein product
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>lcl|AMAG_02082 unnamed protein product
MSTTTNAADAADRYWLRHAITIAHRSAPVPSAYCVGAVLVSRTSTILPRASDAITPPDAPTNQIVLATGFSRELPGNTHA
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LEEECWAPNRHLRERYDDGRNGAPRDSGAAADA
```

2 Annotated Phylograms

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```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
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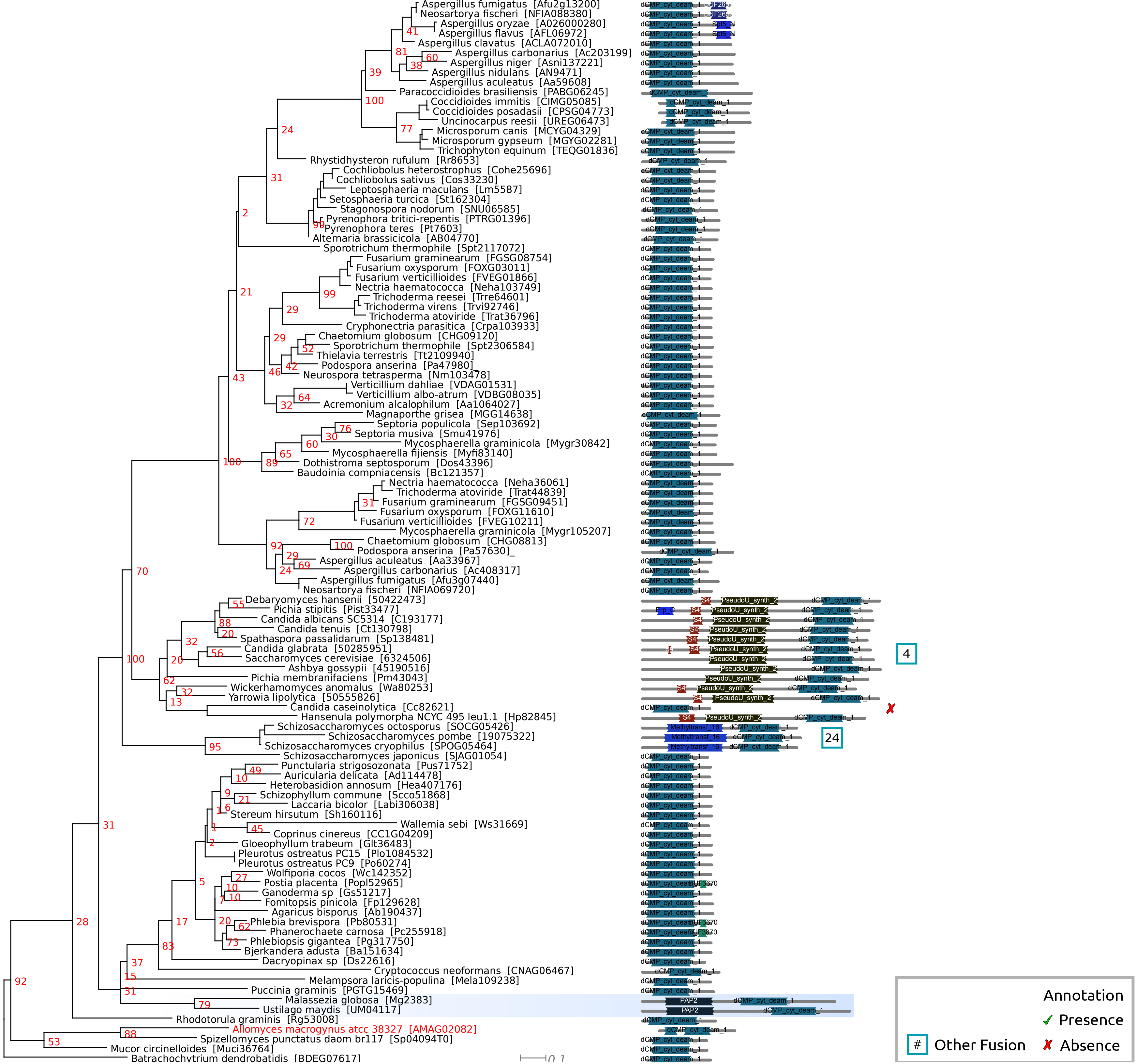
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Aspergillus fumigatus [Afu2g13200]
Neosartorya fischeri [NFIA088380]
Aspergillus oryzae [A026000280]
Aspergillus flavus [AFL06972]
Aspergillus clavatus [ACLA072010]
Aspergillus carbonarius [Ac203199]
Aspergillus niger [Asni137221]
Aspergillus nidulans [AN9471]
Aspergillus aculeatus [Aa59608]
Paracoccidioides brasiliensis [PABG06245]
Coccidioides immitis [CIMG05085]
Coccidioides posadasii [CPSG04773]
Uncinocarpus reesii [UREG06473]
Microsporum canis [MCYG04329]
Microsporum gypseum [MGYG02281]
Trichophyton equinum [TEQG01836]
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Cochliobolus heterostrophus [Cohe25696]
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Leptosphaeria maculans [Lm5587]
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Nectria haematococca [Neha103749]
Trichoderma reesei [Trre64601]
Trichoderma virens [Trvi92746]
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Chaetomium globosum [CHG09120]
Sporotrichum thermophile [Spt2306584]
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Podospora anserina [Pa47980]
Neurospora tetrasperma [Nm103478]
Verticillium dahliae [VDAG01531]
Verticillium albo-atrum [VDBG08035]
Acremonium alcalophilum [Aa1064027]
Magnaporthe grisea [MGG14638]
Septoria populicola [Sep103692]
Septoria musiva [Smu41976]
Mycosphaerella graminicola [Mygr30842]
Mycosphaerella fijiensis [Myfi83140]
Dothistroma septosporum [Dos43396]
Baudoinia compniacensis [Bc121357]
Nectria haematococca [Neha36061]
Trichoderma atoviride [Trat44839]
Fusarium graminearum [FGSG09451]
Fusarium oxysporum [FOXG11610]
Fusarium verticillioides [FVEG10211]
Mycosphaerella graminicola [Mygr105207]
Chaetomium globosum [CHG08813]
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Aspergillus aculeatus [Aa33967]
Aspergillus carbonarius [Ac408317]
Aspergillus fumigatus [Afu3g07440]
Neosartorya fischeri [NFIA069720]
Debaryomyces hansenii [50422473]
Pichia stipitis [Pist33477]
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Candida caseinolytica [Cc82621]
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Schizosaccharomyces japonicus [SJAG01054]
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Auricularia delicata [Ad114478]
Heterobasidion annosum [Hea407176]
Schizophyllum commune [Scco51868]
Laccaria bicolor [Labi306038]
Stereum hirsutum [Sh160116]
Wallemia sebi [Ws31669]
Coprinus cinereus [CC1G04209]
Gloeophyllum trabeum [Glt36483]
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Postia placenta [Popl52965]
Ganoderma sp [Gs51217]
Fomitopsis pinicola [Fp129628]
Agaricus bisporus [Ab190437]
Phlebia brevispora [Pb80531]
Phanerochaete carnosa [Pc255918]
Phlebiopsis gigantea [Pg317750]
Bjerkandera adusta [Ba151634]
Dacryopinax sp [Ds22616]
Cryptococcus neoformans [CNAG06467]
Melampsora laricis-populina [Mela109238]
Puccinia graminis [PGTG15469]
Malassezia globosa [Mg2383]
Ustilago maydis [UM04117]
Rhodotorula graminis [Rg53008]
Allomyces macrogynus atcc 38327 [AMAG02082]
Spizellomyces punctatus daom br117 [Sp04094T0]
Mucor circinelloides [Muci36764]
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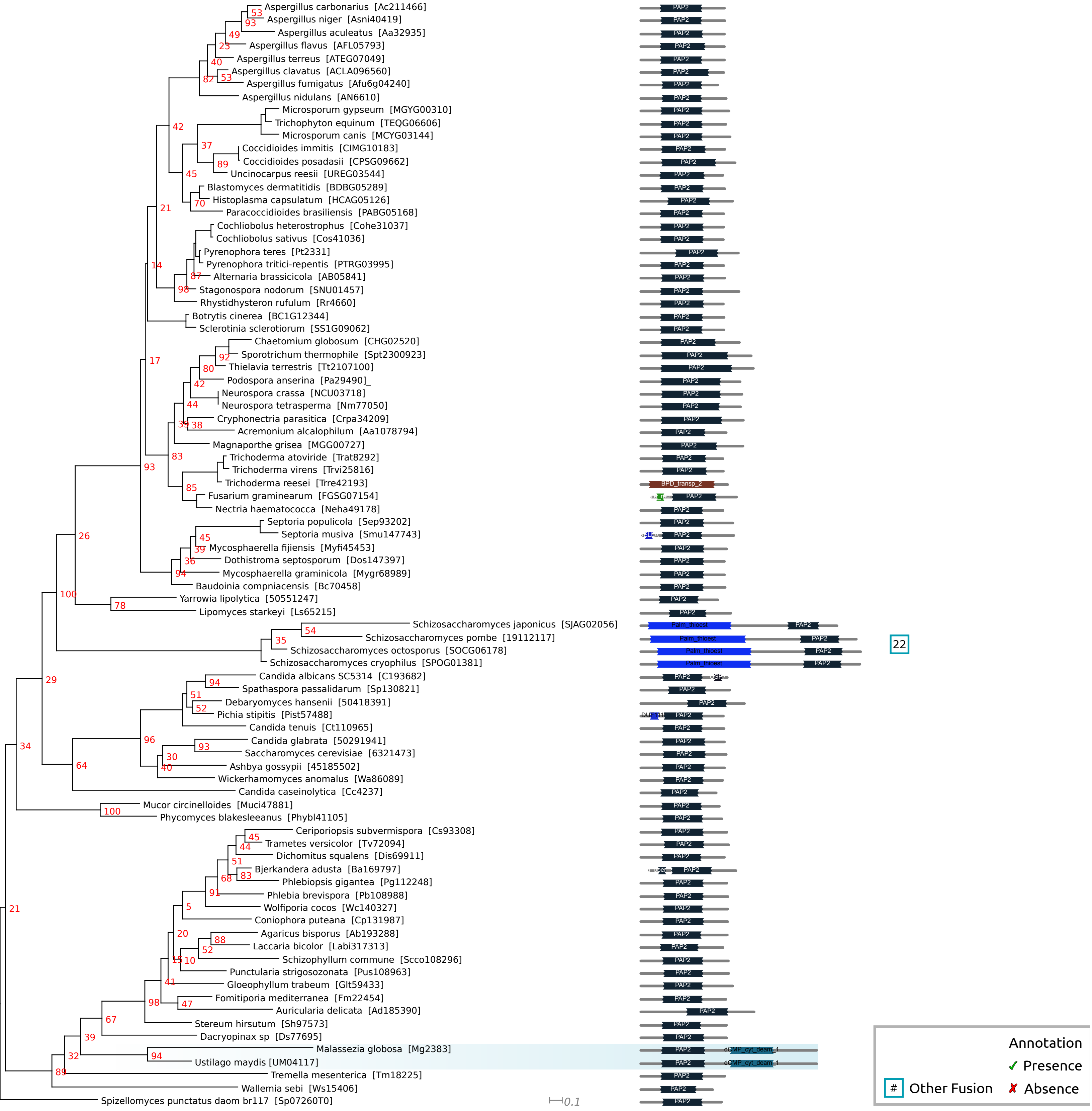
Other Fusion
✗ Absence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Stagonospora nodorum [SNU01457]
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Botrytis cinerea [BC1G12344]
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Magnaporthe grisea [MGG00727]
Trichoderma atoviride [Trat8292]
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Fusarium graminearum [FGSG07154]
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Septoria populicola [Sep93202]
Septoria musiva [Smu147743]
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Dothistroma septosporum [Dos147397]
Mycosphaerella graminicola [Mygr68989]
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Yarrowia lipolytica [50551247]
Lipomyces starkeyi [Ls65215]
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Pichia stipitis [Pist57488]
Candida tenuis [Ct110965]
Candida glabrata [50291941]
Saccharomyces cerevisiae [6321473]
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Wickerhamomyces anomalus [Wa86089]
Candida caseinolytica [Cc4237]
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Phycomyces blakesleeanus [Phybl41105]
Ceriporiopsis subvermispora [Cs93308]
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Bjerkandera adusta [Ba169797]
Phlebiopsis gigantea [Pg112248]
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Fomitiporia mediterranea [Fm22454]
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Stereum hirsutum [Sh97573]
Dacryopinax sp [Ds77695]
Malassezia globosa [Mg2383]
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Spizellomyces punctatus daom br117 [Sp07260T0]
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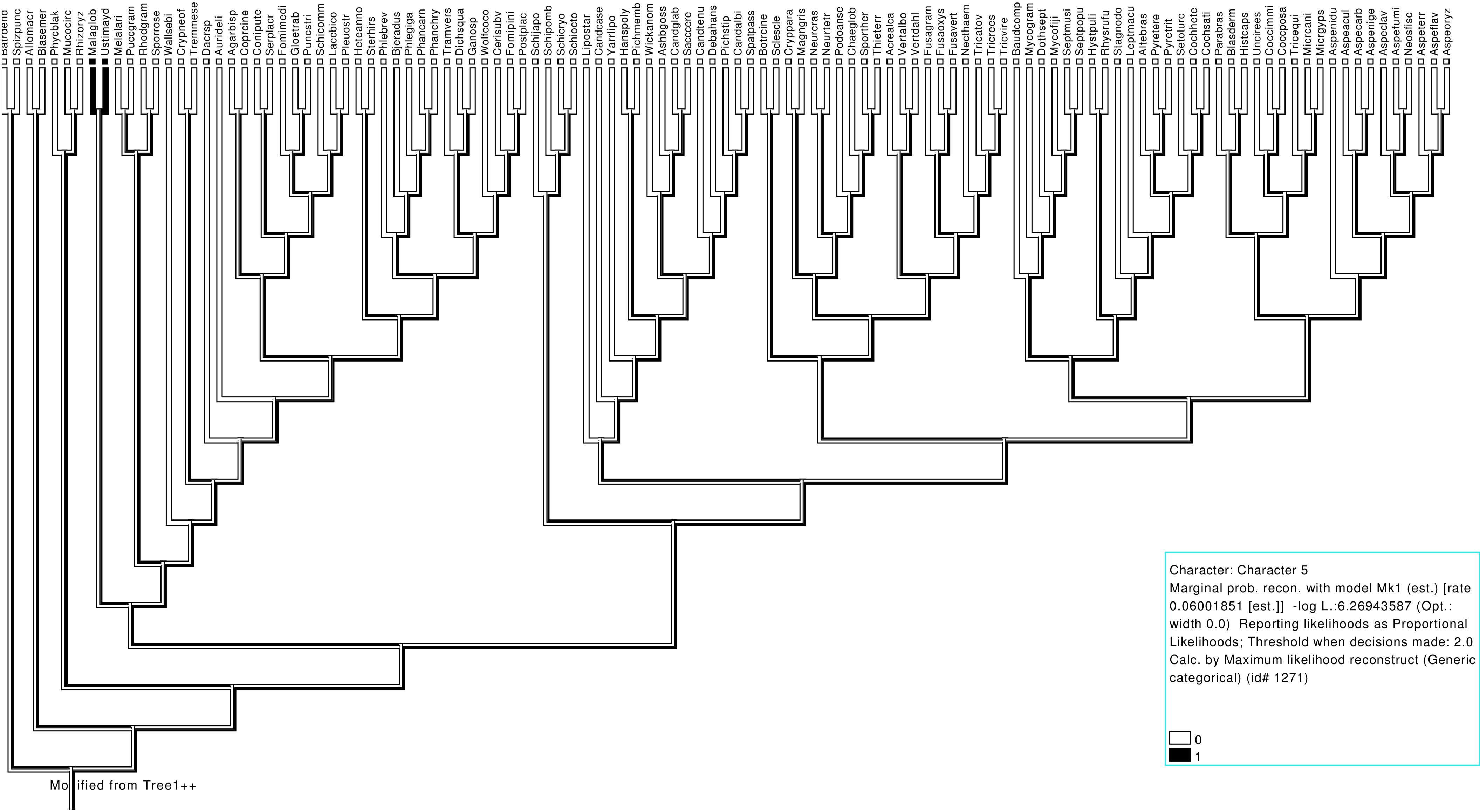
Other Fusion
✗ Absence



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☐ 0
■ 1

Putative Fusion 6

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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RQRLAEAGLPDVPLTLFAKGANYALKKLADESGYDVLGLDWCIDPAEARRIVGDKVALQGNMDPNVLYGGREAIEQTVKR
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FLDVRGNLNTRLAKLDAEDGPYAALILAKAGLVRLGWGDRITADLNPPTLYHAVSQGALAVEIRDDDLESLEILQKLTHR
GTDWKCRAERALLRVLEGGCSVPVGVYTTLTKEGGDELLEITGCVTSLDGSEHVEESLKEKVTSVEEAEAVGVKLAKVLM
EKGATRILDEINKDREHRIELAKVADAKGGP
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2 Annotated Phylograms

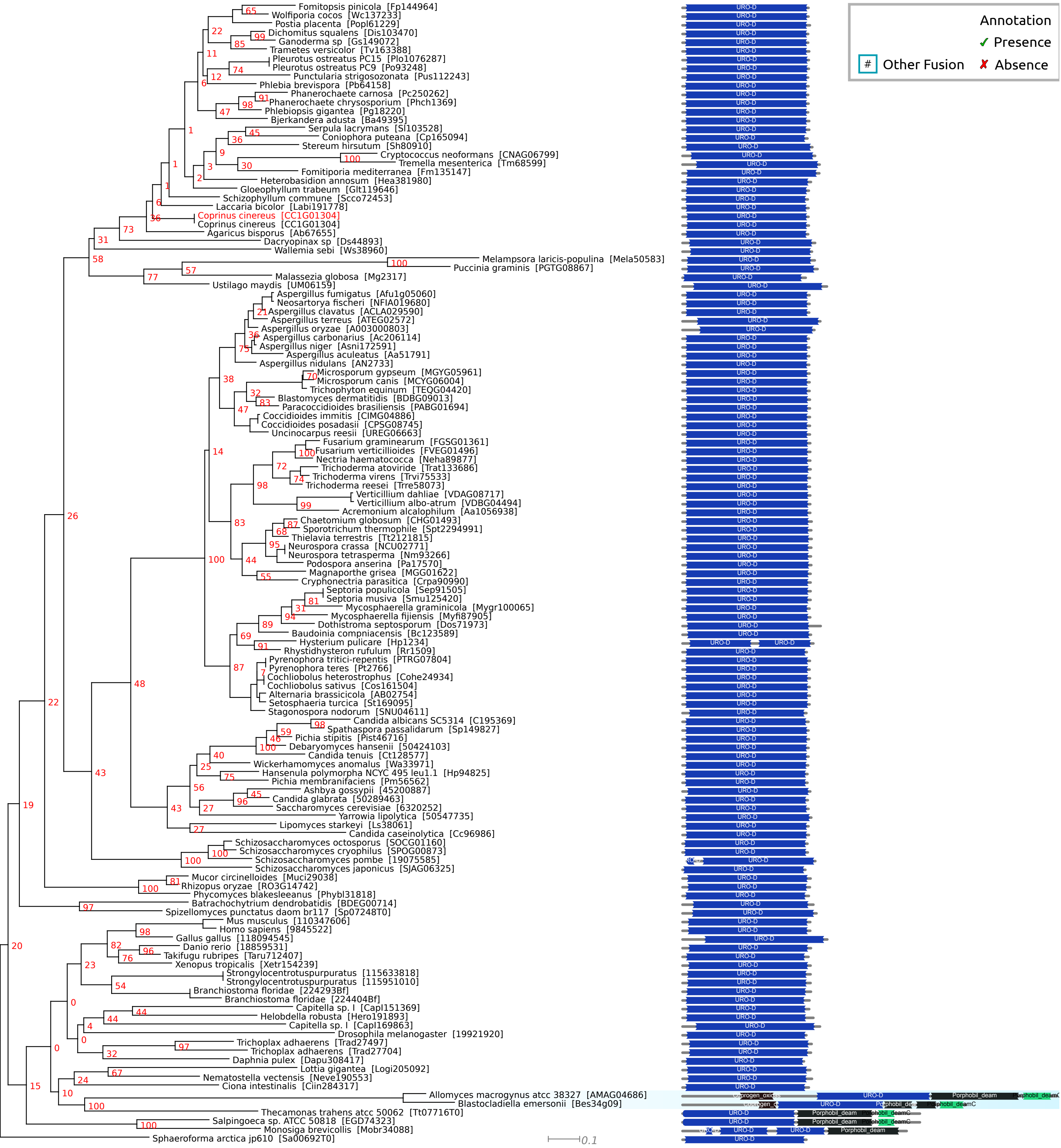
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



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✓ Presence
Other Fusion
✗ Absence
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Wolfiporia cocos [Wc137233]
Postia placenta [Popl61229]
Dichomitus squalens [Dis103470]
Ganoderma sp [Gs149072]
Trametes versicolor [Tv163388]
Pleurotus ostreatus PC15 [Plo1076287]
Pleurotus ostreatus PC9 [Po93248]
Punctularia strigosozonata [Pus112243]
Phlebia brevispora [Pb64158]
Phanerochaete carnosa [Pc250262]
Phanerochaete chrysosporium [Phch1369]
Phlebiopsis gigantea [Pg18220]
Bjerkandera adusta [Ba49395]
Serpula lacrymans [Sl103528]
Coniophora puteana [Cp165094]
Stereum hirsutum [Sh80910]
Cryptococcus neoformans [CNAG06799]
Tremella mesenterica [Tm68599]
Fomitiporia mediterranea [Fm135147]
Heterobasidion annosum [Hea381980]
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Schizophyllum commune [Scco72453]
Laccaria bicolor [Labi191778]
Coprinus cinereus [CC1G01304]
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Agaricus bisporus [Ab67655]
Dacryopinax sp [Ds44893]
Wallemia sebi [Ws38960]
Melampsora laricis-populina [Mela50583]
Puccinia graminis [PGTG08867]
Malassezia globosa [Mg2317]
Ustilago maydis [UM06159]
Aspergillus fumigatus [Afu1g05060]
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Aspergillus clavatus [ACLA029590]
Aspergillus terreus [ATEG02572]
Aspergillus oryzae [A003000803]
Aspergillus carbonarius [Ac206114]
Aspergillus niger [Asni172591]
Aspergillus aculeatus [Aa51791]
Aspergillus nidulans [AN2733]
Microsporum gypseum [MGYG05961]
Microsporum canis [MCYG06004]
Trichophyton equinum [TEQG04420]
Blastomyces dermatitidis [BDBG09013]
Paracoccidioides brasiliensis [PABG01694]
Coccidioides immitis [CIMG04886]
Coccidioides posadasii [CPSG08745]
Uncinocarpus reesii [UREG06663]
Fusarium graminearum [FGSG01361]
Fusarium verticillioides [FVEG01496]
Nectria haematococca [Neha89877]
Trichoderma atoviride [Trat133686]
Trichoderma virens [Trvi75533]
Trichoderma reesei [Trre58073]
Verticillium dahliae [VDAG08717]
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Acremonium alcalophilum [Aa1056938]
Chaetomium globosum [CHG01493]
Sporotrichum thermophile [Spt2294991]
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Neurospora crassa [NCU02771]
Neurospora tetrasperma [Nm93266]
Podospora anserina [Pa17570]
Magnaporthe grisea [MGG01622]
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Septoria populicola [Sep91505]
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Dothistroma septosporum [Dos71973]
Baudoinia compniacensis [Bc123589]
Hysterium pulicare [Hp1234]
Rhystidhysteron rufulum [Rr1509]
Pyrenophora tritici-repentis [PTRG07804]
Pyrenophora teres [Pt2766]
Cochliobolus heterostrophus [Cohe24934]
Cochliobolus sativus [Cos161504]
Alternaria brassicicola [AB02754]
Setosphaeria turcica [St169095]
Stagonospora nodorum [SNU04611]
Candida albicans SC5314 [C195369]
Spathaspora passalidarum [Sp149827]
Pichia stipitis [Pist46716]
Debaryomyces hansenii [50424103]
Candida tenuis [Ct128577]
Wickerhamomyces anomalus [Wa33971]
Hansenula polymorpha NCYC 495 leu1.1 [Hp94825]
Pichia membranifaciens [Pm56562]
Ashbya gossypii [45200887]
Candida glabrata [50289463]
Saccharomyces cerevisiae [6320252]
Yarrowia lipolytica [50547735]
Lipomyces starkeyi [Ls38061]
Candida caseinolytica [Cc96986]
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Schizosaccharomyces pombe [19075585]
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Mucor circinelloides [Muci29038]
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Phycomyces blakesleeanus [Phybl31818]
Batrachochytrium dendrobatidis [BDEG00714]
Spizellomyces punctatus daom br117 [Sp07248T0]
Mus musculus [110347606]
Homo sapiens [9845522]
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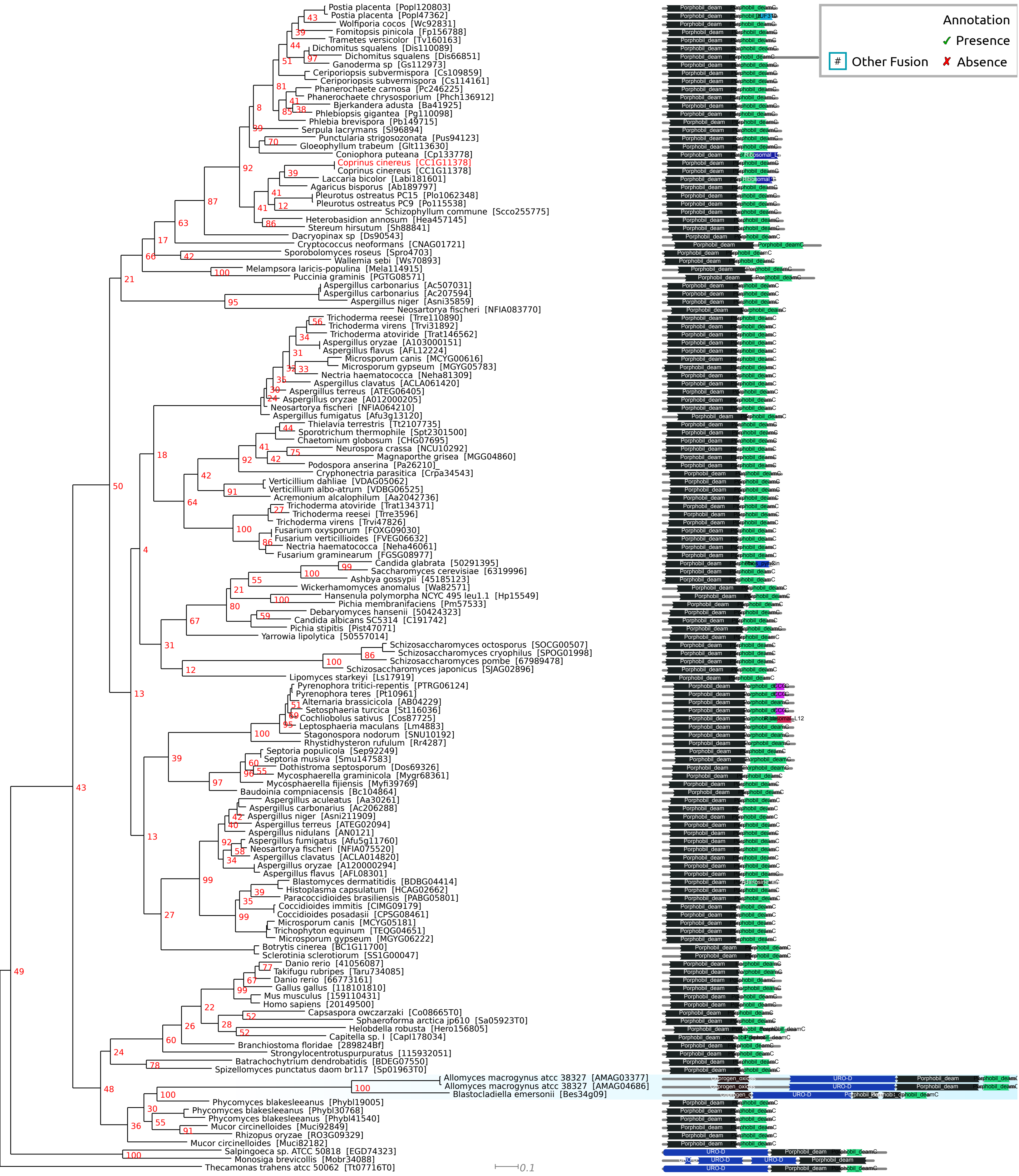
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Other Fusion
✗ Absence
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Coniophora puteana [Cp133778]
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Agaricus bisporus [Ab189797]
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Pleurotus ostreatus PC9 [Po115538]
Schizophyllum commune [Scco255775]
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Puccinia graminis [PGTG08571]
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Neosartorya fischeri [NFIA083770]
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Trichoderma virens [Trvi31892]
Trichoderma atoviride [Trat146562]
Aspergillus oryzae [A103000151]
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Microsporum canis [MCYG00616]
Microsporum gypseum [MGYG05783]
Nectria haematococca [Neha81309]
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Neosartorya fischeri [NFIA064210]
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Sporotrichum thermophile [Spt2301500]
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Magnaporthe grisea [MGG04860]
Podospora anserina [Pa26210]
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Wickerhamomyces anomalus [Wa82571]
Hansenula polymorpha NCYC 495 leu1.1 [Hp15549]
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Candida albicans SC5314 [C191742]
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Dothistroma septosporum [Dos69326]
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Takifugu rubripes [Taru734085]
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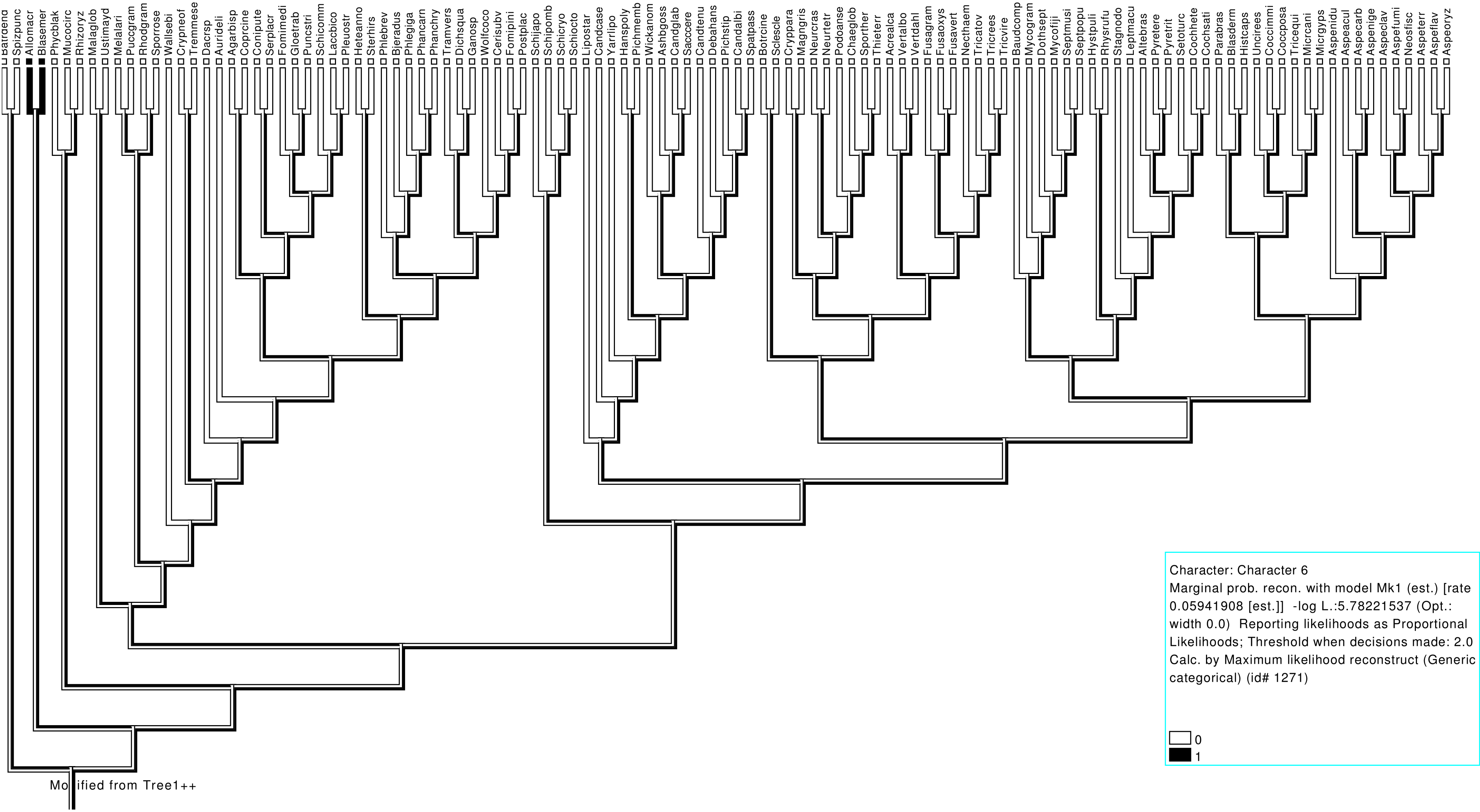

Character: Character 6
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□ 0
■ 1

Putative Fusion 7

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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FQEAGFDWREAGCSMCLGMNPDQLKPGERCASTSNRNFEGRQGAGGRTHLLSPAMAAAAGIKGCLTDVRHMEVAEIALTG
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WPWLDGKGYKGKATKIEINGGQQKKAKLDW
```

2 Annotated Phylograms

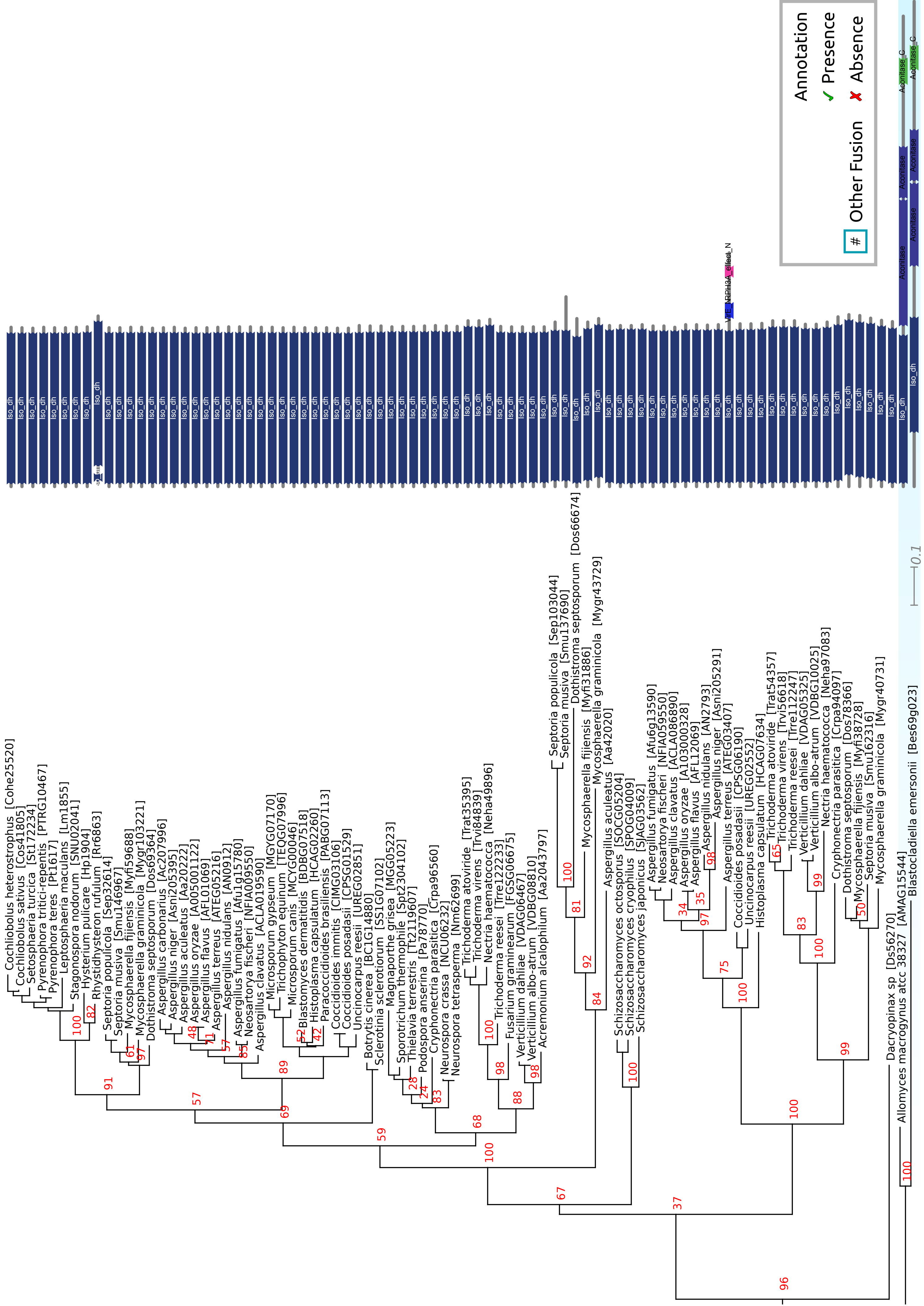
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



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Leptosphaeria maculans [Lm1855]
Stagonospora nodorum [SNU02041]
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Septoria musiva [Smu146967]
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Dothistroma septosporum [Dos69364]
Aspergillus carbonarius [Ac207996]
Aspergillus niger [Asni205395]
Aspergillus aculeatus [Aa20222]
Aspergillus oryzae [A005001122]
Aspergillus flavus [AFL01069]
Aspergillus terreus [ATEG05216]
Aspergillus nidulans [AN0912]
Aspergillus fumigatus [Afu1g15780]
Neosartorya fischeri [NFIA009550]
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Microsporum gypseum [MGYG07170]
Trichophyton equinum [TEQG07996]
Microsporum canis [MCYG00046]
Blastomyces dermatitidis [BDBG07518]
Histoplasma capsulatum [HCAG02260]
Paracoccidioides brasiliensis [PABG07113]
Coccidioides immitis [CIMG03106]
Coccidioides posadasii [CPSG01529]
Uncinocarpus reesii [UREG02851]
Botrytis cinerea [BC1G14880]
Sclerotinia sclerotiorum [SS1G07102]
Magnaporthe grisea [MGG05223]
Sporotrichum thermophile [Spt2304102]
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Podospora anserina [Pa78770]
Cryphonectria parasitica [Crpa96560]
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Neurospora tetrasperma [Nm62699]
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Trichoderma virens [Trvi84839]
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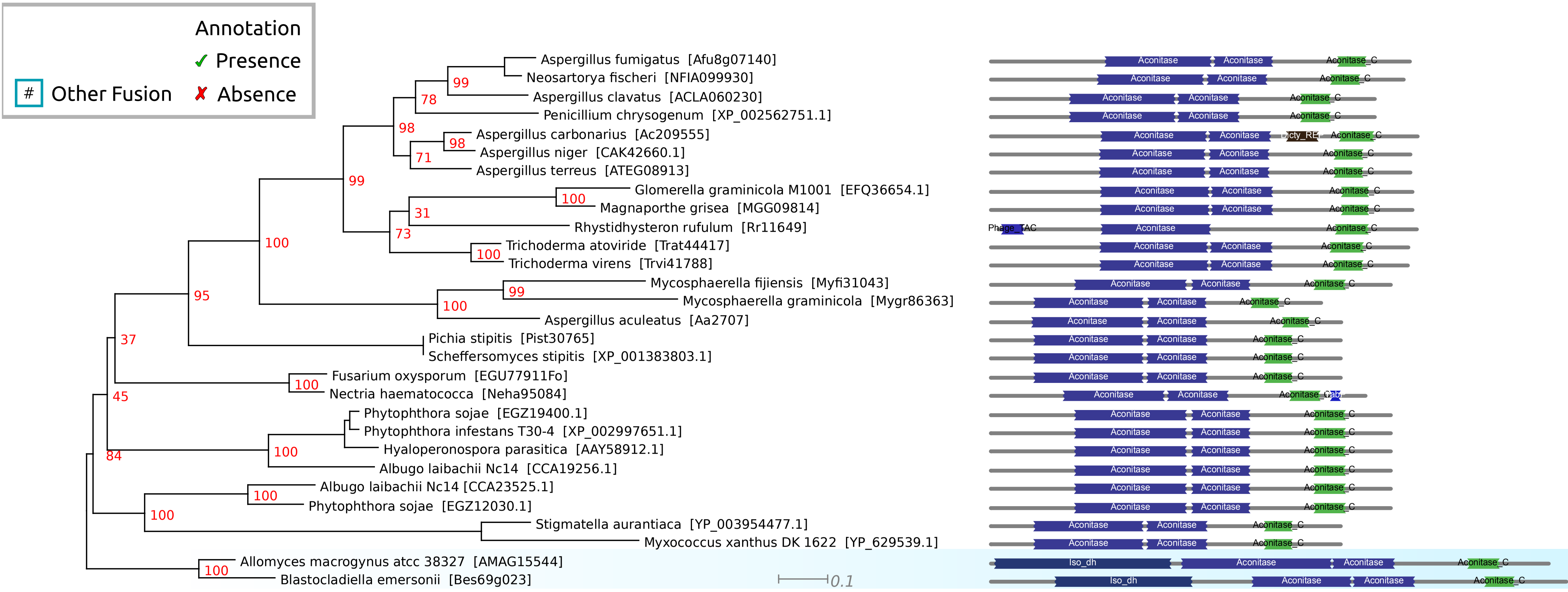
✗ Absence
Other Fusion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Fusarium oxysporum [EGU77911Fo]
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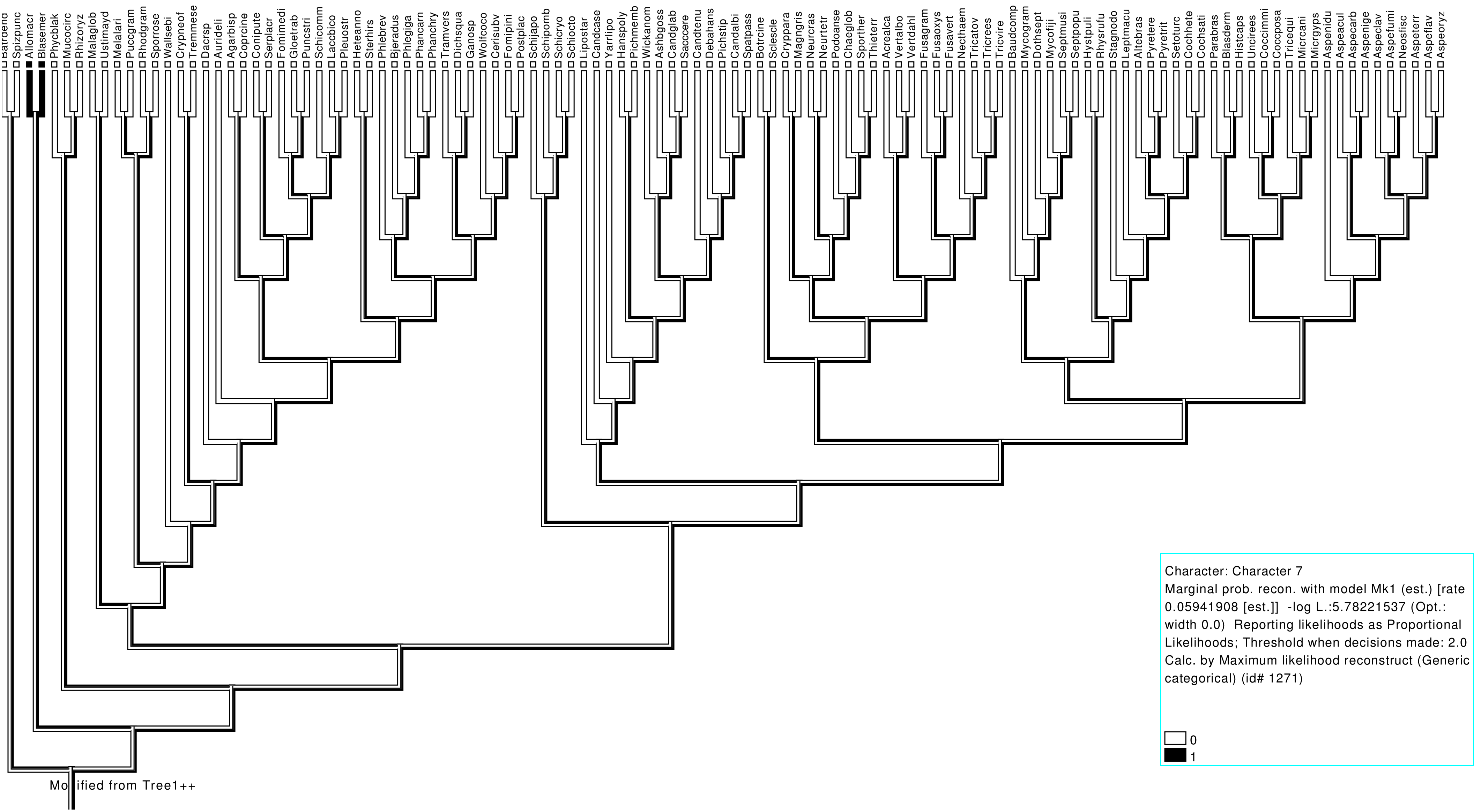
Phage_TAC
Iso_dh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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
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Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 7
Marginal prob. recon. with model Mk1 (est.) [rate 0.05941908 [est.]] -log L.:5.78221537 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1
Modified from Tree1++

Putative Fusion 8

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|173045Sc unnamed protein product
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SDWVGRQESPESLHFMLAGGLTPENVGDALRLNGVIGVDVSGGVETNGVKDSNKIANFVKNAKK
```

2 Annotated Phylograms

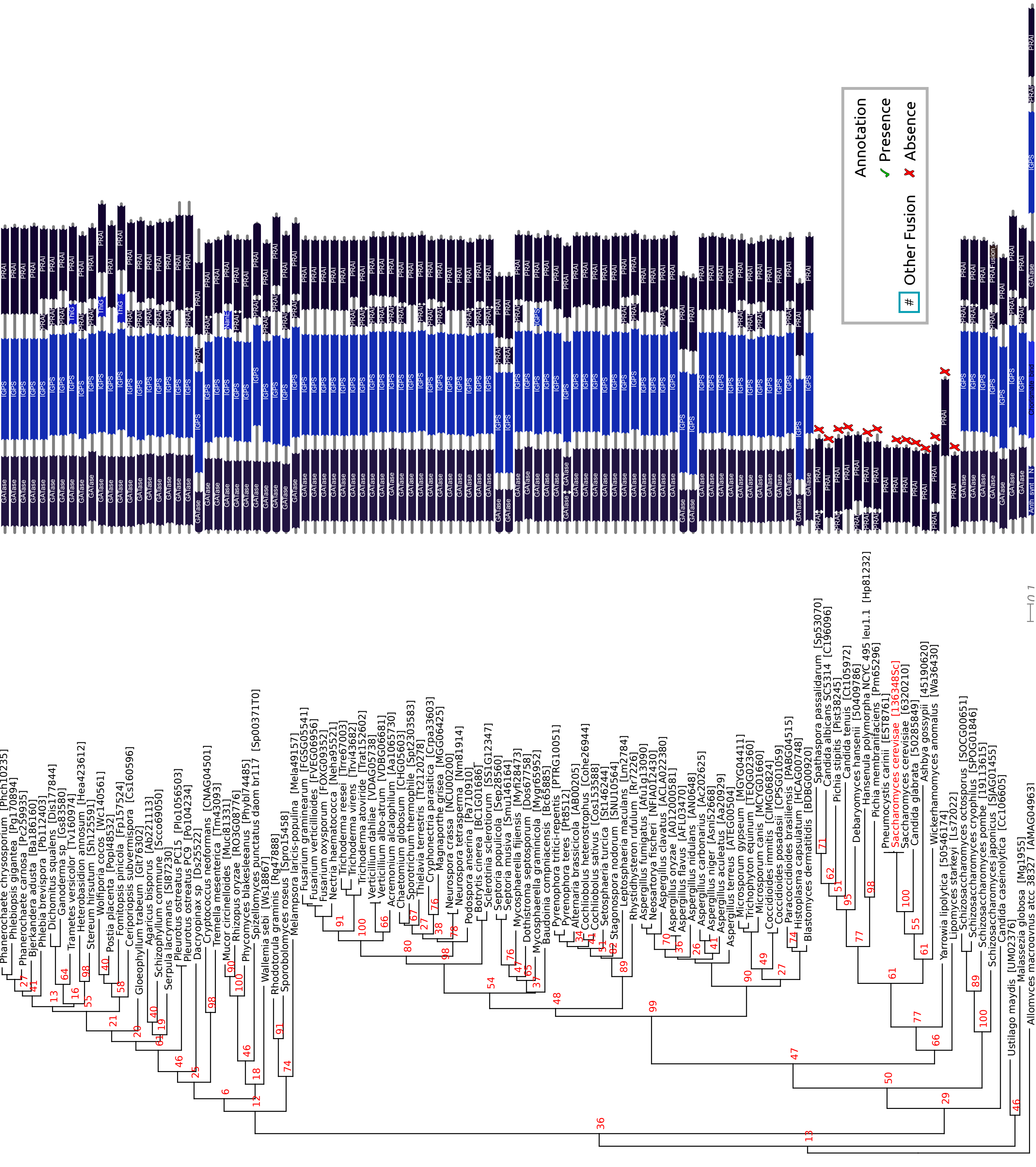
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



Annotation
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✗ Absence
Other Fusion
GATase
IGPS
PRAI
ThiG
NanE
PRAIFusion
Anth_synt_I_N
Chorismate_bind
0.1
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Phlebiopsis gigantea [Pg170894]
Phanerochaete carnosa [Pc259935]
Bjerkandera adusta [Ba186160]
Phlebia brevispora [Pb112403]
Dichomitus squalens [Ds177844]
Ganoderma sp [Gs83580]
Trametes versicolor [Tv160974]
Heterobasidion annosum [Hea423612]
Stereum hirsutum [Sh125591]
Wolfiporia cocos [Wc140561]
Postia placenta [Popl48532]
Fomitopsis pinicola [Fp157524]
Ceriporiopsis subvermispora [Cs160596]
Gloeophyllum trabeum [Glt76302]
Agaricus bisporus [Ab221113]
Schizophyllum commune [Scco69050]
Serpula lacrymans [Sl87230]
Pleurotus ostreatus PC15 [Plo1056503]
Pleurotus ostreatus PC9 [Po104234]
Dacryopinax sp [Ds25522]
Cryptococcus neoformans [CNAG04501]
Tremella mesenterica [Tm43093]
Mucor circinelloides [Muci81331]
Rhizopus oryzae [RO3G08776]
Phycomyces blakesleeanus [Phybl74485]
Spizellomyces punctatus daom br117 [Sp00371T0]
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Rhodotorula graminis [Rg47888]
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Chaetomium globosum [CHG05603]
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Dothistroma septosporum [Dos67758]
Mycosphaerella graminicola [Mygr65952]
Baudoinia compniacensis [Bc65885]
Pyrenophora tritici-repentis [PTRG10051]
Pyrenophora teres [Pt8512]
Alternaria brassicicola [AB00205]
Cochliobolus heterostrophus [Cohe26944]
Cochliobolus sativus [Cos153588]
Setosphaeria turcica [St146244]
Stagonospora nodorum [SNU10564]
Leptosphaeria maculans [Lm2784]
Rhystidhysteron rufulum [Rr7226]
Aspergillus fumigatus [Afu1g13090]
Neosartorya fischeri [NFIA012430]
Aspergillus clavatus [ACLA022380]
Aspergillus oryzae [AO12000581]
Aspergillus flavus [AFL03470]
Aspergillus nidulans [AN0648]
Aspergillus carbonarius [Ac202625]
Aspergillus niger [Asni52668]
Aspergillus aculeatus [Aa20929]
Aspergillus terreus [ATEG00504]
Microsporum gypseum [MGYG04411]
Trichophyton equinum [TEQG02360]
Microsporum canis [MCYG01660]
Coccidioides immitis [CIMG06824]
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Paracoccidioides brasiliensis [PABG04515]
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Blastomyces dermatitidis [BDBG00920]
Spathaspora passalidarum [Sp53070]
Candida albicans SC5314 [C196096]
Pichia stipitis [Pist38245]
Candida tenuis [Ct105972]
Debaryomyces hansenii [50409786]
Hansenula polymorpha NCYC 495 leu1.1 [Hp81232]
Pichia membranifaciens [Pm65296]
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Lipomyces starkeyi [Ls72022]
Schizosaccharomyces octosporus [SOCG00651]
Schizosaccharomyces cryophilus [SPOG01846]
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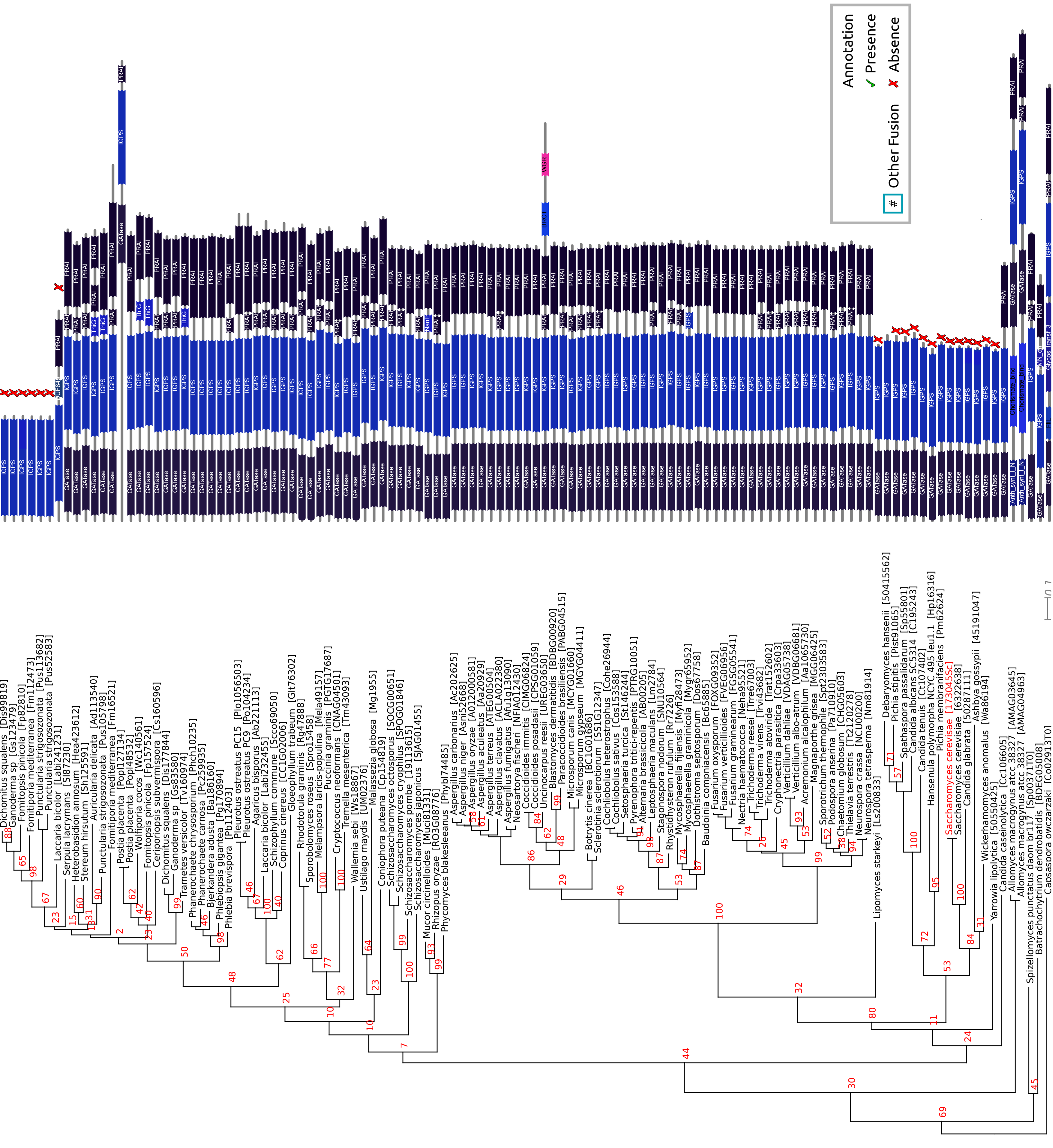
Annotation
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✗ Absence
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Wolfiporia cocos [Wc140561]
Fomitopsis pinicola [Fp157524]
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Dichomitus squalens [Dis177844]
Ganoderma sp [Gs83580]
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Bjerkandera adusta [Ba186160]
Phlebiopsis gigantea [Pg170894]
Phlebia brevispora [Pb112403]
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Laccaria bicolor [Labi232455]
Schizophyllum commune [Scco69050]
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Tremella mesenterica [Tm43093]
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Coniophora puteana [Cp154819]
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Blastomyces dermatitidis [BDBG00920]
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Microsporum gypseum [MGYG04411]
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Chaetomium globosum [CHG05603]
Neurospora crassa [NCU00200]
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Lipomyces starkeyi [Ls200833]
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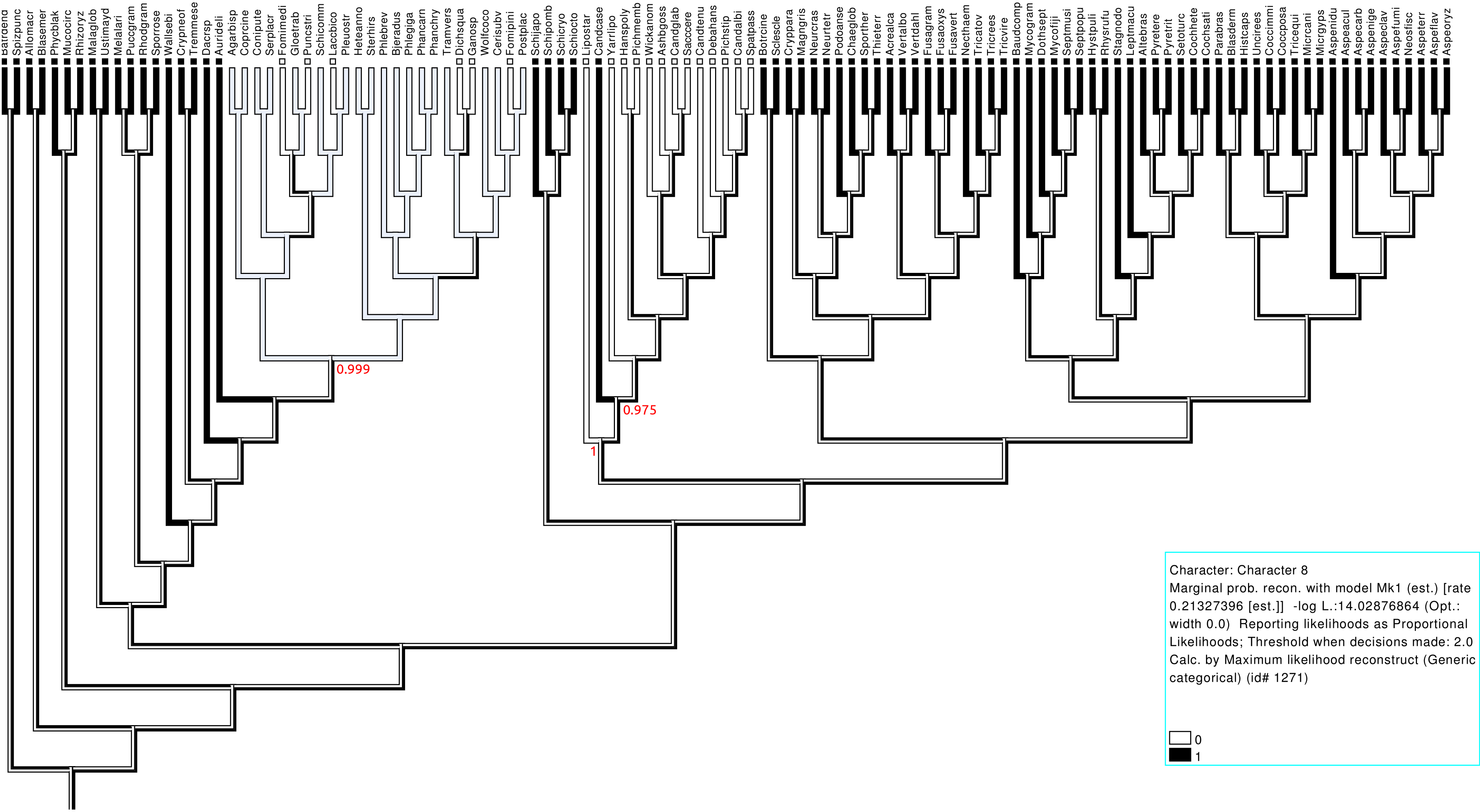
Pichia stipitis [Pist91065]
Spathaspora passalidarum [Sp55801]
Candida albicans SC5314 [C195243]
Candida tenuis [Ct107402]
Hansenula polymorpha NCYC 495 leu1.1 [Hp16316]
Pichia membranifaciens [Pm62624]
Saccharomyces cerevisae [173045Sc]
Saccharomyces cerevisiae [6322638]
Candida glabrata [50287111]
Ashbya gossypii [45191047]
Wickerhamomyces anomalus [Wa86194]
Yarrowia lipolytica [50550425]
Candida caseinolytica [Cc106605]
Allomyces macrogynus atcc 38327 [AMAG03645]
Allomyces macrogynus atcc 38327 [AMAG04963]
Spizellomyces punctatus daom br117 [Sp003717T0]
Batrachochytrium dendrobatidis [BDEG05008]
Capsaspora owczarzaki [Co029131T0]
0.1



Character: Character 8
Marginal prob. recon. with model Mk1 (est.) [rate 0.21327396 [est.]] -log L.:14.02876864 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0
Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 9

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|Mc109954 unnamed protein product
MLLTASRVFTISKRSFHAYPIAKKFVITPEIKAAIERKGPVVALESTIISHGMPYPQNVETAKAVENIIREQGAIPATIA
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SADLTELGRTPVAVVCAGVKSILDIPKTLEVLETQGVTVTTIGKNNQFPAFYTPDSGFKSPYHVEDPLDAAKSIHANHEL
EMNSGMVFAVPIPSASAADAASIQHAIDTAIAEARANNVHGKEETPFLLKRIAELTKGESLAANIALVKNNAKIGGQIAV
HLSQLKNRV
>lcl|Mc168016 unnamed protein product
MSGKPLLVIGGIALDITATVGKSFGASILHTSTPGHVKQSLGGVGRNVAEAAWRTGARVKLVSVVGDDLAGESVKQGLKS
ISMNTEYIQTLANQPTAVYNALHSEDGQLIAAVADMNIFDAMDTTKIISILQHEKPSFVCFDGNITAQMMKSIAMTCQAL
AIPALFEPTSVPKSLKLFQHAETMMAQAVKYTSPNQFELEAMCDTIRSNPVFSDKAAAKQQNAPTLAHLALPNACFLSQF
IPNVITKLGEEGCLYVSKNAGAEYFAPESIEPNEIVNVTGAGDCFVGTLIANLQKHANANMLLSSNVLRSIIRNAQTASI
RTLKSNRAVSDEISPDLLQL
```

2 Annotated Phylograms

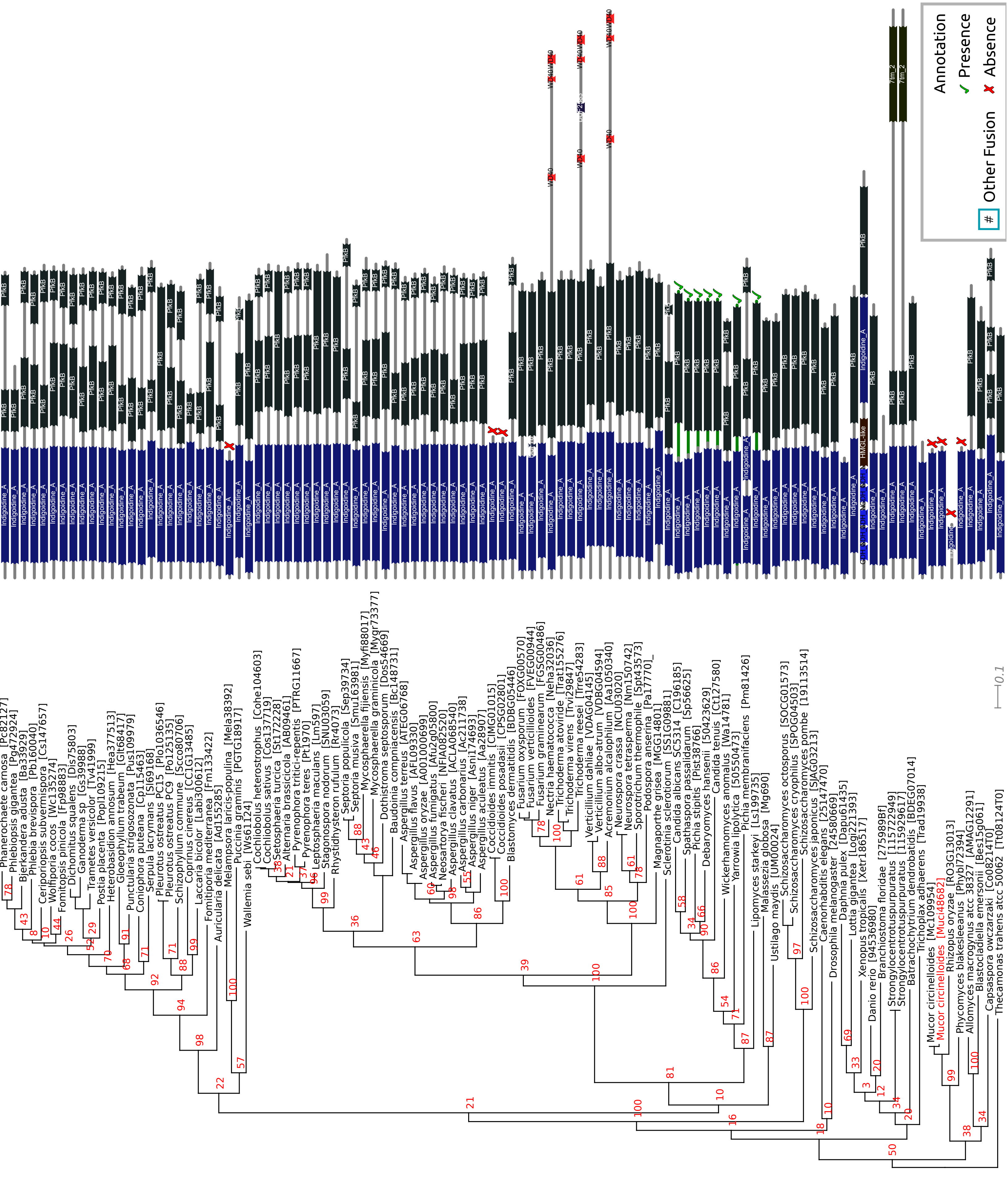
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.

Annotation
Other Fusion
✓ Presence
✗ Absence
0.1
Indigoidine_A
PfkB
WD40
HMGL-like
7tm_2
Phanerochaete carnosa [Pc82127]
Phlebiopsis gigantea [Pg472924]
Bjerkandera adusta [Ba33929]
Phlebia brevispora [Pb160040]
Ceriporiopsis subvermispora [Cs147657]
Wolfiporia cocos [Wc135274]
Fomitopsis pinicola [Fp98883]
Dichomitus squalens [Dis75803]
Ganoderma sp. [Gs39988]
Trametes versicolor [Tv41999]
Postia placenta [Popl109215]
Heterobasidion annosum [Hea377513]
Gloeophyllum trabeum [Glt68417]
Punctularia strigosozonata [Pus109979]
Coniophora puteana [Cp115463]
Serpula lacrymans [Sl69168]
Pleurotus ostreatus PC15 [Plo1036546]
Pleurotus ostreatus PC9 [Po125135]
Schizophyllum commune [Scco80706]
Coprinus cinereus [CC1G13485]
Laccaria bicolor [Labi300612]
Fomitiporia mediterranea [Fm133422]
Auricularia delicata [Ad155285]
Melampsora laricis-populina [Mela38392]
Puccinia graminis [PGTG18917]
Wallemia sebi [Ws61124]
Cochliobolus heterostrophus [Cohe104603]
Cochliobolus sativus [Cos137719]
Setosphaeria turcica [St172228]
Alternaria brassicicola [AB09461]
Pyrenophora tritici-repentis [PTRG11667]
Pyrenophora teres [Pt1970]
Leptosphaeria maculans [Lm597]
Stagonospora nodorum [SNU03059]
Rhytidhysteron rufulum [Rr4073]
Septoria populicola [Sep39734]
Septoria musiva [Smu163981]
Mycosphaerella fijiensis [Myfi88017]
Mycosphaerella graminicola [Mygr73377]
Dothistroma septosporum [Dos54669]
Baudoinia compniacensis [Bc148731]
Aspergillus terreus [ATEG06768]
Aspergillus flavus [AFL09330]
Aspergillus oryzae [A01000699]
Aspergillus fumigatus [Afu2g05800]
Neosartorya fischeri [NFIA082520]
Aspergillus clavatus [ACLA068540]
Aspergillus carbonarius [Ac211738]
Aspergillus niger [Asni174693]
Aspergillus aculeatus [Aa28907]
Coccidioides immitis [CIMG01015]
Coccidioides posadasii [CPSG02801]
Blastomyces dermatitidis [BDBG05446]
Fusarium oxysporum [FOXG00570]
Fusarium verticillioides [FVEG00944]
Fusarium graminearum [FGSG00486]
Nectria haematococca [Neha32036]
Trichoderma atroviride [Trat155276]
Trichoderma virens [Trvi29847]
Trichoderma reesei [Tre54283]
Verticillium dahliae [VDAG04145]
Verticillium albo-atrum [VDBG04594]
Acremonium alcalophilum [Aa1050340]
Neurospora crassa [NCU03020]
Neurospora tetrasperma [Nm150742]
Sporotrichum thermophile [Spt43573]
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Magnaporthe grisea [MGG14801]
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Candida albicans SC5314 [C196185]
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Pichia stipitis [Pist38766]
Debaryomyces hansenii [50423629]
Candida tenuis [Ct127580]
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Yarrowia lipolytica [50550473]
Pichia membranifaciens [Pm81426]
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Malassezia globosa [Mg690]
Ustilago maydis [UM00024]
Schizosaccharomyces octosporus [SOCG01573]
Schizosaccharomyces cryophilus [SPOG04503]
Schizosaccharomyces pombe [19113514]
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Danio rerio [94536980]
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Batrachochytrium dendrobatidis [BDEG07014]
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Mucor circinelloides [Mc109954]
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Rhizopus oryzae [RO3G13013]
Phycomyces blakesleeanus [Phybl72394]
Allomyces macrogynus atcc 38327 [AMAG12291]
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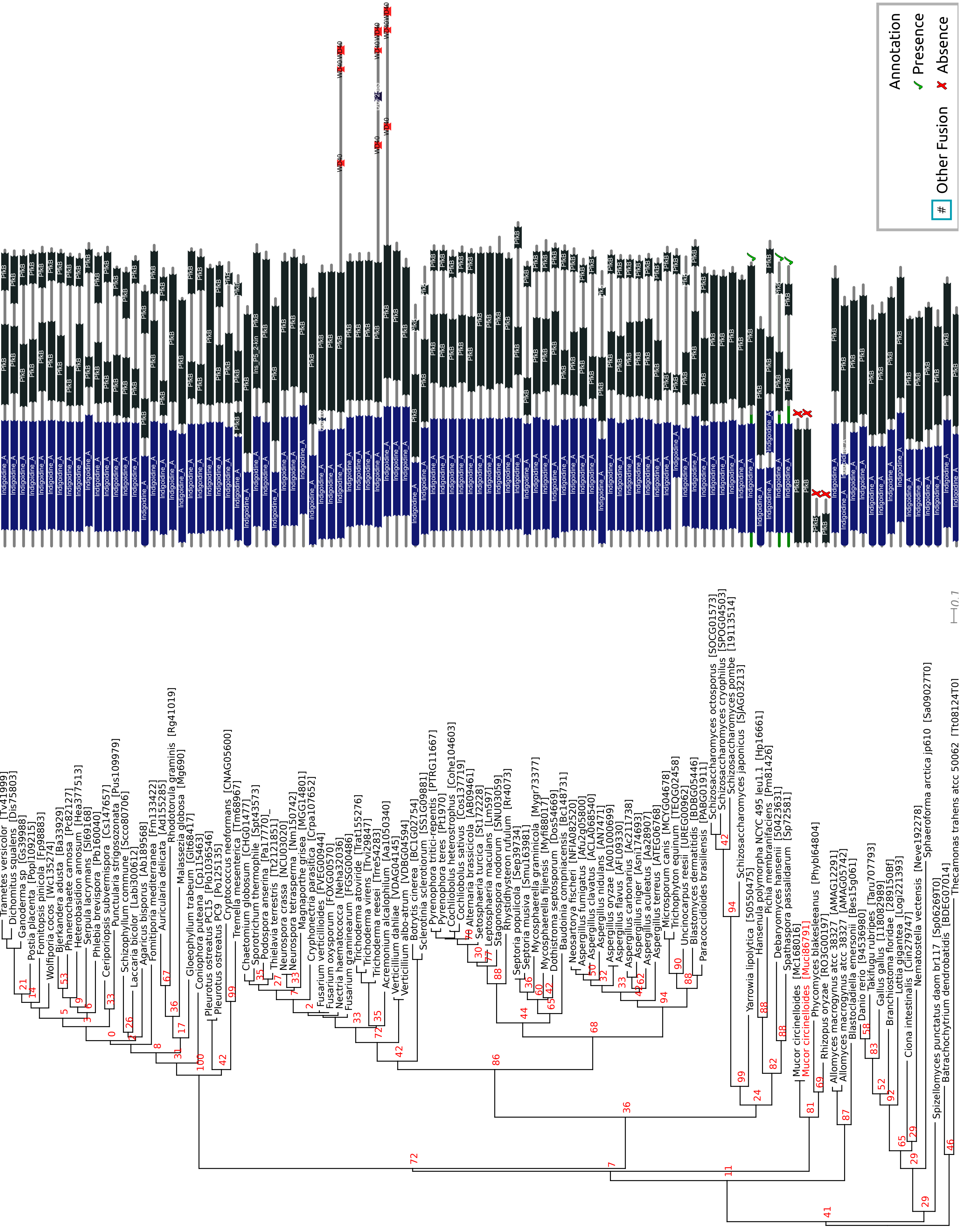
Annotation
Presence
Absence
Other Fusion
PfkB
Indigoidine_A
WD40
Ins_P5_2-kin
0.1
Trametes versicolor [Tv41999]
Dichomitus squalens [Dis75803]
Ganoderma sp. [Gs39988]
Postia placenta [Popl109215]
Fomitopsis pinicola [Fp98883]
Wolfiporia cocos [Wc135274]
Bjerkandera adusta [Ba33929]
Phanerochaete carnosa [Pc82127]
Heterobasidion annosum [Hea377513]
Serpula lacrymans [Sl69168]
Phlebia brevispora [Pb160040]
Ceriporiopsis subvermispora [Cs147657]
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Agaricus bisporus [Ab189568]
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Rhodotorula graminis [Rg41019]
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Gloeophyllum trabeum [Glt68417]
Coniophora puteana [Cp115463]
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Pleurotus ostreatus PC9 [Po125135]
Cryptococcus neoformans [CNAG05600]
Tremella mesenterica [Tm68967]
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Sporotrichum thermophile [Spt43573]
Podospora anserina [Pa17770_]
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Fusarium verticillioides [FVEG00944]
Fusarium oxysporum [FOXG00570]
Nectria haematococca [Neha32036]
Fusarium graminearum [FGSG00486]
Trichoderma atoviride [Trat155276]
Trichoderma virens [Trvi29847]
Trichoderma reesei [Trre54283]
Acremonium alcalophilum [Aa1050340]
Verticillium dahliae [VDAG04145]
Verticillium albo-atrum [VDBG04594]
Botrytis cinerea [BC1G02754]
Sclerotinia sclerotiorum [SS1G09881]
Pyrenophora tritici-repentis [PTRG11667]
Pyrenophora teres [Pt1970]
Cochliobolus heterostrophus [Cohe104603]
Cochliobolus sativus [Cos137719]
Alternaria brassicicola [AB09461]
Setosphaeria turcica [St172228]
Leptosphaeria maculans [Lm597]
Stagonospora nodorum [SNU03059]
Rhytidhysteron rufulum [Rr4073]
Septoria populicola [Sep39734]
Septoria musiva [Smu163981]
Mycosphaerella graminicola [Mygr73377]
Mycosphaerella fijiensis [Myfi88017]
Dothistroma septosporum [Dos54669]
Baudoinia compniacensis [Bc148731]
Neosartorya fischeri [NFIA082520]
Aspergillus fumigatus [Afu2g05800]
Aspergillus clavatus [ACLA068540]
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Aspergillus oryzae [AO01000699]
Aspergillus flavus [AFL09330]
Aspergillus carbonarius [Ac211738]
Aspergillus niger [Asni174693]
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Microsporum canis [MCYG04678]
Trichophyton equinum [TEQG02458]
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Blastomyces dermatitidis [BDBG05446]
Paracoccidioides brasiliensis [PABG01911]
Schizosaccharomyces octosporus [SOCG01573]
Schizosaccharomyces cryophilus [SPOG04503]
Schizosaccharomyces pombe [19113514]
Schizosaccharomyces japonicus [SJAG03213]
Yarrowia lipolytica [50550475]
Hansenula polymorpha NCYC 495 leu1.1 [Hp16661]
Pichia membranifaciens [Pm81426]
Debaryomyces hansenii [50423631]
Spathaspora passalidarum [Sp72581]
Mucor circinelloides [Mc168016]
Mucor circinelloides [Muci86791]
Phycomyces blakesleeanus [Phybl64804]
Rhizopus oryzae [RO3G00197]
Allomyces macrogynus atcc 38327 [AMAG12291]
Allomyces macrogynus atcc 38327 [AMAG05742]
Blastocladiella emersonii [Bes15g061]
Danio rerio [94536980]
Takifugu rubripes [Taru707793]
Gallus gallus [118082989]
Branchiostoma floridae [289150Bf]
Lottia gigantea [Logi221393]
Ciona intestinalis [Ciin279747]
Nematostella vectensis [Neve192278]
Sphaeroforma arctica jp610 [Sa09027T0]
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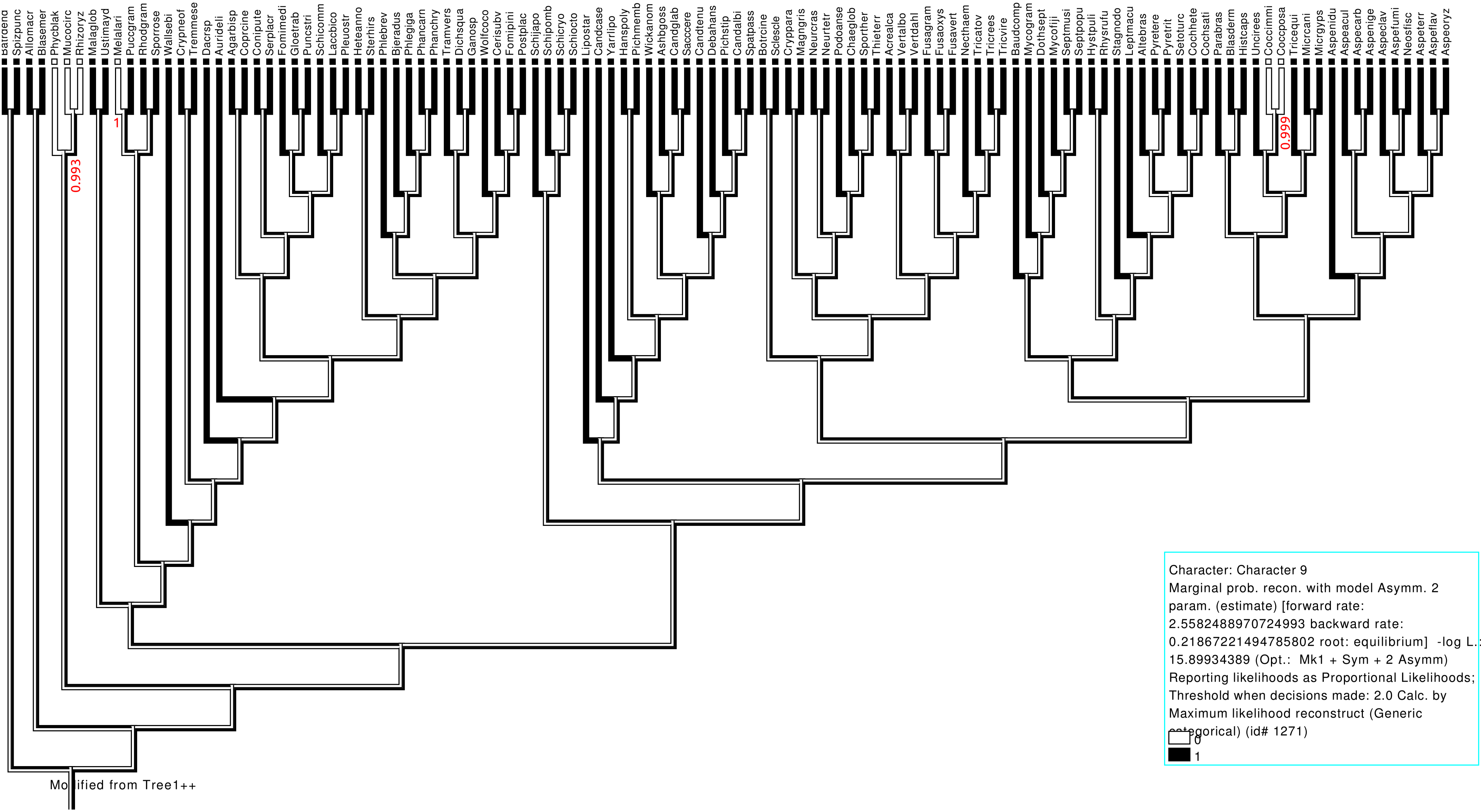
Thecamonas trahens atcc 50062 [Tt08124T01]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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
0.993
1
0.999
Modified from Tree1++
Character: Character 9
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
2.5582488970724993 backward rate:
0.21867221494785802 root: equilibrium] -log L.:
15.89934389 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 10

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|CC1G01201 unnamed protein product
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VPEPHQDLETHTEIFRRQGFSQEEMIGLVACGHTMGGVRSSDFPDIVPPQDDSERFADFDDTHEFDNDVVVKYIDGTTQN
PLVVHANMTLNSDLRIFESDGNATMRRLASPEDFSSTCGTLLEKMLNVVPSNVVLTEEITMLPVKVTDAHLTIENEQLVF
KASLRIAQPISAPNKNRLVKIFWCDRYGANKDCENRTGKTAGVASSPRIDDPQVSPLTFRAGFQFVHYDFIVPIDTEESL
SKFWFEVDEKDGTKPKRHDNDGEGYVLQQDNVIYVPRLSSISFNREDRTQKTYYITAGVKSGASPSRVYMSAFDSATDAF
STIIDEDVDMALNETLPSAAGYTFYSASIESPGTQLTVDLHAVIDGETYTEDYMQTFFVAGRTPSTKPTNVTIVDIVPPT
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PDPRFSFTNTRQYNAQLETGKLGVPYYVNPTEFTAHPVIGPELAKAGVKIGKQGEELKSGKESDSVKLRGKGKKRGPAMT
KFEDNVEGIYTHDLRVQCHRGRERLERLRDAEIGIFGIGTDWEKVKKIESEVIPSCEELKRLGVLR
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

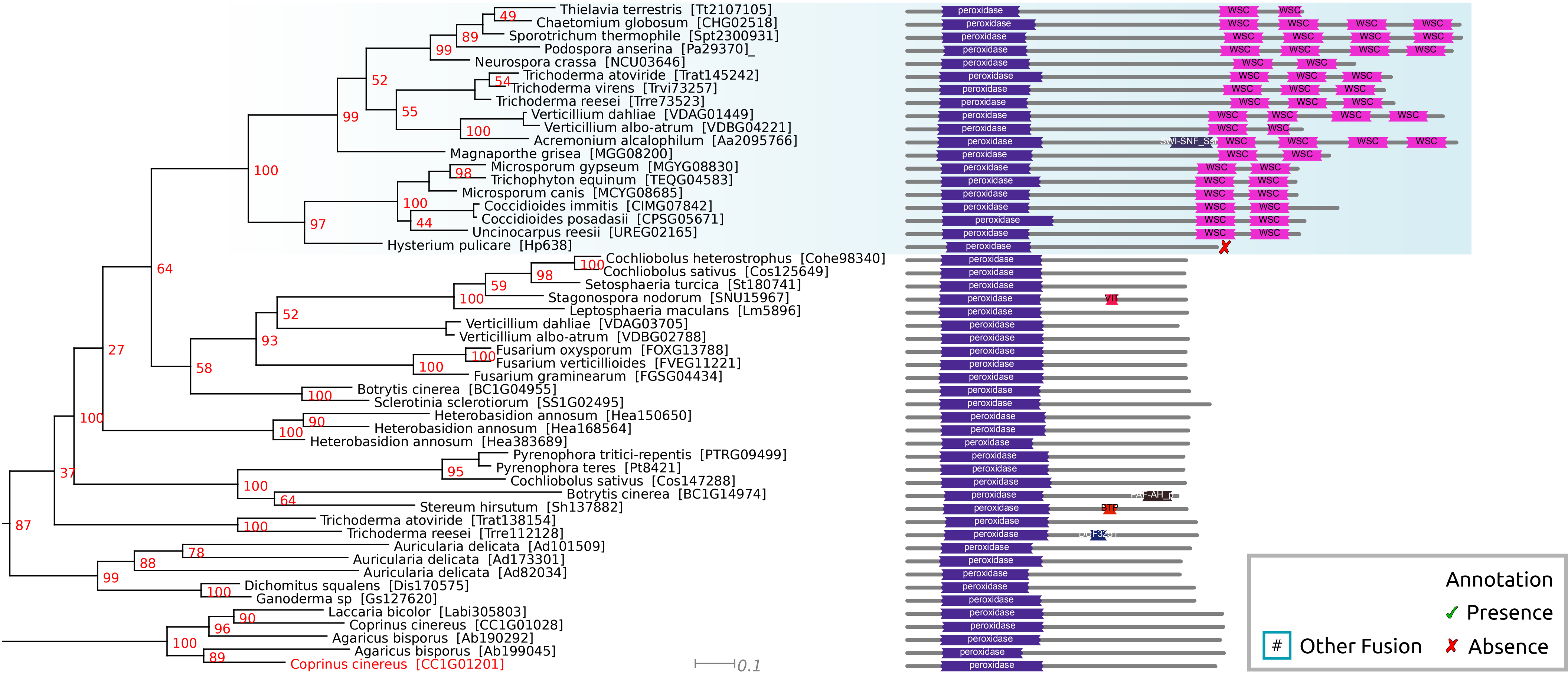
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

There is only one phylogeny here as one domain consists of a series of repeats and so an alignment would not be possible as the resulting phylogeny would likely be unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Thielavia terrestris [Tt2107105]
Chaetomium globosum [CHG02518]
Sporotrichum thermophile [Spt2300931]
Podospora anserina [Pa29370]_
Neurospora crassa [NCU03646]
Trichoderma atoviride [Trat145242]
Trichoderma virens [Trvi73257]
Trichoderma reesei [Trre73523]
Verticillium dahliae [VDAG01449]
Verticillium albo-atrum [VDBG04221]
Acremonium alcalophilum [Aa2095766]
Magnaporthe grisea [MGG08200]
Microsporum gypseum [MGYG08830]
Trichophyton equinum [TEQG04583]
Microsporum canis [MCYG08685]
Coccidioides immitis [CIMG07842]
Coccidioides posadasii [CPSG05671]
Uncinocarpus reesii [UREG02165]
Hysterium pulicare [Hp638]
Cochliobolus heterostrophus [Cohe98340]
Cochliobolus sativus [Cos125649]
Setosphaeria turcica [St180741]
Stagonospora nodorum [SNU15967]
Leptosphaeria maculans [Lm5896]
Verticillium dahliae [VDAG03705]
Verticillium albo-atrum [VDBG02788]
Fusarium oxysporum [FOXG13788]
Fusarium verticillioides [FVEG11221]
Fusarium graminearum [FGSG04434]
Botrytis cinerea [BC1G04955]
Sclerotinia sclerotiorum [SS1G02495]
Heterobasidion annosum [Hea150650]
Heterobasidion annosum [Hea168564]
Heterobasidion annosum [Hea383689]
Pyrenophora tritici-repentis [PTRG09499]
Pyrenophora teres [Pt8421]
Cochliobolus sativus [Cos147288]
Botrytis cinerea [BC1G14974]
Stereum hirsutum [Sh137882]
Trichoderma atoviride [Trat138154]
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Auricularia delicata [Ad101509]
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Dichomitus squalens [Dis170575]
Ganoderma sp [Gs127620]
Laccaria bicolor [Labi305803]
Coprinus cinereus [CC1G01028]
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49
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64
87
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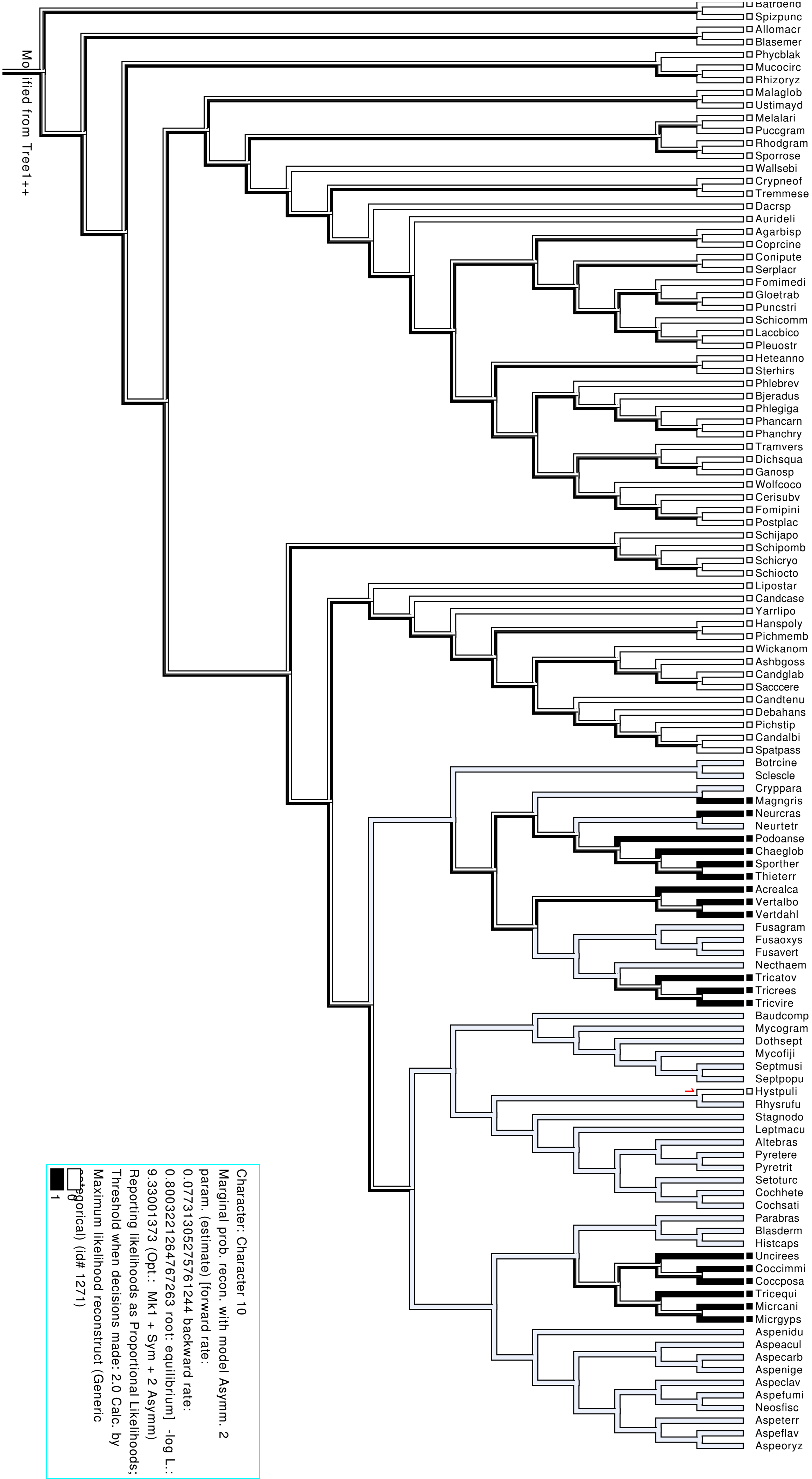
78
88
99
100
90
96
100
89
0.1
peroxidase
WSC
SWI-SNF_Ssr
VIT
PAF-AH_p
BTP
DUF
Annotation
Other Fusion
✓ Presence
✗ Absence



Character: Character 10
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.07731305275761244 backward rate:
0.8003221264767263 root: equilibrium] -log L.:
9.33001373 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 11

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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HLDFSVLIYESLDPDRPEKDCVEEHYSDGDVCIII
```

2 Annotated Phylograms

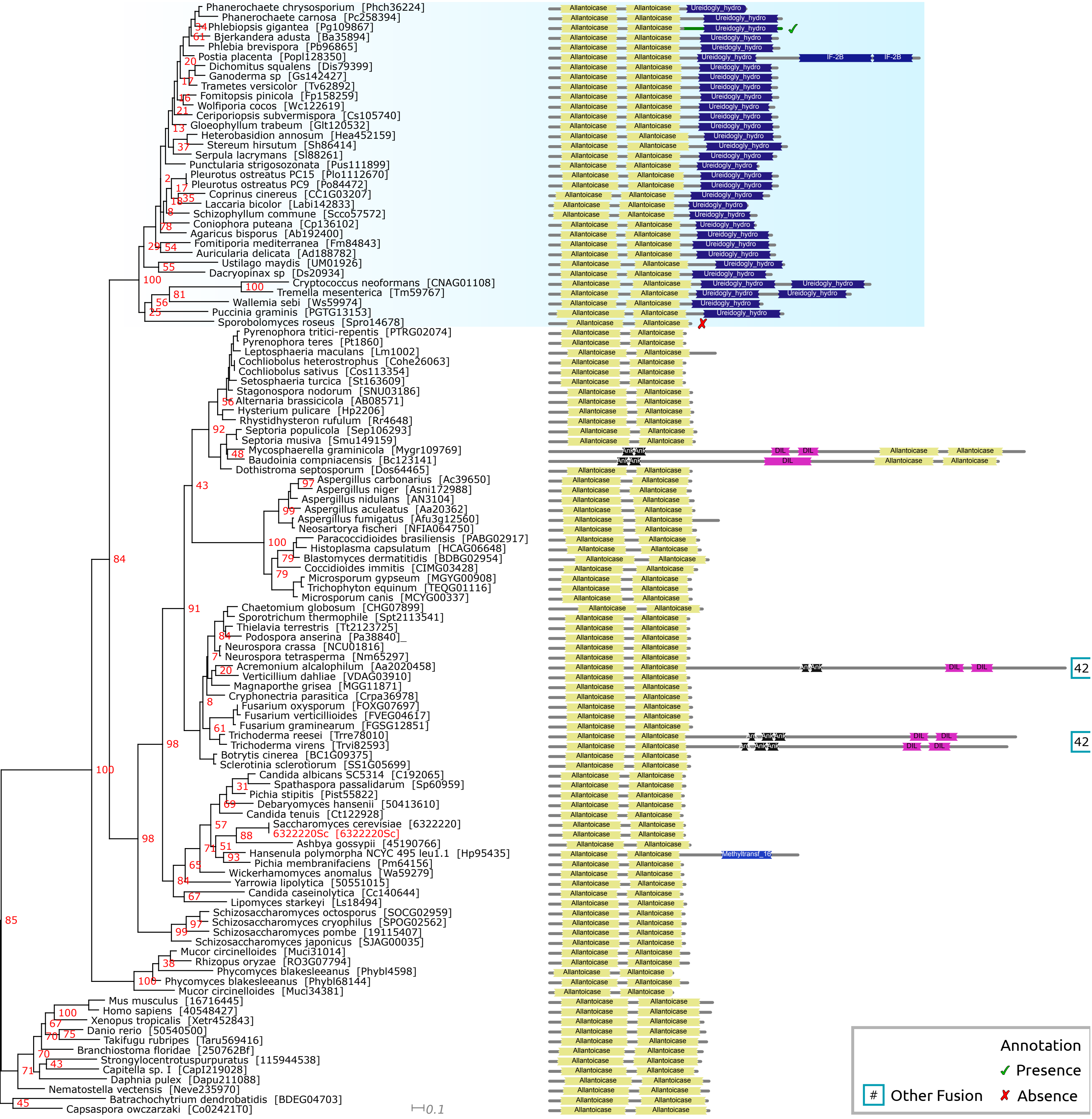
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Stereum hirsutum [Sh86414]
Serpula lacrymans [Sl88261]
Punctularia strigosozonata [Pus111899]
Pleurotus ostreatus PC15 [Plo1112670]
Pleurotus ostreatus PC9 [Po84472]
Coprinus cinereus [CC1G03207]
Laccaria bicolor [Labi142833]
Schizophyllum commune [Scco57572]
Coniophora puteana [Cp136102]
Agaricus bisporus [Ab192400]
Fomitiporia mediterranea [Fm84843]
Auricularia delicata [Ad188782]
Ustilago maydis [UM01926]
Dacryopinax sp [Ds20934]
Cryptococcus neoformans [CNAG01108]
Tremella mesenterica [Tm59767]
Wallemia sebi [Ws59974]
Puccinia graminis [PGTG13153]
Sporobolomyces roseus [Spro14678]
Pyrenophora tritici-repentis [PTRG02074]
Pyrenophora teres [Pt1860]
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Cochliobolus sativus [Cos113354]
Setosphaeria turcica [St163609]
Stagonospora nodorum [SNU03186]
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Hysterium pulicare [Hp2206]
Rhystidhysteron rufulum [Rr4648]
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Dothistroma septosporum [Dos64465]
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Aspergillus niger [Asni172988]
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Neosartorya fischeri [NFIA064750]
Paracoccidioides brasiliensis [PABG02917]
Histoplasma capsulatum [HCAG06648]
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Coccidioides immitis [CIMG03428]
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Magnaporthe grisea [MGG11871]
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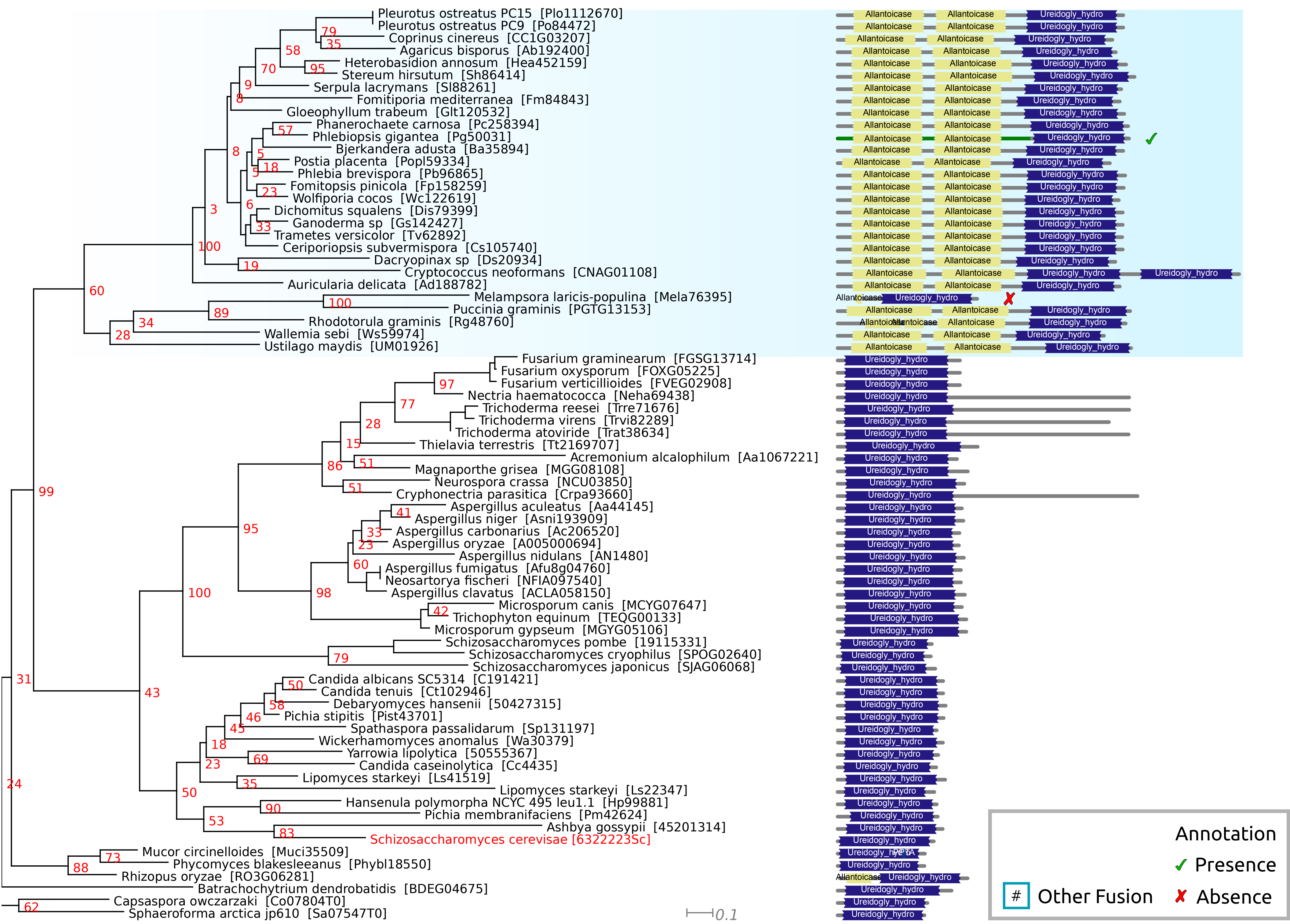
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Stereum hirsutum [Sh86414]
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Ureidogly_hydro
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✗ Absence
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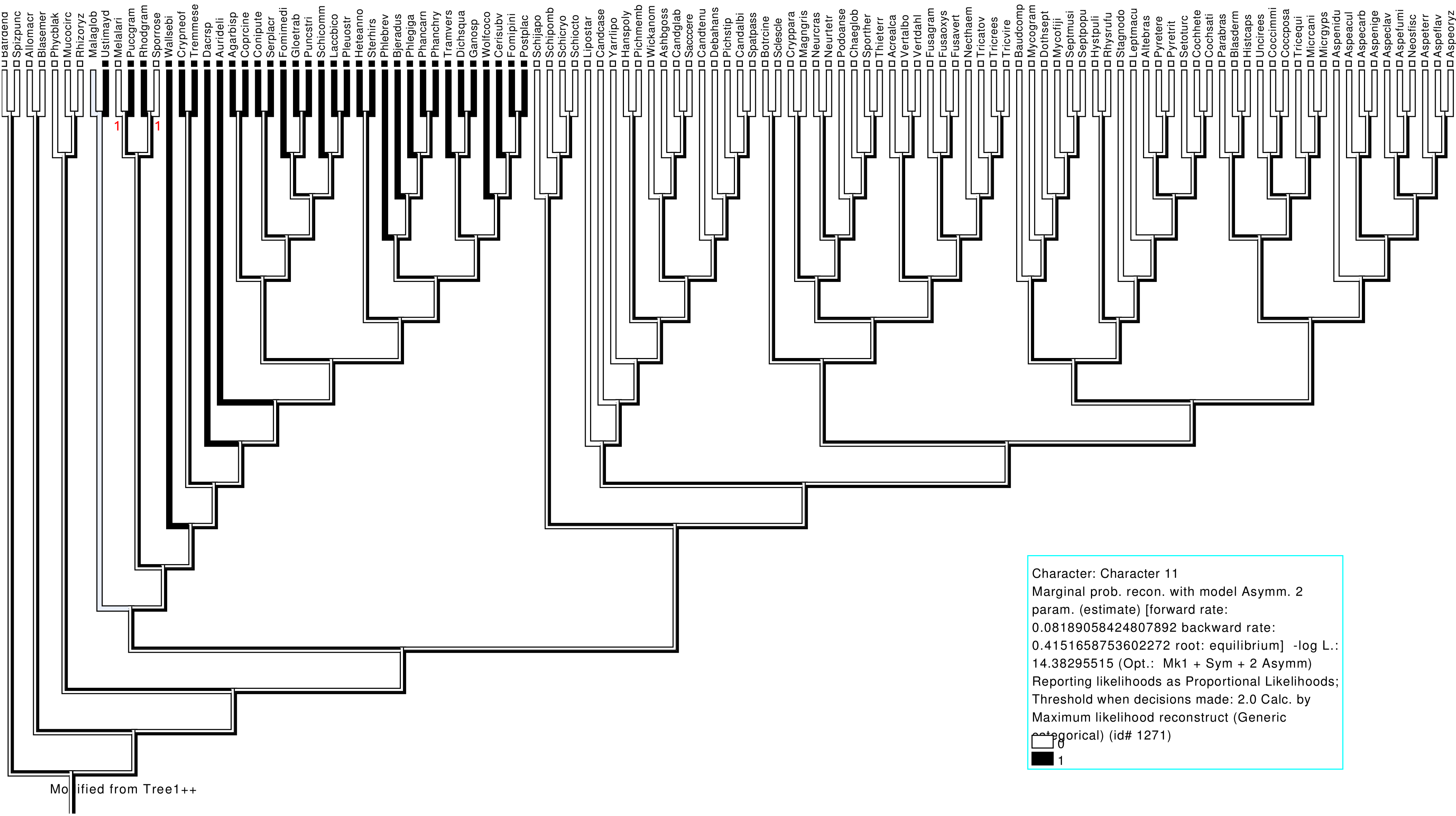
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Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
1
Modified from Tree1++
Character: Character 11
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.08189058424807892 backward rate: 0.4151658753602272 root: equilibrium] -log L.: 14.38295515 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 12

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|AMAG_02423 unnamed protein product
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HFVYTGTHLVYQLLYMFDWTRYYSPLLHVLGVEVKRVTSADMRAMQRIAASAPPRTGLAAAGHVALEALKVGLPVAIFFS
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TRKPVVVGDIRRVFQSQ
>lcl|AMAG_14666 unnamed protein product
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TTALARSDSLDDLESDLAHVVKAGATDRLRDTLARLRTASPAQATTAVVSRVLVRACRQGGAKAADAVAVLVESGFADVH
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QHVLAQEKHGVDGVYSDGVVRFTTSAAGVI
```

2 Annotated Phylograms

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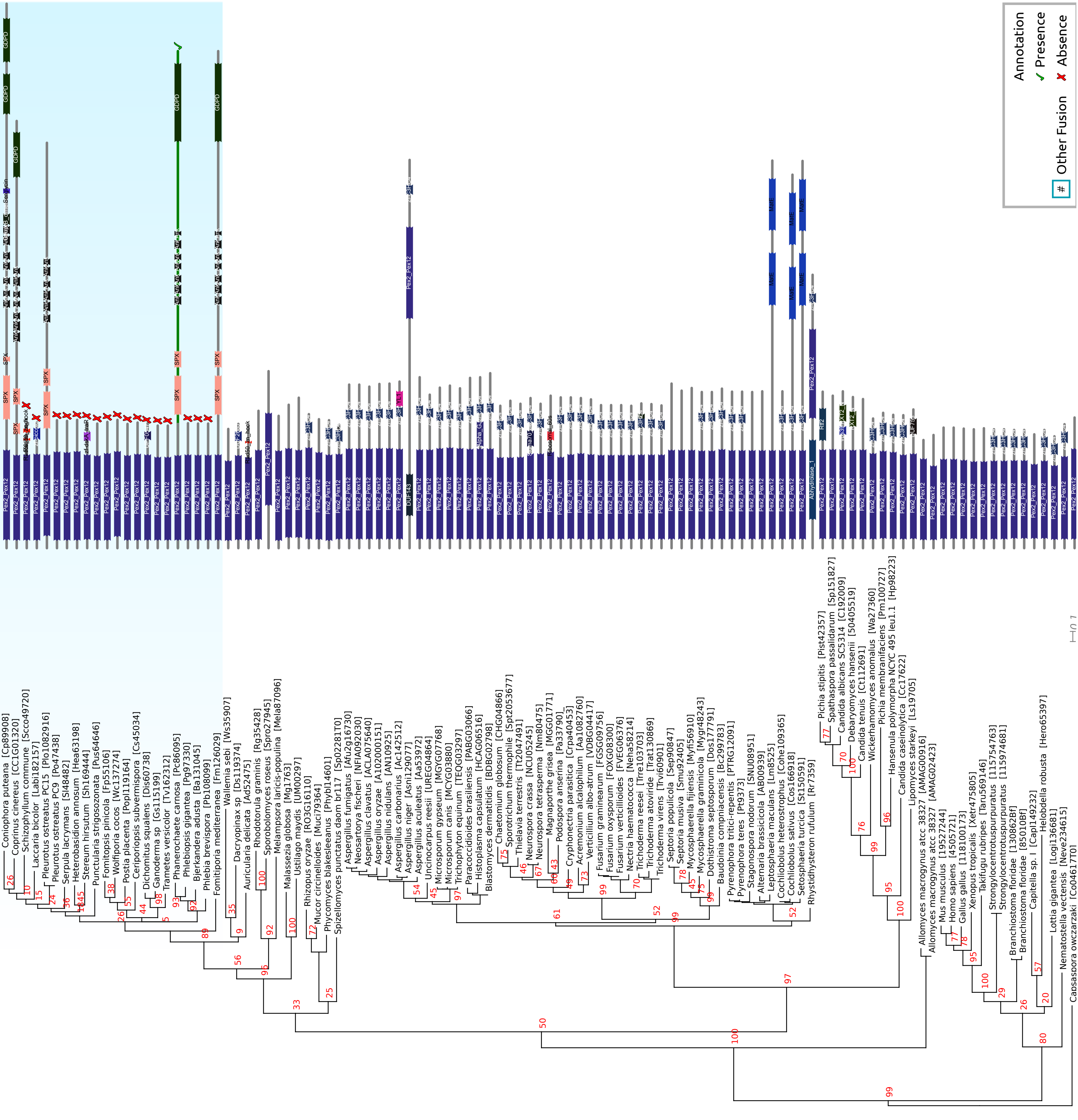
```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
✗ Absence
Other Fusion
Coniophora puteana [Cp89908]
Coprinus cinereus [CC1G01320]
Schizophyllum commune [Scco49720]
Laccaria bicolor [Labi182157]
Pleurotus ostreatus PC15 [Plo1082916]
Pleurotus ostreatus PC9 [Po47438]
Serpula lacrymans [Sl48482]
Heterobasidion annosum [Hea63198]
Stereum hirsutum [Sh169444]
Punctularia strigosozonata [Pus64646]
Fomitopsis pinicola [Fp55106]
Wolfiporia cocos [Wc137274]
Postia placenta [Popl119164]
Ceriporiopsis subvermispora [Cs45034]
Dichomitus squalens [Dis60738]
Ganoderma sp [Gs115199]
Trametes versicolor [Tv162312]
Phanerochaete carnosa [Pc86095]
Phlebiopsis gigantea [Pg97330]
Bjerkandera adusta [Ba131045]
Phlebia brevispora [Pb108099]
Fomitiporia mediterranea [Fm126029]
Wallemia sebi [Ws35907]
Dacryopinax sp [Ds119374]
Auricularia delicata [Ad52475]
Rhodotorula graminis [Rg35428]
Sporobolomyces roseus [Spro27945]
Melampsora laricis-populina [Mela87096]
Malassezia globosa [Mg1763]
Ustilago maydis [UM00297]
Rhizopus oryzae [RO3G16110]
Mucor circinelloides [Muci79364]
Phycomyces blakesleeanus [Phybl14601]
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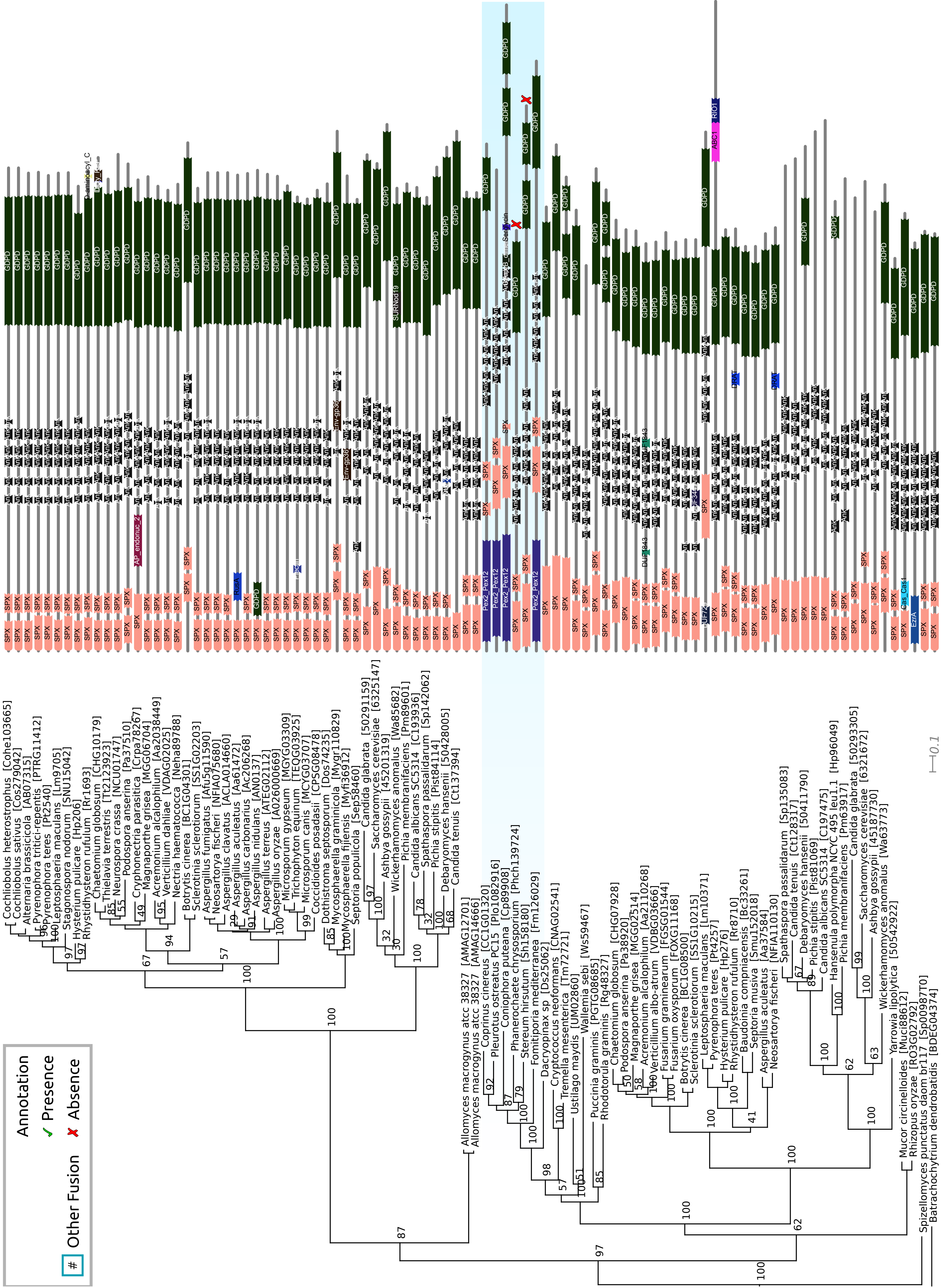
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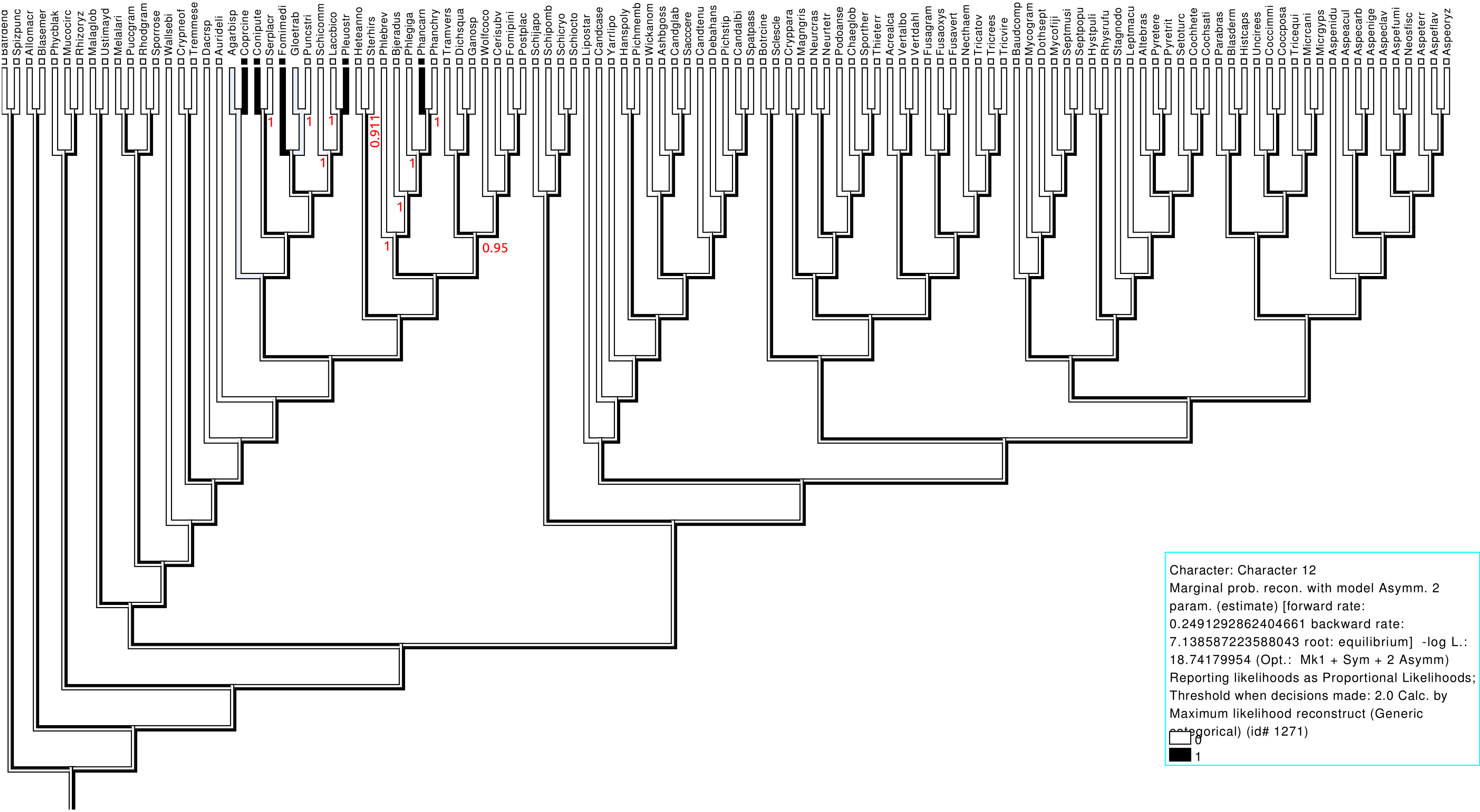
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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
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Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
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Laccbico
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Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
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Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
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Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
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Cryppara
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Neurtetr
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Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
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Histcaps
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Aspeterr
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1
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1
1
0.95
Character: Character 12
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.2491292862404661 backward rate: 7.138587223588043 root: equilibrium] -log L.: 18.74179954 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 13

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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EDSDNPLGYKFSWSSRGVLLALRNSAKYWKDGKIETVSSEDLMATAKPYFIYPGYAFVCYPNRDSTLFKDLYHIPEAETV
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LGLFSDAKITPRGNALDTLCARLEELMQYEDNERDMVVLQHKFGIEWADGTTETRTSTLVDYGKVGGYSSMAATVGYPVA
IATKFVLDGTIKGPGLLAPYSPEINDPIMKELKDKYGIYLKEKTVA
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.

HGT not counted as a reversion in final figures
Phanerochaete chrysosporium [Phch9263]
Phanerochaete carnosa [Pc262714]
Phanerochaete carnosa [Pc187523]
Bjerkandera adusta [Ba54772]
Bjerkandera adusta [Ba149575]
Phlebiopsis gigantea [Pg32236]
Phlebia brevispora [Pb28104]
Ganoderma sp [Gs122293]
Dichomitus squalens [Dis85486]
Trametes versicolor [Tv53623]
Ceriporiopsis subvermispora [Cs85225]
Wolfiporia cocos [Wc85122]
Postia placenta [Popl107976]
Fomitopsis pinicola [Fp160371]
Pleurotus ostreatus PC15 [Plo1091586]
Coprinus cinereus [CC1G05582]
Agaricus bisporus [Ab184364]
Laccaria bicolor [Labi177008]
Stereum hirsutum [Sh76391]
Stereum hirsutum [Sh129850]
Heterobasidion annosum [Hea471805]
Serpula lacrymans [Sl92863]
Gloeophyllum trabeum [Glt139895]
Coniophora puteana [Cp84267]
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Schizophyllum commune [Scco257519]
Punctularia strigosozonata [Pus145068]
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Lipomyces starkeyi [Ls17266]
Auricularia delicata [Ad115750]
Dacryopinax sp [Ds24735]
Ustilago maydis [UM05818]
Malassezia globosa [Mg1530]
Tremella mesenterica [Tm74272]
Cryptococcus neoformans [CNAG03476]
Wallemia sebi [Ws31404]
Sporobolomyces roseus [Spro23418]
Rhodotorula graminis [Rg33307]
Puccinia graminis [PGTG06954]
Cochliobolus sativus [Cos188437]
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Setosphaeria turcica [St26659]
Alternaria brassicicola [AB09195]
Pyrenophora teres [Pt3864]
Pyrenophora tritici-repentis [PTRG01069]
Stagonospora nodorum [SNU09324]
Leptosphaeria maculans [Lm6287]
Rhystidhysteron rufulum [Rr6615]
Septoria musiva [Smu149838]
Septoria populicola [Sep135229]
Mycosphaerella fijiensis [Myfi49608]
Dothistroma septosporum [Dos72458]
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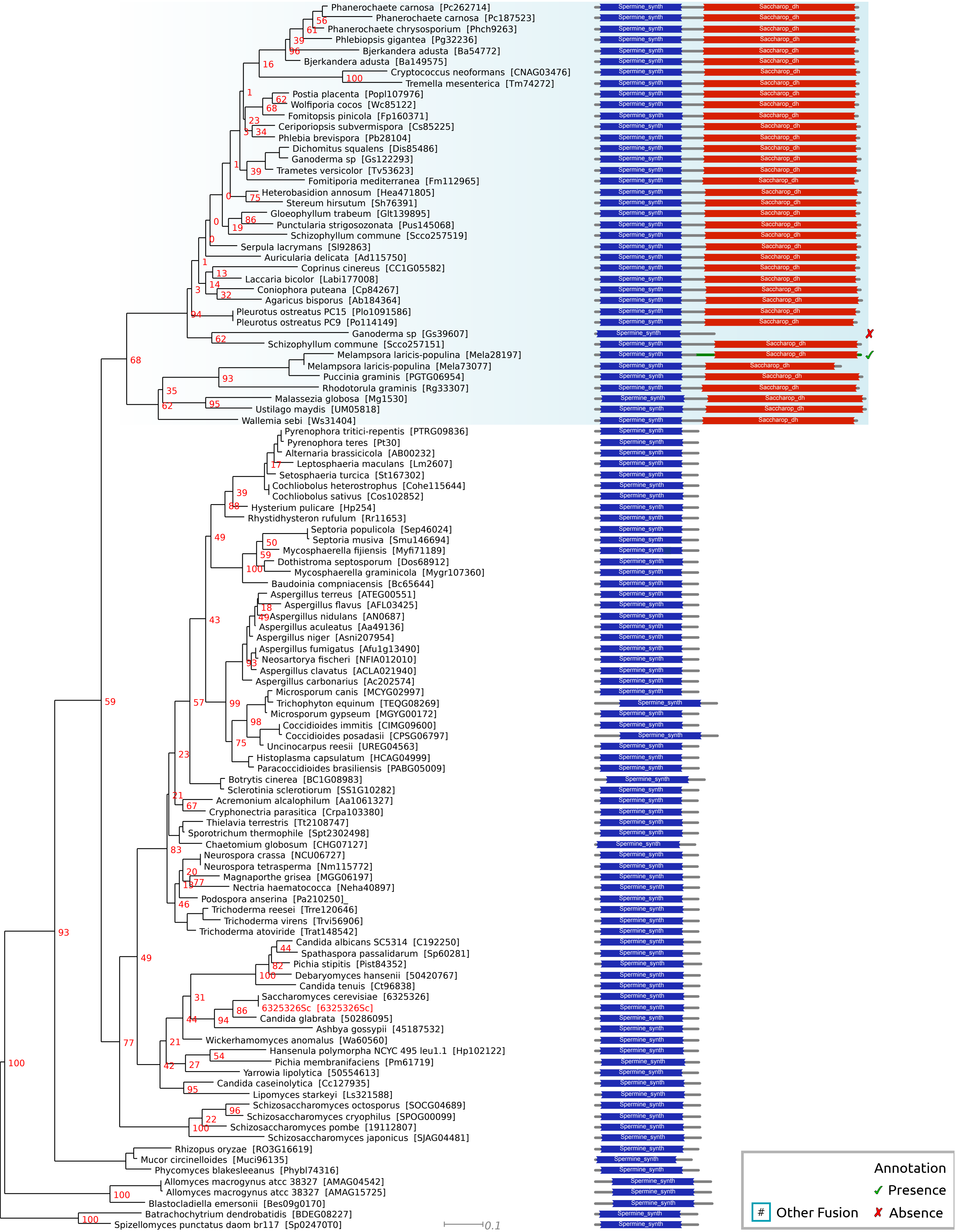
Annotation
✓ Presence
Other Fusion
✗ Absence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Stereum hirsutum [Sh76391]
Gloeophyllum trabeum [Glt139895]
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Serpula lacrymans [Sl92863]
Auricularia delicata [Ad115750]
Coprinus cinereus [CC1G05582]
Laccaria bicolor [Labi177008]
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Pichia membranifaciens [Pm61719]
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Saccharop_dh
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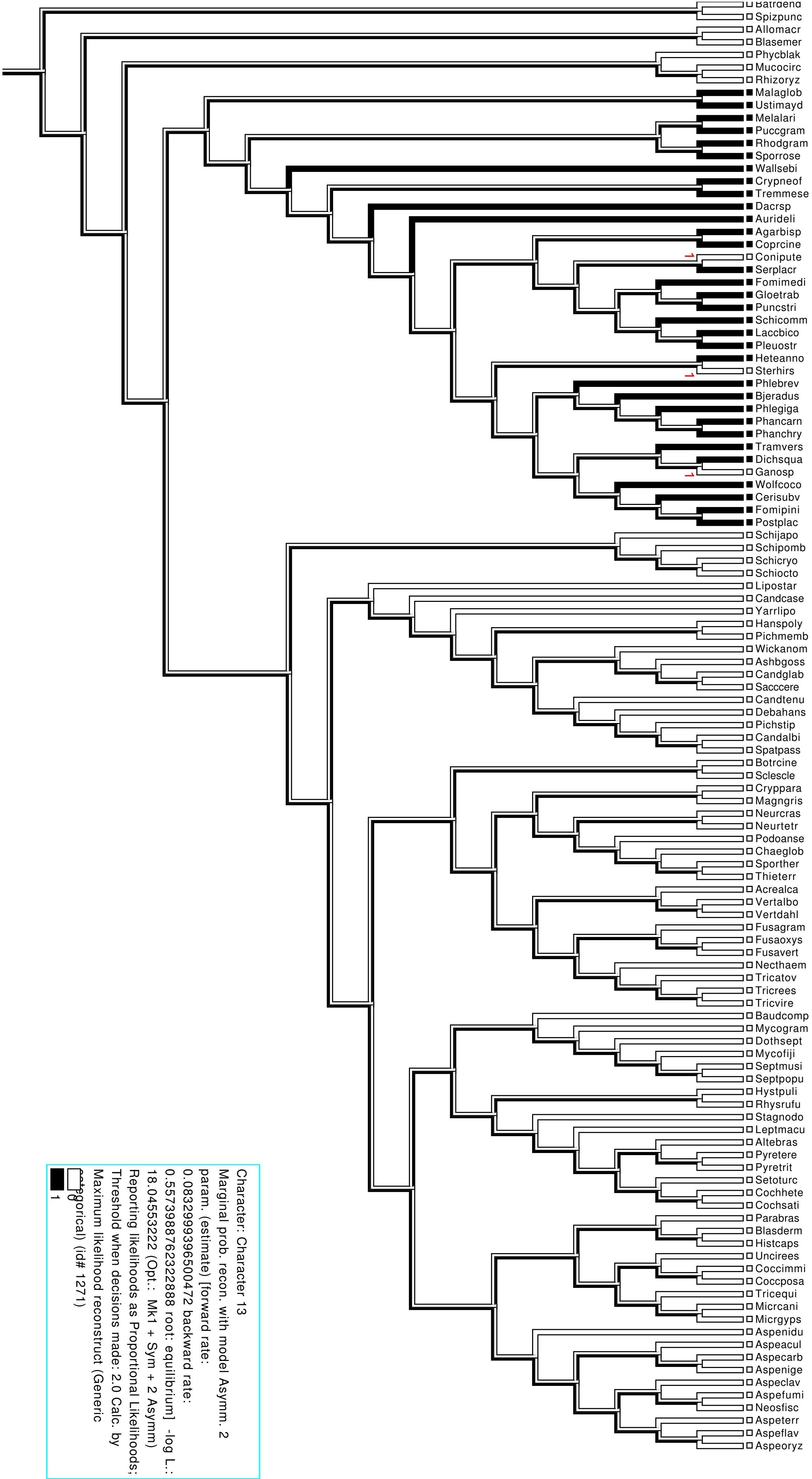
Other Fusion
✗ Absence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Ustimayd
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Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
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Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
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Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
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Aspecarb
Aspenige
Aspeclav
Aspefumi
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Aspeterr
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param. (estimate) [forward rate:
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18.04553222 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 14

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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AKNLNKDLKIKSLVFQLFENKTTTKQQIDDLLLPGNTNLPWTS
```

2 Annotated Phylograms

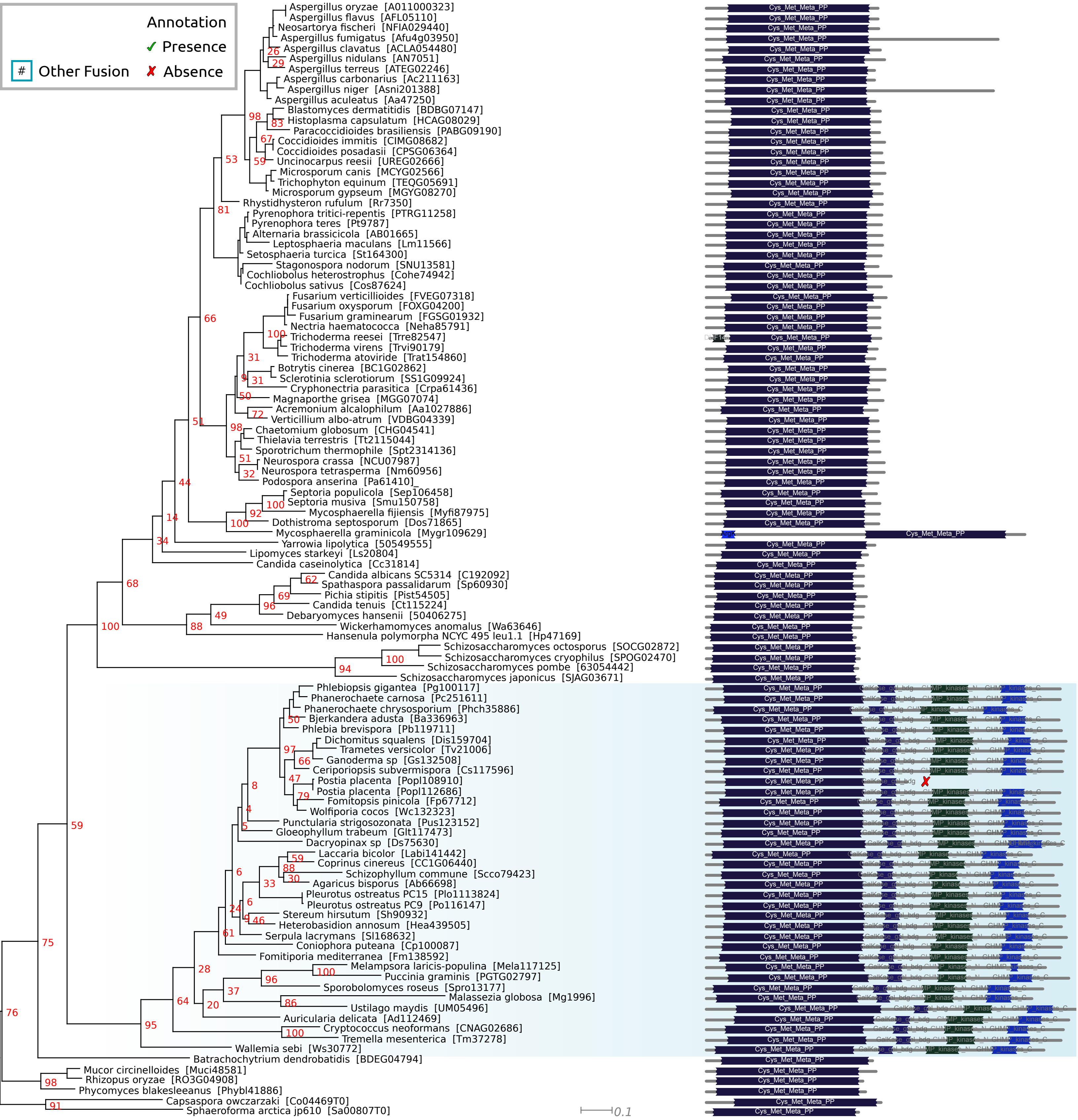
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✓ Presence
Other Fusion
✗ Absence
Aspergillus oryzae [AO11000323]
Aspergillus flavus [AFL05110]
Neosartorya fischeri [NFIA029440]
Aspergillus fumigatus [Afu4g03950]
Aspergillus clavatus [ACLA054480]
Aspergillus nidulans [AN7051]
Aspergillus terreus [ATEG02246]
Aspergillus carbonarius [Ac211163]
Aspergillus niger [Asni201388]
Aspergillus aculeatus [Aa47250]
Blastomyces dermatitidis [BDBG07147]
Histoplasma capsulatum [HCAG08029]
Paracoccidioides brasiliensis [PABG09190]
Coccidioides immitis [CIMG08682]
Coccidioides posadasii [CPSG06364]
Uncinocarpus reesii [UREG02666]
Microsporum canis [MCYG02566]
Trichophyton equinum [TEQG05691]
Microsporum gypseum [MGYG08270]
Rhystidhysteron rufulum [Rr7350]
Pyrenophora tritici-repentis [PTRG11258]
Pyrenophora teres [Pt9787]
Alternaria brassicicola [AB01665]
Leptosphaeria maculans [Lm11566]
Setosphaeria turcica [St164300]
Stagonospora nodorum [SNU13581]
Cochliobolus heterostrophus [Cohe74942]
Cochliobolus sativus [Cos87624]
Fusarium verticillioides [FVEG07318]
Fusarium oxysporum [FOXG04200]
Fusarium graminearum [FGSG01932]
Nectria haematococca [Neha85791]
Trichoderma reesei [Trre82547]
Trichoderma virens [Trvi90179]
Trichoderma atoviride [Trat154860]
Botrytis cinerea [BC1G02862]
Sclerotinia sclerotiorum [SS1G09924]
Cryphonectria parasitica [Crpa61436]
Magnaporthe grisea [MGG07074]
Acremonium alcalophilum [Aa1027886]
Verticillium albo-atrum [VDBG04339]
Chaetomium globosum [CHG04541]
Thielavia terrestris [Tt2115044]
Sporotrichum thermophile [Spt2314136]
Neurospora crassa [NCU07987]
Neurospora tetrasperma [Nm60956]
Podospora anserina [Pa61410]_
Septoria populicola [Sep106458]
Septoria musiva [Smu150758]
Mycosphaerella fijiensis [Myfi87975]
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Lipomyces starkeyi [Ls20804]
Candida caseinolytica [Cc31814]
Candida albicans SC5314 [C192092]
Spathaspora passalidarum [Sp60930]
Pichia stipitis [Pist54505]
Candida tenuis [Ct115224]
Debaryomyces hansenii [50406275]
Wickerhamomyces anomalus [Wa63646]
Hansenula polymorpha NCYC 495 leu1.1 [Hp47169]
Schizosaccharomyces octosporus [SOCG02872]
Schizosaccharomyces cryophilus [SPOG02470]
Schizosaccharomyces pombe [63054442]
Schizosaccharomyces japonicus [SJAG03671]
Phlebiopsis gigantea [Pg100117]
Phanerochaete carnosa [Pc251611]
Phanerochaete chrysosporium [Phch35886]
Bjerkandera adusta [Ba336963]
Phlebia brevispora [Pb119711]
Dichomitus squalens [Dis159704]
Trametes versicolor [Tv21006]
Ganoderma sp [Gs132508]
Ceriporiopsis subvermispora [Cs117596]
Postia placenta [Popl108910]
Postia placenta [Popl112686]
Fomitopsis pinicola [Fp67712]
Wolfiporia cocos [Wc132323]
Punctularia strigosozonata [Pus123152]
Gloeophyllum trabeum [Glt117473]
Dacryopinax sp [Ds75630]
Laccaria bicolor [Labi141442]
Coprinus cinereus [CC1G06440]
Schizophyllum commune [Scco79423]
Agaricus bisporus [Ab66698]
Pleurotus ostreatus PC15 [Plo1113824]
Pleurotus ostreatus PC9 [Po116147]
Stereum hirsutum [Sh90932]
Heterobasidion annosum [Hea439505]
Serpula lacrymans [Sl168632]
Coniophora puteana [Cp100087]
Fomitiporia mediterranea [Fm138592]
Melampsora laricis-populina [Mela117125]
Puccinia graminis [PGTG02797]
Sporobolomyces roseus [Spro13177]
Malassezia globosa [Mg1996]
Ustilago maydis [UM05496]
Auricularia delicata [Ad112469]
Cryptococcus neoformans [CNAG02686]
Tremella mesenterica [Tm37278]
Wallemia sebi [Ws30772]
Batrachochytrium dendrobatidis [BDEG04794]
Mucor circinelloides [Muci48581]
Rhizopus oryzae [RO3G04908]
Phycomyces blakesleeanus [Phybl41886]
Capsaspora owczarzaki [Co04469T0]
Sphaeroforma arctica jp610 [Sa00807T0]
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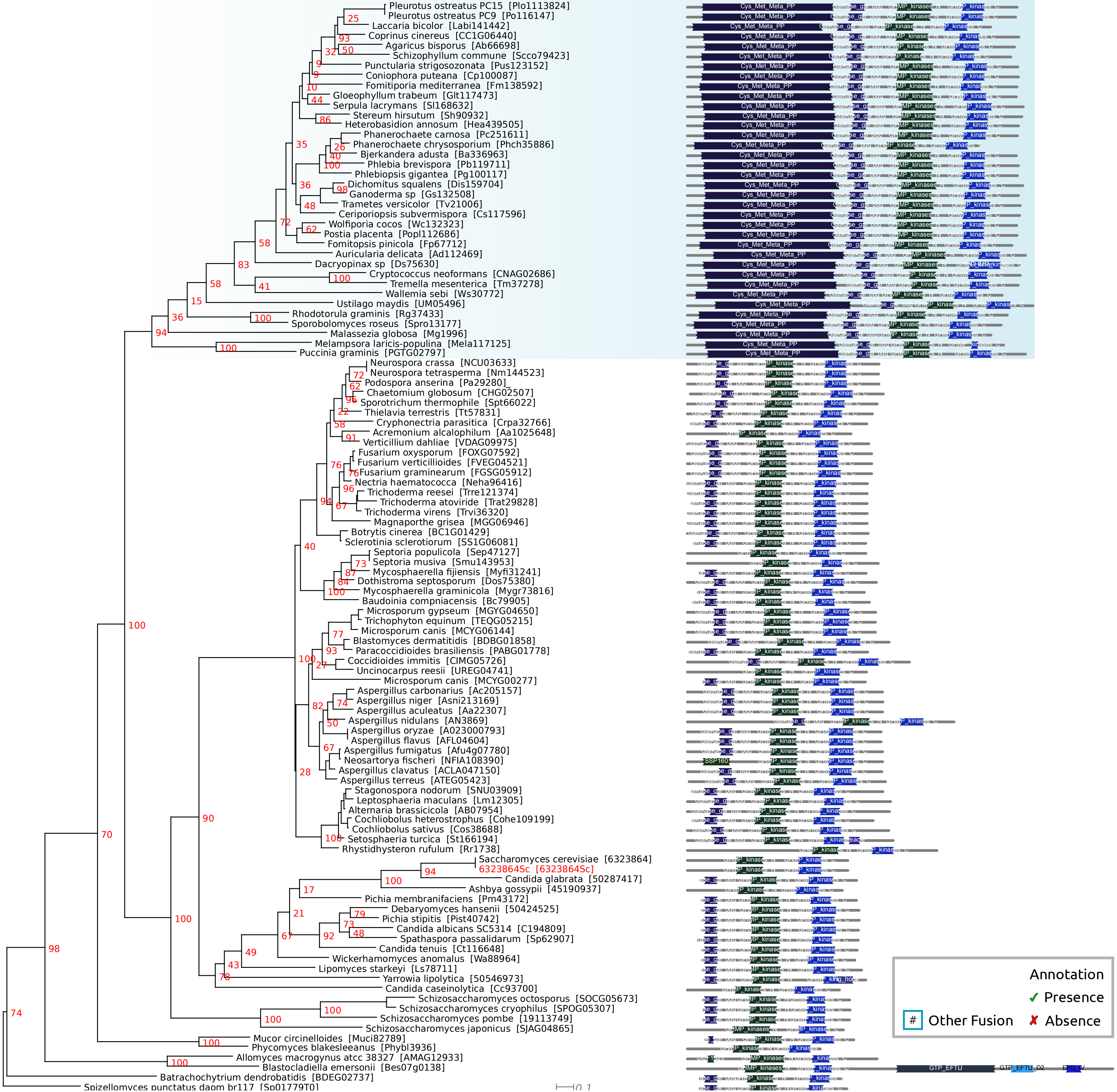
GalKase_gal_bdg
GHMP_kinases_N
GHMP_kinases_C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Coniophora puteana [Cp100087]
Fomitiporia mediterranea [Fm138592]
Gloeophyllum trabeum [Glt117473]
Serpula lacrymans [Sl168632]
Stereum hirsutum [Sh90932]
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Phanerochaete carnosa [Pc251611]
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Phlebiopsis gigantea [Pg100117]
Dichomitus squalens [Dis159704]
Ganoderma sp [Gs132508]
Trametes versicolor [Tv21006]
Ceriporiopsis subvermispora [Cs117596]
Wolfiporia cocos [Wc132323]
Postia placenta [Popl112686]
Fomitopsis pinicola [Fp67712]
Auricularia delicata [Ad112469]
Dacryopinax sp [Ds75630]
Cryptococcus neoformans [CNAG02686]
Tremella mesenterica [Tm37278]
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Ustilago maydis [UM05496]
Rhodotorula graminis [Rg37433]
Sporobolomyces roseus [Spro13177]
Malassezia globosa [Mg1996]
Melampsora laricis-populina [Mela117125]
Puccinia graminis [PGTG02797]
Neurospora crassa [NCU03633]
Neurospora tetrasperma [Nm144523]
Podospora anserina [Pa29280]
Chaetomium globosum [CHG02507]
Sporotrichum thermophile [Spt66022]
Thielavia terrestris [Tt57831]
Cryphonectria parasitica [Crpa32766]
Acremonium alcalophilum [Aa1025648]
Verticillium dahliae [VDAG09975]
Fusarium oxysporum [FOXG07592]
Fusarium verticillioides [FVEG04521]
Fusarium graminearum [FGSG05912]
Nectria haematococca [Neha96416]
Trichoderma reesei [Tre121374]
Trichoderma atoviride [Trat29828]
Trichoderma virens [Trvi36320]
Magnaporthe grisea [MGG06946]
Botrytis cinerea [BC1G01429]
Sclerotinia sclerotiorum [SS1G06081]
Septoria populicola [Sep47127]
Septoria musiva [Smu143953]
Mycosphaerella fijiensis [Myfi31241]
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Mycosphaerella graminicola [Mygr73816]
Baudoinia compniacensis [Bc79905]
Microsporum gypseum [MGYG04650]
Trichophyton equinum [TEQG05215]
Microsporum canis [MCYG06144]
Blastomyces dermatitidis [BDBG01858]
Paracoccidioides brasiliensis [PABG01778]
Coccidioides immitis [CIMG05726]
Uncinocarpus reesii [UREG04741]
Microsporum canis [MCYG00277]
Aspergillus carbonarius [Ac205157]
Aspergillus niger [Asni213169]
Aspergillus aculeatus [Aa22307]
Aspergillus nidulans [AN3869]
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Aspergillus flavus [AFL04604]
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Neosartorya fischeri [NFIA108390]
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Aspergillus terreus [ATEG05423]
Stagonospora nodorum [SNU03909]
Leptosphaeria maculans [Lm12305]
Alternaria brassicicola [AB07954]
Cochliobolus heterostrophus [Cohe109199]
Cochliobolus sativus [Cos38688]
Setosphaeria turcica [St166194]
Rhystidhysteron rufulum [Rr1738]
Saccharomyces cerevisiae [6323864]
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Candida glabrata [50287417]
Ashbya gossypii [45190937]
Pichia membranifaciens [Pm43172]
Debaryomyces hansenii [50424525]
Pichia stipitis [Pist40742]
Candida albicans SC5314 [C194809]
Spathaspora passalidarum [Sp62907]
Candida tenuis [Ct116648]
Wickerhamomyces anomalus [Wa88964]
Lipomyces starkeyi [Ls78711]
Yarrowia lipolytica [50546973]
Candida caseinolytica [Cc93700]
Schizosaccharomyces octosporus [SOCG05673]
Schizosaccharomyces cryophilus [SPOG05307]
Schizosaccharomyces pombe [19113749]
Schizosaccharomyces japonicus [SJAG04865]
Mucor circinelloides [Muci82789]
Phycomyces blakesleeanus [Phybl3936]
Allomyces macrogynus atcc 38327 [AMAG12933]
Blastocladiella emersonii [Bes07g0138]
Batrachochytrium dendrobatidis [BDEG02737]
Spizellomyces punctatus daom br117 [Sp01779T0]
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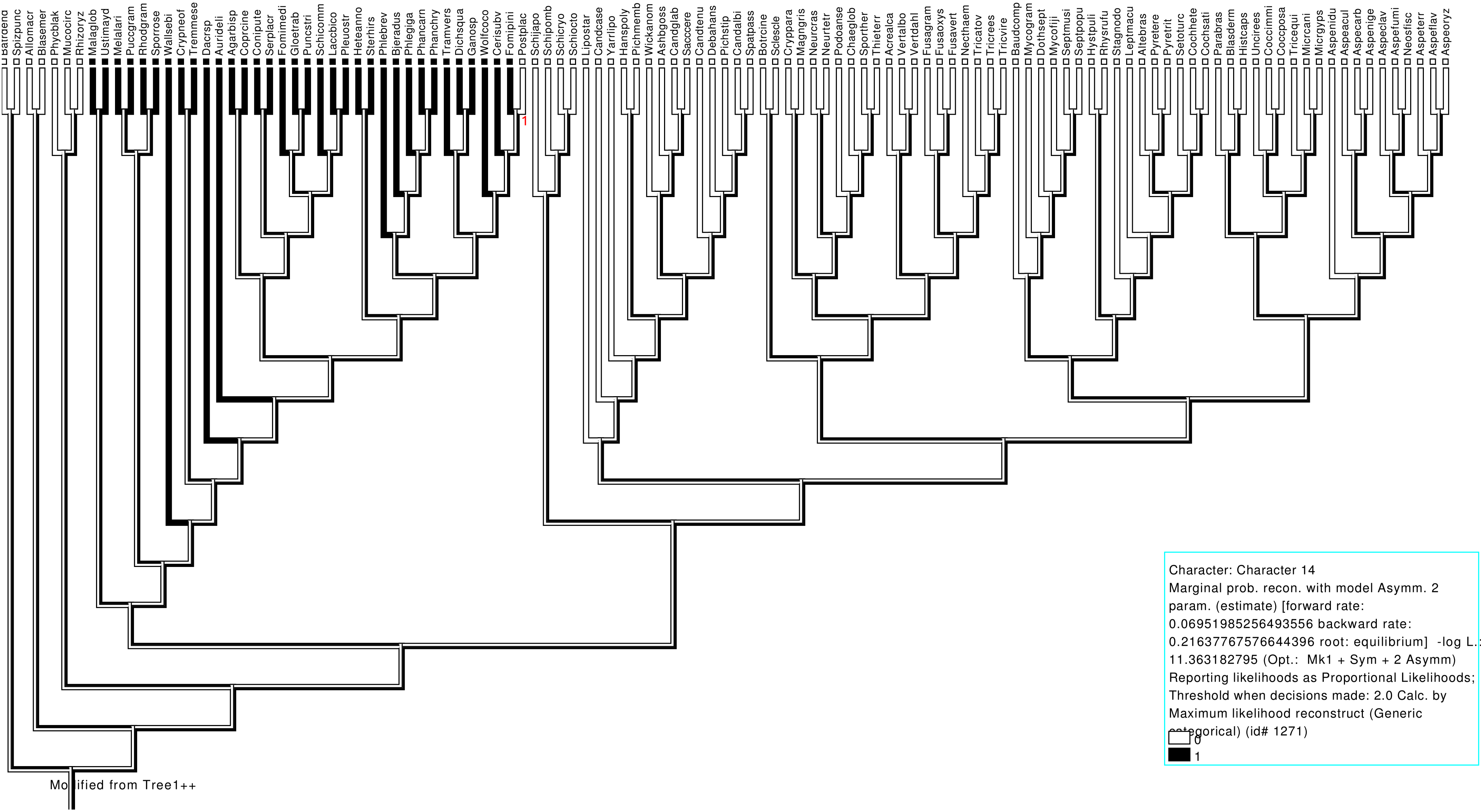
SSP160
GTP_EFTU
GTP_EFTU_D2
Annotation
✓ Presence
Other Fusion
✗ Absence


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
1
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Modified from Tree1++
Character: Character 14
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.06951985256493556 backward rate:
0.21637767576644396 root: equilibrium] -log L.:
11.363182795 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 15

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|Mc113296 unnamed protein product
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QDSSEDEQAYL
>lcl|Mc106337 unnamed protein product
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RLDPKFTQQDIDIIHSHMQAILANQQHSVVCRVVDPSTNEIMAEKSDTRAEHPLHHAVMNSIDHVAQNESKLYGGCGRMK
RTASQMTAVDDDAEAAAKKAAYLCTGYDIYITHEPCAMCAMALVHSRVSRVFYSIPSKTGSLGTNYKIHAHASLNHHYRV
FRHVLKDTAATFTLDSSLQDQEL
```

2 Annotated Phylograms

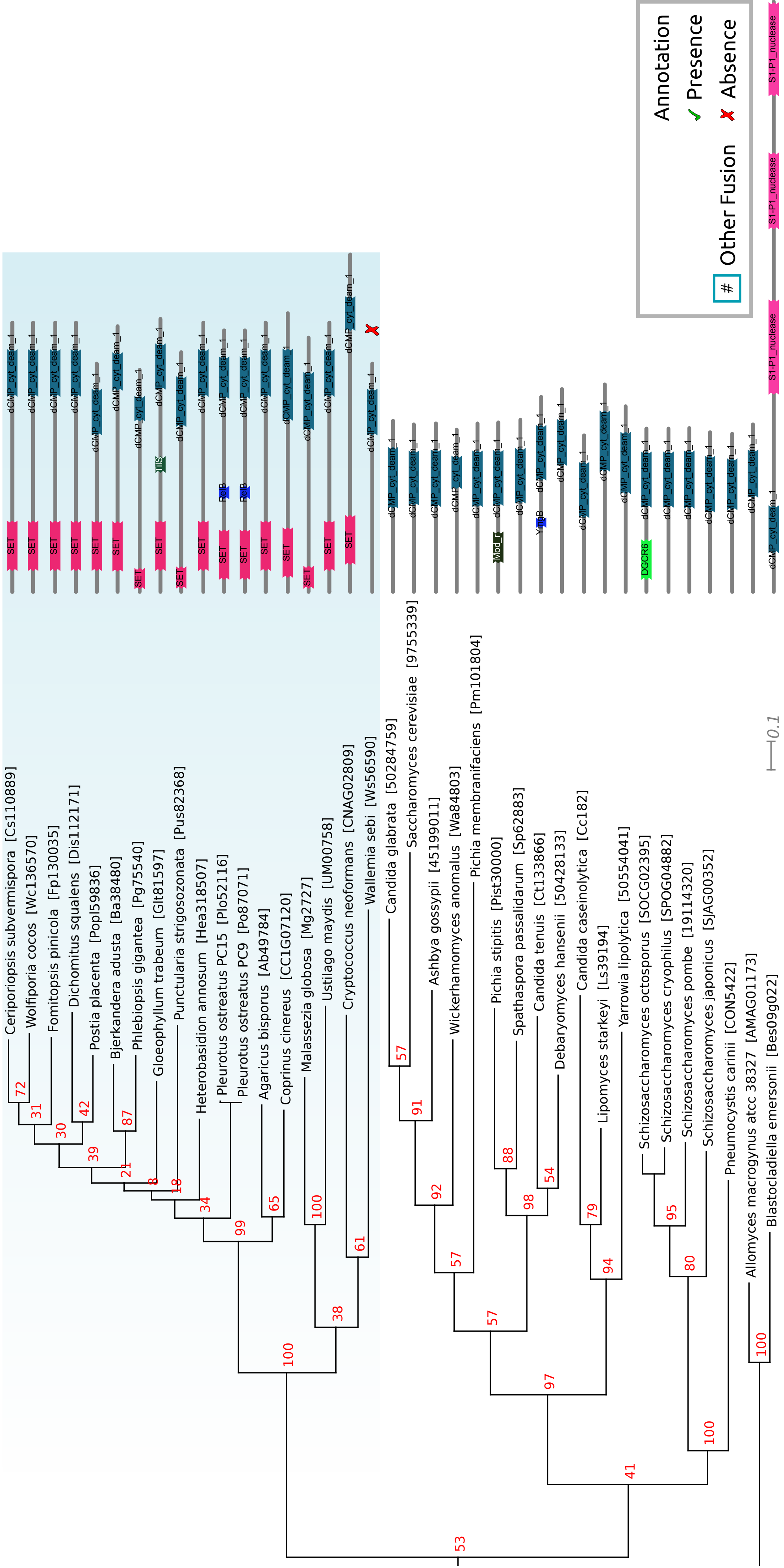
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
Presence
Absence
Other Fusion
#
0.1
Ceriporiopsis subvermispora [Cs110889]
Wolfiporia cocos [Wc136570]
Fomitopsis pinicola [Fp130035]
Dichomitus squalens [Dis112171]
Postia placenta [Popl59836]
Bjerkandera adusta [Ba38480]
Phlebiopsis gigantea [Pg75540]
Gloeophyllum trabeum [Glt81597]
Punctularia strigosozonata [Pus82368]
Heterobasidion annosum [Hea318507]
Pleurotus ostreatus PC15 [Plo52116]
Pleurotus ostreatus PC9 [Po87071]
Agaricus bisporus [Ab49784]
Coprinus cinereus [CC1G07120]
Malassezia globosa [Mg2727]
Ustilago maydis [UM00758]
Cryptococcus neoformans [CNAG02809]
Wallemia sebi [Ws56590]
Candida glabrata [50284759]
Saccharomyces cerevisiae [9755339]
Ashbya gossypii [45199011]
Wickerhamomyces anomalus [Wa84803]
Pichia membranifaciens [Pm101804]
Pichia stipitis [Pist30000]
Spathaspora passalidarum [Sp62883]
Candida tenuis [Ct133866]
Debaryomyces hansenii [50428133]
Candida caseinolytica [Cc182]
Lipomyces starkeyi [Ls39194]
Yarrowia lipolytica [50554041]
Schizosaccharomyces octosporus [SOCG02395]
Schizosaccharomyces cryophilus [SPOG04882]
Schizosaccharomyces pombe [19114320]
Schizosaccharomyces japonicus [SJAG00352]
Pneumocystis carinii [CON5422]
Allomyces macrogynus atcc 38327 [AMAG01173]
Blastocladiella emersonii [Bes09g022]
72
31
30
42
39
87
21
8
18
34
99
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100
38
61
100
57
91
92
57
88
98
54
57
79
94
97
95
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100
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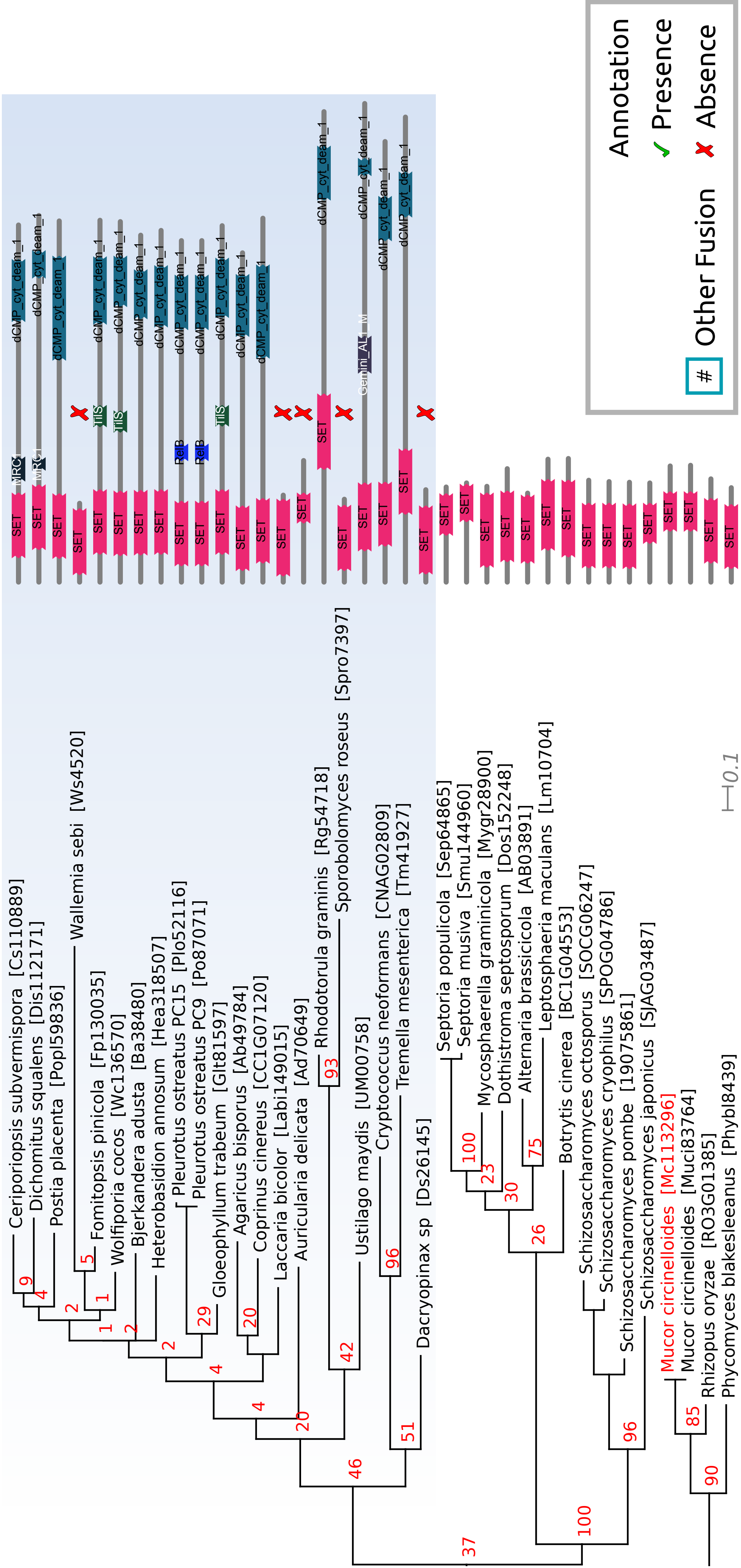
dCMP_cyt_deam_1
SET
S1-P1_nuclease
DGCR6
Mod_r
TIIS
RelB
YqaB


Annotation
✓ Presence
✗ Absence
Other Fusion
0.1
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Dichomitus squalens [Dis112171]
Postia placenta [Popl59836]
Wallemia sebi [Ws4520]
Fomitopsis pinicola [Fp130035]
Wolfiporia cocos [Wc136570]
Bjerkandera adusta [Ba38480]
Heterobasidion annosum [Hea3185507]
Pleurotus ostreatus PC15 [Plo52116]
Pleurotus ostreatus PC9 [Po87071]
Gloeophyllum trabeum [Glt81597]
Agaricus bisporus [Ab49784]
Coprinus cinereus [CC1G07120]
Laccaria bicolor [Labi149015]
Auricularia delicata [Ad70649]
Rhodotorula graminis [Rg54718]
Sporobolomyces roseus [Spro7397]
Ustilago maydis [UM00758]
Cryptococcus neoformans [CNAG02809]
Tremella mesenterica [Tm41927]
Dacryopinax sp [Ds26145]
Septoria populicola [Sep64865]
Septoria musiva [Smu144960]
Mycosphaerella graminicola [Mygr28900]
Dothistroma septosporum [Dos152248]
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Leptosphaeria maculans [Lm10704]
Botrytis cinerea [BC1G04553]
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Phycomyces blakesleeanus [Phybl8439]
9
4
2
5
1
1
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29
20
4
4
20
93
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46
96
51
37
100
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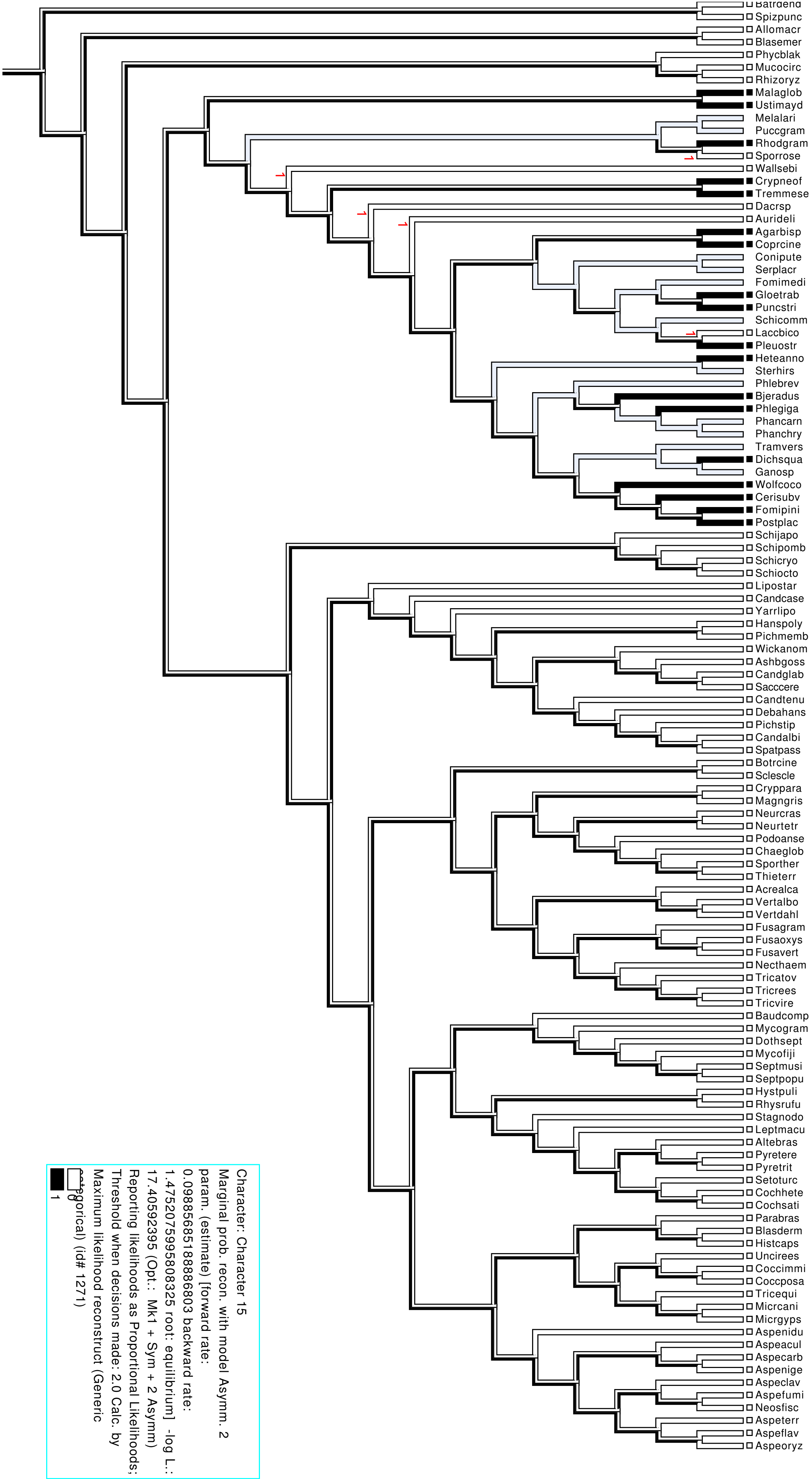
MRC1
TilS
RelB
Gemini_AL1_M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Spizpunc
Allomacr
Blasemer
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Mucocirc
Rhizoryz
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Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochthete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
1
1
1
1
Character: Character 15
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.0988568518886803 backward rate:
1.4752075995808325 root: equilibrium] -log L.:
17.40592395 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 16

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|Mc72864 unnamed protein product
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YNNIHMGSCAENTAANYNITREDQDNHAIESYKRAAKAWENGAFDAEIAPVTIKSKKGETVIKVDEEYKNVKFDKITSLR
AVFKKDGTVTAANASTLNDGASALVLMSRAKAEELGVKPLARIVSYADAATAPIDFTIAPAKALPVALEKAGLTVDDISK
FELNEAFSVVARVNEQLMKLDPSKVNVNGGAVALGHPIGSSGSRIIVTLTHLLKSGEFGAAAVCNGGGAASSIVIQRE
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
   -a gamma
```

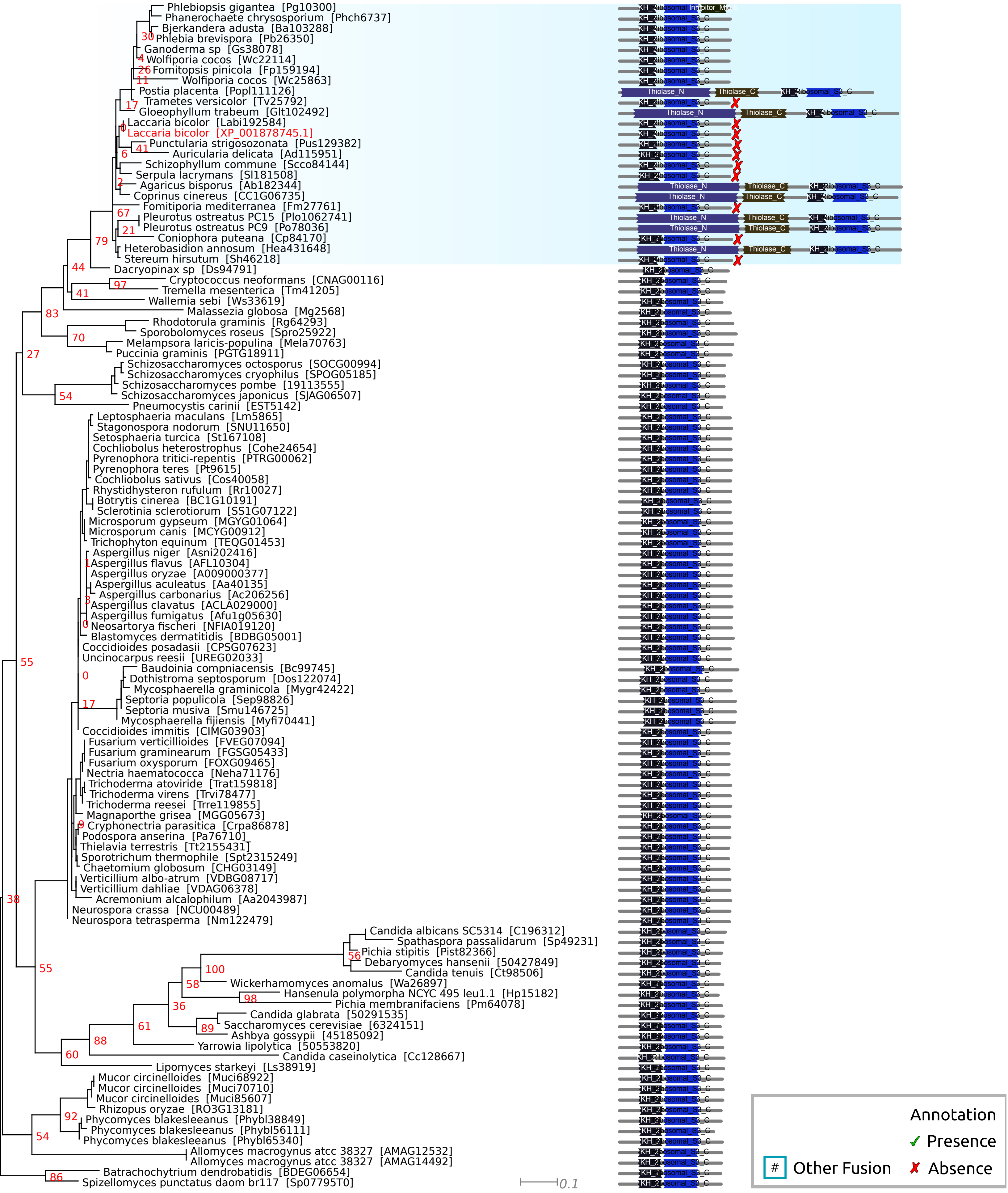
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

First domain phylogney showed low resolution, so this result was not included here.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Phanerochaete chrysosporium [Phch6737]
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Phlebia brevispora [Pb26350]
Ganoderma sp [Gs38078]
Wolfiporia cocos [Wc22114]
Fomitopsis pinicola [Fp159194]
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Postia placenta [Popl111126]
Trametes versicolor [Tv25792]
Gloeophyllum trabeum [Glt102492]
Laccaria bicolor [Labi192584]
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Auricularia delicata [Ad115951]
Schizophyllum commune [Scco84144]
Serpula lacrymans [Sl181508]
Agaricus bisporus [Ab182344]
Coprinus cinereus [CC1G06735]
Fomitiporia mediterranea [Fm27761]
Pleurotus ostreatus PC15 [Plo1062741]
Pleurotus ostreatus PC9 [Po78036]
Coniophora puteana [Cp84170]
Heterobasidion annosum [Hea431648]
Stereum hirsutum [Sh46218]
Dacryopinax sp [Ds94791]
Cryptococcus neoformans [CNAG00116]
Tremella mesenterica [Tm41205]
Wallemia sebi [Ws33619]
Malassezia globosa [Mg2568]
Rhodotorula graminis [Rg64293]
Sporobolomyces roseus [Spro25922]
Melampsora laricis-populina [Mela70763]
Puccinia graminis [PGTG18911]
Schizosaccharomyces octosporus [SOCG00994]
Schizosaccharomyces cryophilus [SPOG05185]
Schizosaccharomyces pombe [19113555]
Schizosaccharomyces japonicus [SJAG06507]
Pneumocystis carinii [EST5142]
Leptosphaeria maculans [Lm5865]
Stagonospora nodorum [SNU11650]
Setosphaeria turcica [St167108]
Cochliobolus heterostrophus [Cohe24654]
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Cochliobolus sativus [Cos40058]
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Botrytis cinerea [BC1G10191]
Sclerotinia sclerotiorum [SS1G07122]
Microsporum gypseum [MGYG01064]
Microsporum canis [MCYG00912]
Trichophyton equinum [TEQG01453]
Aspergillus niger [Asni202416]
Aspergillus flavus [AFL10304]
Aspergillus oryzae [A009000377]
Aspergillus aculeatus [Aa40135]
Aspergillus carbonarius [Ac206256]
Aspergillus clavatus [ACLA029000]
Aspergillus fumigatus [Afu1g05630]
Neosartorya fischeri [NFIA019120]
Blastomyces dermatitidis [BDBG05001]
Coccidioides posadasii [CPSG07623]
Uncinocarpus reesii [UREG02033]
Baudoinia compniacensis [Bc99745]
Dothistroma septosporum [Dos122074]
Mycosphaerella graminicola [Mygr42422]
Septoria populicola [Sep98826]
Septoria musiva [Smu146725]
Mycosphaerella fijiensis [Myfi70441]
Coccidioides immitis [CIMG03903]
Fusarium verticillioides [FVEG07094]
Fusarium graminearum [FGSG05433]
Fusarium oxysporum [FOXG09465]
Nectria haematococca [Neha71176]
Trichoderma atoviride [Trat159818]
Trichoderma virens [Trvi78477]
Trichoderma reesei [Tre119855]
Magnaporthe grisea [MGG05673]
Cryphonectria parasitica [Crpa86878]
Podospora anserina [Pa76710]
Thielavia terrestris [Tt2155431]
Sporotrichum thermophile [Spt2315249]
Chaetomium globosum [CHG03149]
Verticillium albo-atrum [VDBG08717]
Verticillium dahliae [VDAG06378]
Acremonium alcalophilum [Aa2043987]
Neurospora crassa [NCU00489]
Neurospora tetrasperma [Nm122479]
Candida albicans SC5314 [C196312]
Spathaspora passalidarum [Sp49231]
Pichia stipitis [Pist82366]
Debaryomyces hansenii [50427849]
Candida tenuis [Ct98506]
Wickerhamomyces anomalus [Wa26897]
Hansenula polymorpha NCYC 495 leu1.1 [Hp15182]
Pichia membranifaciens [Pm64078]
Candida glabrata [50291535]
Saccharomyces cerevisiae [6324151]
Ashbya gossypii [45185092]
Yarrowia lipolytica [50553820]
Candida caseinolytica [Cc128667]
Lipomyces starkeyi [Ls38919]
Mucor circinelloides [Muci68922]
Mucor circinelloides [Muci70710]
Mucor circinelloides [Muci85607]
Rhizopus oryzae [RO3G13181]
Phycomyces blakesleeanus [Phybl38849]
Phycomyces blakesleeanus [Phybl56111]
Phycomyces blakesleeanus [Phybl65340]
Allomyces macrogynus atcc 38327 [AMAG12532]
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Batrachochytrium dendrobatidis [BDEG06654]
Spizellomyces punctatus daom br117 [Sp07795T0]
30
4
26
11
17
0
41
6
2
67
21
79
44
97
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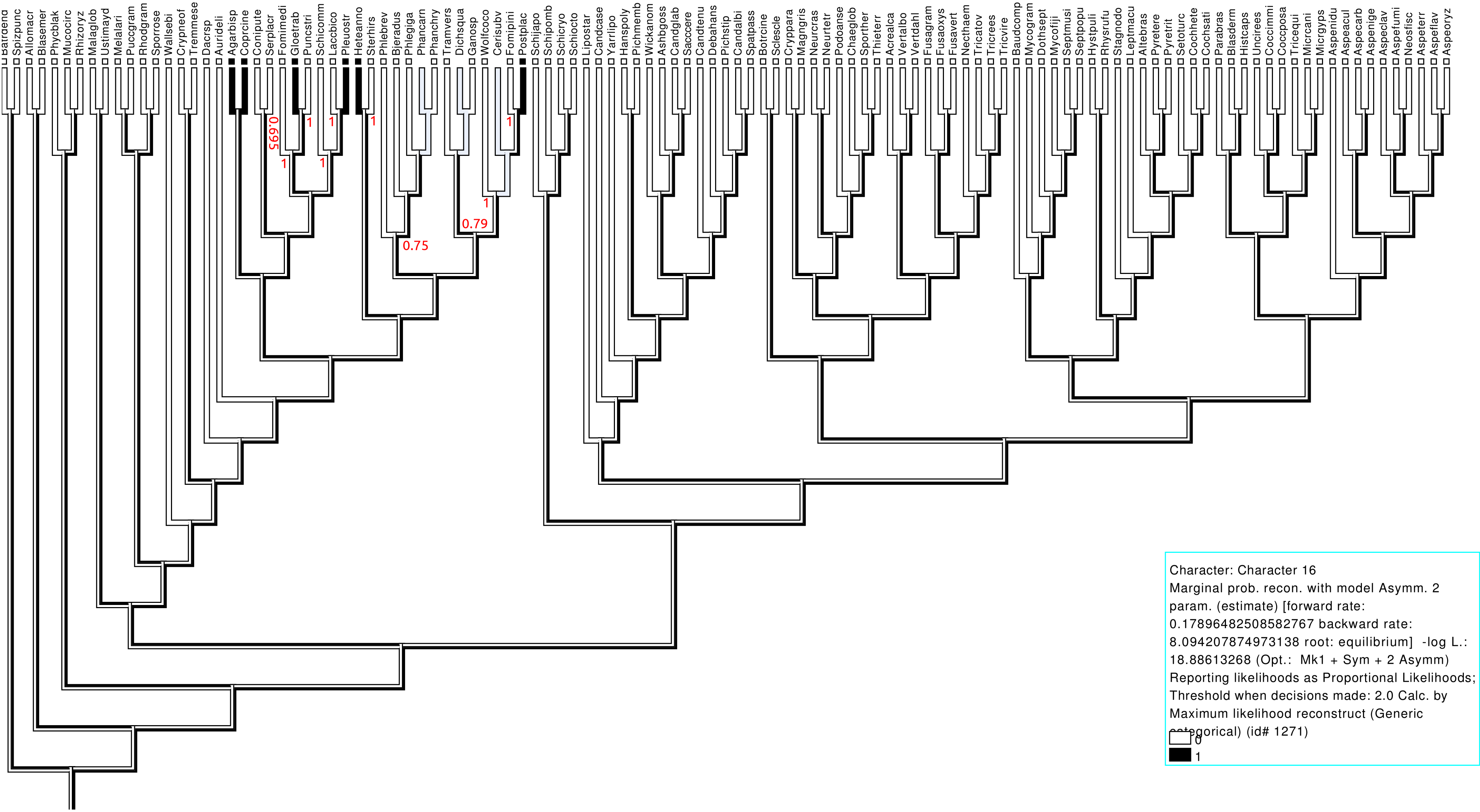
83
70
27
54
1
3
0
0
17
9
55
38
56
100
58
98
36
89
61
88
60
92
54
86
0.1
KH_Ribosomal_S3_C
Inhibitor_Mig
Thiolase_N
Thiolase_C
Annotation
✓ Presence
Other Fusion
✗ Absence



Character: Character 16
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.17896482508582767 backward rate:
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Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 17

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|NCU02798T0 unnamed protein product
MADTFVSDFQVRSLAGEPCAAVSVRNLSTTLYAASDAWGRKCTVAPQPCLISAEVHFKQPFGTAAANDQLGADTVHYGNL
SKAILERMKRFTVPREQEQEQEQEQKQSGSGNGNGDHSVQETNNNNNNNNNNFTLAYVIHDLWVGLTGWAHFGSVKEEEK
PFLDISSIRFLSLTVTLPKASLLGDGVSMTCSQFFKNGPGEKMRENLISASLKIHNLKVPTLVGVNPHERRAKQFVVTSV
NVERYFRMDDYYSELEGVVVKALEESSYETLEALGAHLAEKILEPDHRKDHTKWQVHIRMEKPTAVPLADCPIVEVRAGY
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>lcl|NCU09930T0 unnamed protein product
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LEPLELLDALQDIENSLGRKKIIDKGPRNIDLDILLYENLKVDHERLKIPHIGIPEREFVLRPLAELIPDKPLDHTRPWT
LTRDLLDALPPSSTPITTMTPLSSHGHPPIQALNPSRKTHVMAILNMTPDSFSDGGQHASAGLESTIQSFLDAGATMIDV
GGQSTAPRTPQVSAEEEIGRVVPAIKMIREKFSHRDVLISVDTYRASVAEAAVAAGADIVNDVSGGSMDPDMLPTVARLG
STICLMHMRGTPANMSSLNEYPEAEGGLIGGIAKELVGRVAAAEAAGIRRWRIVLDPGLGFAKVGPQNVDVLRHLEELRS
WPGLQGLPWLVGSSRKSFIGQVTGVPTPKERIWGTAATVAAAVQGGADVVRVHDVKEMAQVVAMADAIWRY
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

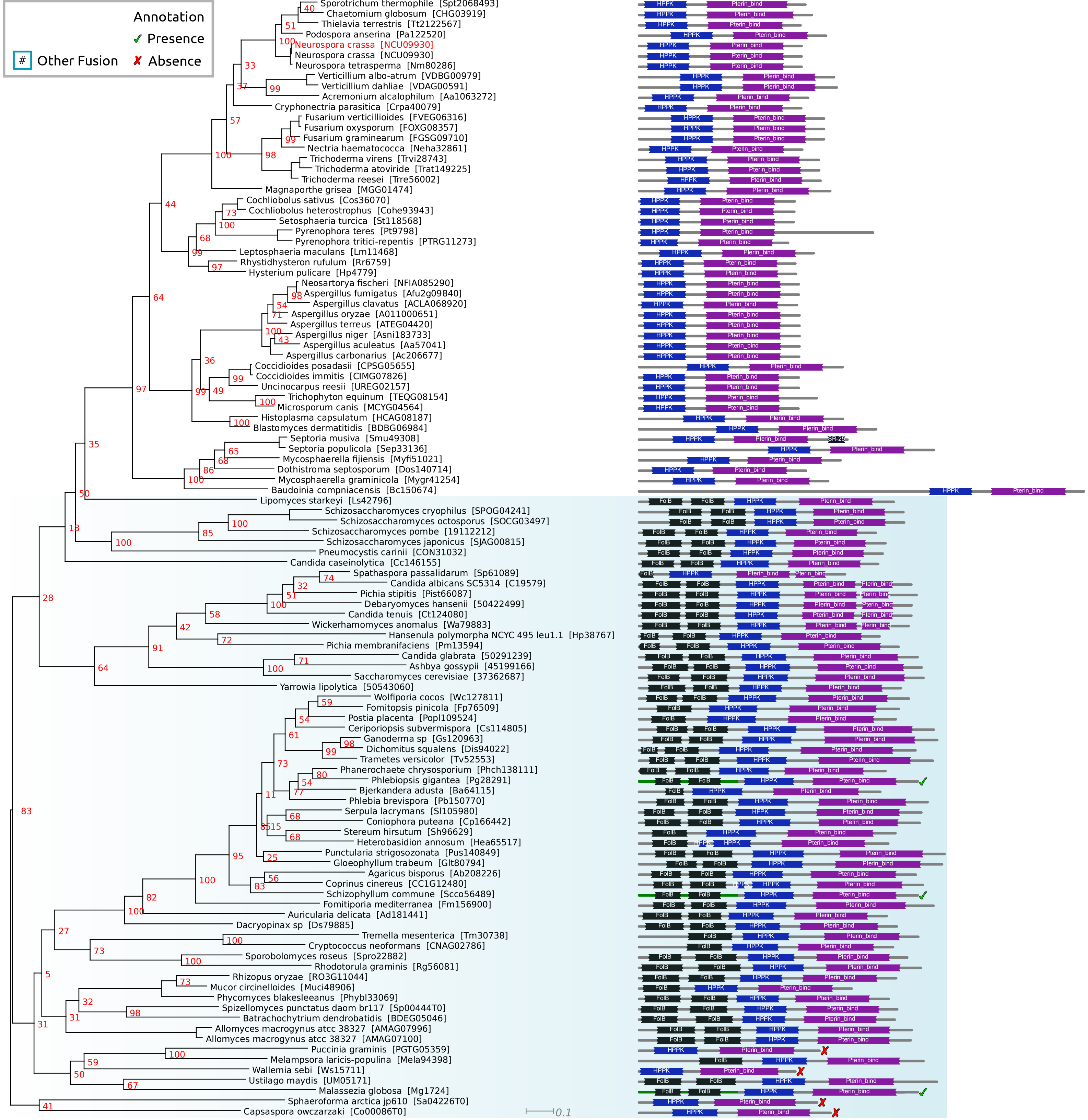
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

FolB phylogney showed low resolution, so this result was not included here.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Sporotrichum thermophile [Spt2068493]
Chaetomium globosum [CHG03919]
Thielavia terrestris [Tt2122567]
Podospora anserina [Pa122520]
Neurospora crassa [NCU09930]
Neurospora crassa [NCU09930]
Neurospora tetrasperma [Nm80286]
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Verticillium dahliae [VDAG00591]
Acremonium alcalophilum [Aa1063272]
Cryphonectria parasitica [Crpa40079]
Fusarium verticillioides [FVEG06316]
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Fusarium graminearum [FGSG09710]
Nectria haematococca [Neha32861]
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Trichoderma atoviride [Trat149225]
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Magnaporthe grisea [MGG01474]
Cochliobolus sativus [Cos36070]
Cochliobolus heterostrophus [Cohe93943]
Setosphaeria turcica [St118568]
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Rhystidhysteron rufulum [Rr6759]
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Aspergillus fumigatus [Afu2g09840]
Aspergillus clavatus [ACLA068920]
Aspergillus oryzae [A011000651]
Aspergillus terreus [ATEG04420]
Aspergillus niger [Asni183733]
Aspergillus aculeatus [Aa57041]
Aspergillus carbonarius [Ac206677]
Coccidioides posadasii [CPSG05655]
Coccidioides immitis [CIMG07826]
Uncinocarpus reesii [UREG02157]
Trichophyton equinum [TEQG08154]
Microsporum canis [MCYG04564]
Histoplasma capsulatum [HCAG08187]
Blastomyces dermatitidis [BDBG06984]
Septoria musiva [Smu49308]
Septoria populicola [Sep33136]
Mycosphaerella fijiensis [Myfi51021]
Dothistroma septosporum [Dos140714]
Mycosphaerella graminicola [Mygr41254]
Baudoinia compniacensis [Bc150674]
Lipomyces starkeyi [Ls42796]
Schizosaccharomyces cryophilus [SPOG04241]
Schizosaccharomyces octosporus [SOCG03497]
Schizosaccharomyces pombe [19112212]
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Pneumocystis carinii [CON31032]
Candida caseinolytica [Cc146155]
Spathaspora passalidarum [Sp61089]
Candida albicans SC5314 [C19579]
Pichia stipitis [Pist66087]
Debaryomyces hansenii [50422499]
Candida tenuis [Ct124080]
Wickerhamomyces anomalus [Wa79883]
Hansenula polymorpha NCYC 495 leu1.1 [Hp38767]
Pichia membranifaciens [Pm13594]
Candida glabrata [50291239]
Ashbya gossypii [45199166]
Saccharomyces cerevisiae [37362687]
Yarrowia lipolytica [50543060]
Wolfiporia cocos [Wc127811]
Fomitopsis pinicola [Fp76509]
Postia placenta [Popl109524]
Ceriporiopsis subvermispora [Cs114805]
Ganoderma sp [Gs120963]
Dichomitus squalens [Dis94022]
Trametes versicolor [Tv52553]
Phanerochaete chrysosporium [Phch138111]
Phlebiopsis gigantea [Pg28291]
Bjerkandera adusta [Ba64115]
Phlebia brevispora [Pb150770]
Serpula lacrymans [Sl105980]
Coniophora puteana [Cp166442]
Stereum hirsutum [Sh96629]
Heterobasidion annosum [Hea65517]
Punctularia strigosozonata [Pus140849]
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Agaricus bisporus [Ab208226]
Coprinus cinereus [CC1G12480]
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Fomitiporia mediterranea [Fm156900]
Auricularia delicata [Ad181441]
Dacryopinax sp [Ds79885]
Tremella mesenterica [Tm30738]
Cryptococcus neoformans [CNAG02786]
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Rhodotorula graminis [Rg56081]
Rhizopus oryzae [RO3G11044]
Mucor circinelloides [Muci48906]
Phycomyces blakesleeanus [Phybl33069]
Spizellomyces punctatus daom br117 [Sp00444T0]
Batrachochytrium dendrobatidis [BDEG05046]
Allomyces macrogynus atcc 38327 [AMAG07996]
Allomyces macrogynus atcc 38327 [AMAG07100]
Puccinia graminis [PGTG05359]
Melampsora laricis-populina [Mela94398]
Wallemia sebi [Ws15711]
Ustilago maydis [UM05171]
Malassezia globosa [Mg1724]
Sphaeroforma arctica jp610 [Sa04226T0]
Capsaspora owczarzaki [Co00086T0]
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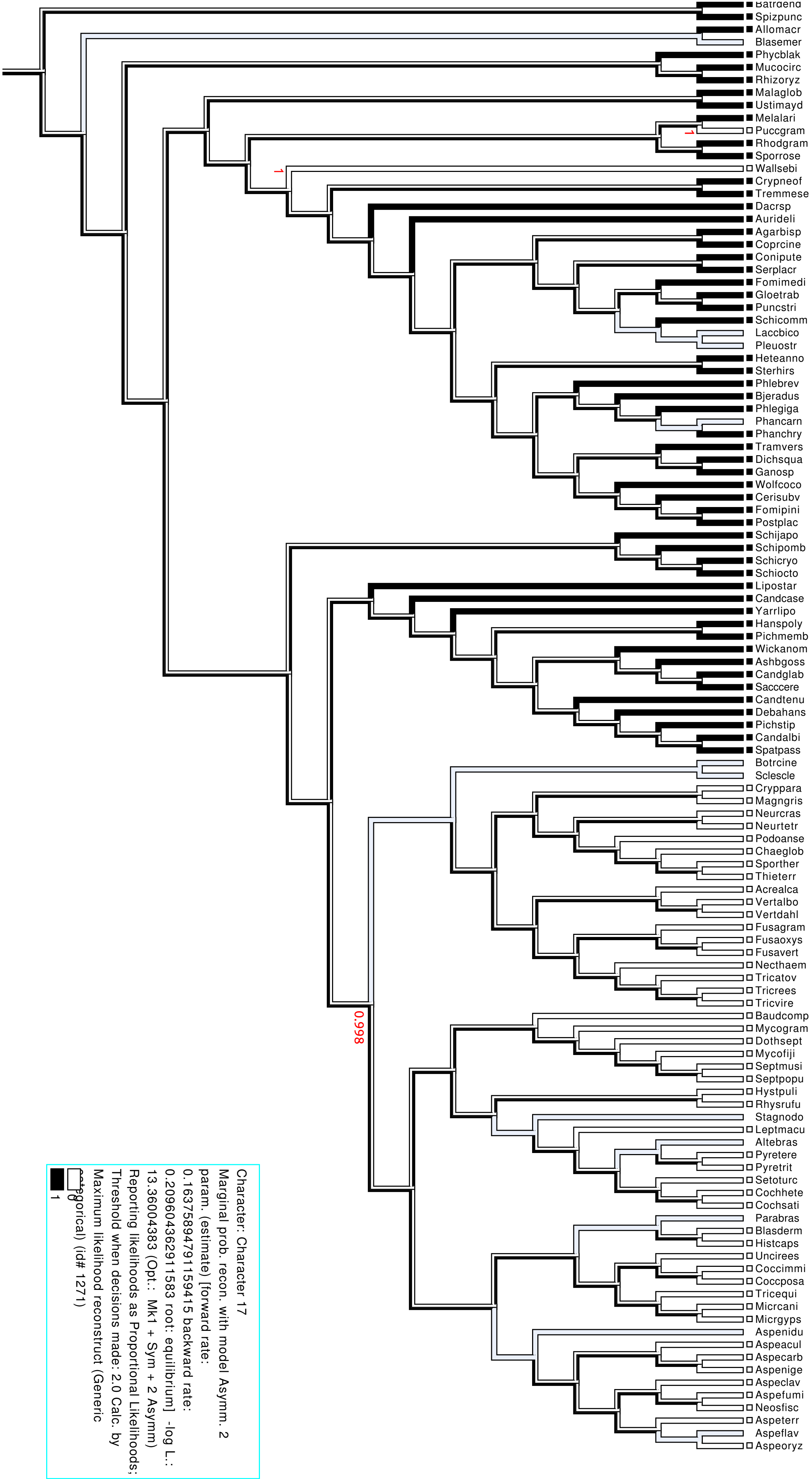
Pterin_bind
FolB
SR-25
0.1


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
1
0.998
Character: Character 17
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.163758947911594l5 backward rate:
0.209604362911583 root: equilibrium] -log L.:
13.36004383 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 18

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|NCU08029T0 unnamed protein product
MTPRLSTLDLVAKVDAFPYADRDPEAYAQIMKSFYTFVWEDQQGQVPIGYVKLDVVDALNKAPATLKGQLGLHIDVSNRT
VVLFRDAPDKTYEERTRLVGKLTALWREQEAFAILKSWRNELWPVYGRNKELVFSIERAAMGLFGTTRYGVHMNAFIRRQ
DASSKYDLRIWVPKRSATKSTYPSMLDNAVAGGLMTNEDPFECVIREADEEASLSEHIVRNNAKEVCTITYIYITDERAG
GEAGLIYPECQWIYDLELPADGSVVPEPKDGEVESFSLCTVEEIQKQLAQGMWKPNCAVVMLDFFVRHGIYTPENEPHYD
AFRDRAHRHIAFPGPHQA
>lcl|NCU04944T0 unnamed protein product
MLGFGSKFIPTKLPSISRIFISFHVSPCRTVTALPDLTFTTRGTQLFQLNNYKGRAIHSNETMGTTNGTTQSTGALDEGQ
IFEWYPLDLVRDYEQQKQHDHNDQLQNGSNGTTHKPEPFALVVLNQPLTHLGLVKRLWKNASIRVAADGGANCLYDVAGK
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GGRVDQGLSQLHHLYLFQSSPTYADGRMYLFSGESLTFLLKSGTHRIRVREPGQANQPEKDVFAKWVGILPVKEPSRIWT
KGLEWDVEDWPTEFGGQVSTSNHVLPETEVVEVRATKDVLFTIALRDL
```

2 Annotated Phylograms

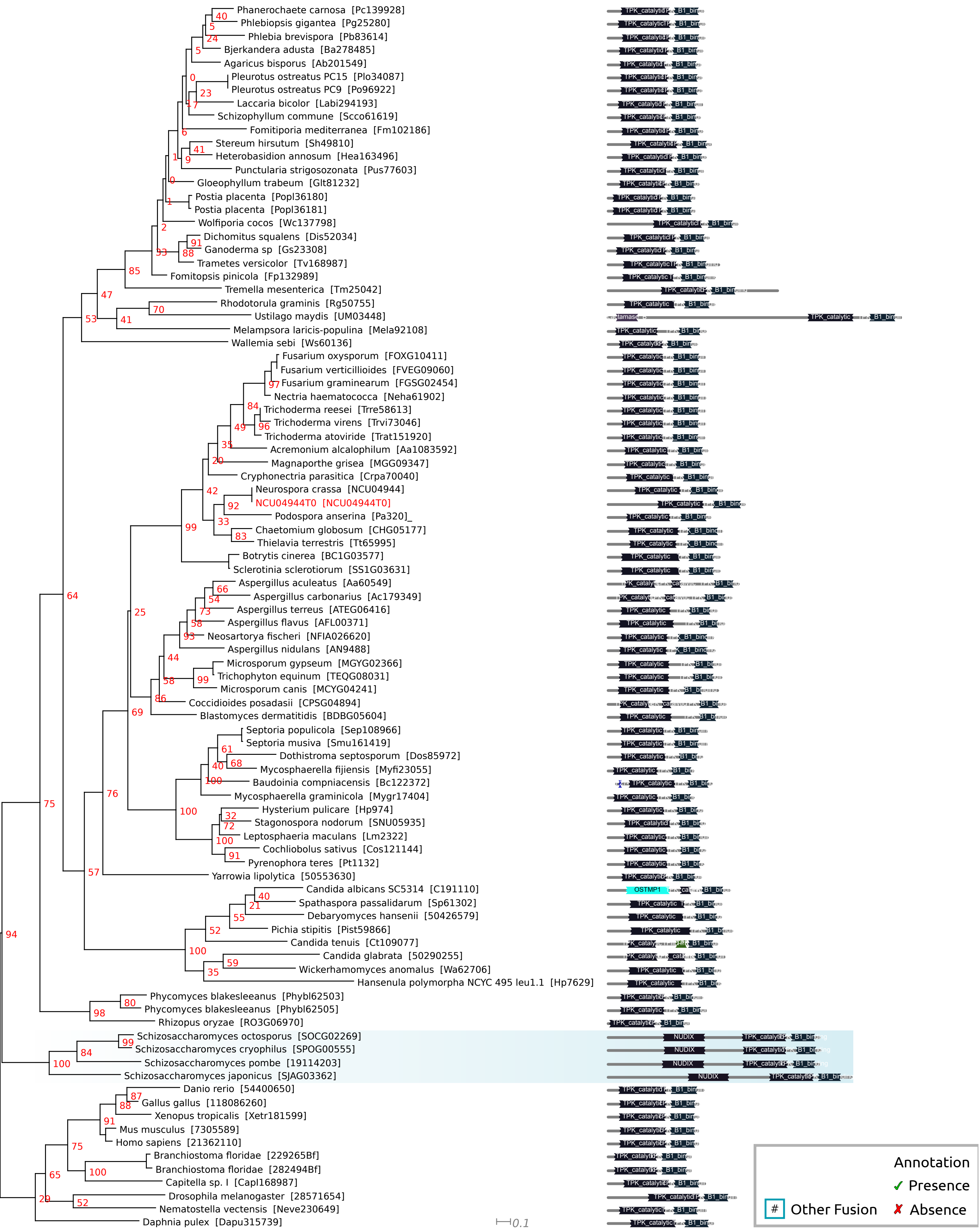
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Phlebiopsis gigantea [Pg25280]
Phlebia brevispora [Pb83614]
Bjerkandera adusta [Ba278485]
Agaricus bisporus [Ab201549]
Pleurotus ostreatus PC15 [Plo34087]
Pleurotus ostreatus PC9 [Po96922]
Laccaria bicolor [Labi294193]
Schizophyllum commune [Scco61619]
Fomitiporia mediterranea [Fm102186]
Stereum hirsutum [Sh49810]
Heterobasidion annosum [Hea163496]
Punctularia strigosozonata [Pus77603]
Gloeophyllum trabeum [Glt81232]
Postia placenta [Popl36180]
Postia placenta [Popl36181]
Wolfiporia cocos [Wc137798]
Dichomitus squalens [Dis52034]
Ganoderma sp [Gs23308]
Trametes versicolor [Tv168987]
Fomitopsis pinicola [Fp132989]
Tremella mesenterica [Tm25042]
Rhodotorula graminis [Rg50755]
Ustilago maydis [UM03448]
Melampsora laricis-populina [Mela92108]
Wallemia sebi [Ws60136]
Fusarium oxysporum [FOXG10411]
Fusarium verticillioides [FVEG09060]
Fusarium graminearum [FGSG02454]
Nectria haematococca [Neha61902]
Trichoderma reesei [Trre58613]
Trichoderma virens [Trvi73046]
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Acremonium alcalophilum [Aa1083592]
Magnaporthe grisea [MGG09347]
Cryphonectria parasitica [Crpa70040]
Neurospora crassa [NCU04944]
NCU04944T0 [NCU04944T0]
Podospora anserina [Pa320]_
Chaetomium globosum [CHG05177]
Thielavia terrestris [Tt65995]
Botrytis cinerea [BC1G03577]
Sclerotinia sclerotiorum [SS1G03631]
Aspergillus aculeatus [Aa60549]
Aspergillus carbonarius [Ac179349]
Aspergillus terreus [ATEG06416]
Aspergillus flavus [AFL00371]
Neosartorya fischeri [NFIA026620]
Aspergillus nidulans [AN9488]
Microsporum gypseum [MGYG02366]
Trichophyton equinum [TEQG08031]
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Coccidioides posadasii [CPSG04894]
Blastomyces dermatitidis [BDBG05604]
Septoria populicola [Sep108966]
Septoria musiva [Smu161419]
Dothistroma septosporum [Dos85972]
Mycosphaerella fijiensis [Myfi23055]
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Hysterium pulicare [Hp974]
Stagonospora nodorum [SNU05935]
Leptosphaeria maculans [Lm2322]
Cochliobolus sativus [Cos121144]
Pyrenophora teres [Pt1132]
Yarrowia lipolytica [50553630]
Candida albicans SC5314 [C191110]
Spathaspora passalidarum [Sp61302]
Debaryomyces hansenii [50426579]
Pichia stipitis [Pist59866]
Candida tenuis [Ct109077]
Candida glabrata [50290255]
Wickerhamomyces anomalus [Wa62706]
Hansenula polymorpha NCYC 495 leu1.1 [Hp7629]
Phycomyces blakesleeanus [Phybl62503]
Phycomyces blakesleeanus [Phybl62505]
Rhizopus oryzae [RO3G06970]
Schizosaccharomyces octosporus [SOCG02269]
Schizosaccharomyces cryophilus [SPOG00555]
Schizosaccharomyces pombe [19114203]
Schizosaccharomyces japonicus [SJAG03362]
Danio rerio [54400650]
Gallus gallus [118086260]
Xenopus tropicalis [Xetr181599]
Mus musculus [7305589]
Homo sapiens [21362110]
Branchiostoma floridae [229265Bf]
Branchiostoma floridae [282494Bf]
Capitella sp. I [Capl168987]
Drosophila melanogaster [28571654]
Nematostella vectensis [Neve230649]
Daphnia pulex [Dapu315739]
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Lactamase
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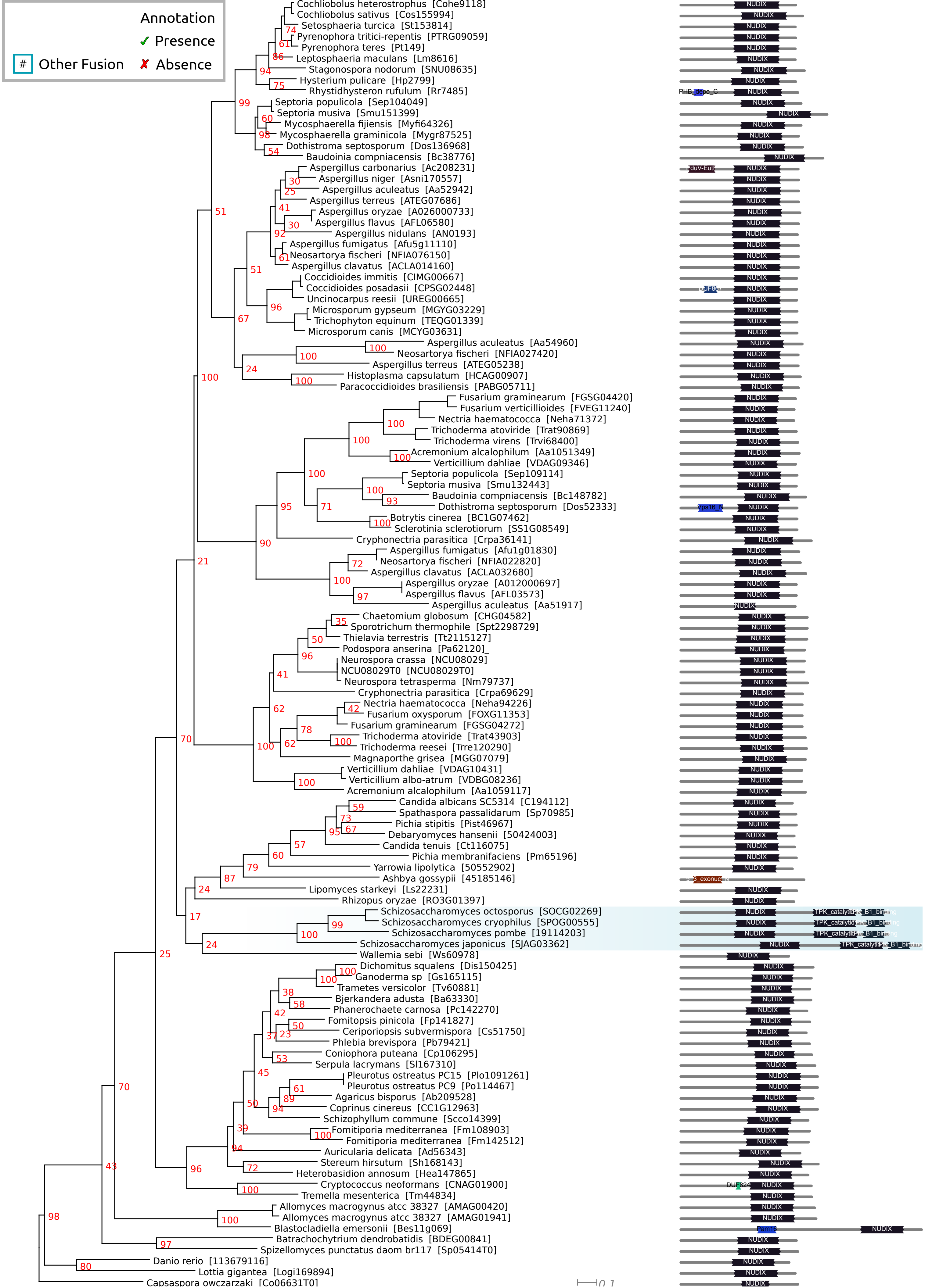
Other Fusion
✗ Absence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Pyrenophora teres [Pt149]
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Leptosphaeria maculans [Lm8616]
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Stagonospora nodorum [SNU08635]
Hysterium pulicare [Hp2799]
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Rhystidhysteron rufulum [Rr7485]
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Septoria populicola [Sep104049]
Septoria musiva [Smu151399]
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Mycosphaerella fijiensis [Myfi64326]
98
Mycosphaerella graminicola [Mygr87525]
Dothistroma septosporum [Dos136968]
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Baudoinia compniacensis [Bc38776]
Aspergillus carbonarius [Ac208231]
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Aspergillus niger [Asni170557]
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Aspergillus aculeatus [Aa52942]
Aspergillus terreus [ATEG07686]
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Aspergillus oryzae [A026000733]
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Aspergillus flavus [AFL06580]
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Neosartorya fischeri [NFIA076150]
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Aspergillus clavatus [ACLA014160]
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Ceriporiopsis subvermispora [Cs51750]
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Serpula lacrymans [Sl167310]
45
Pleurotus ostreatus PC15 [Plo1091261]
70
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Pleurotus ostreatus PC9 [Po114467]
89
Agaricus bisporus [Ab209528]
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94
Coprinus cinereus [CC1G12963]
Schizophyllum commune [Scco14399]
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Fomitiporia mediterranea [Fm108903]
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Fomitiporia mediterranea [Fm142512]
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Auricularia delicata [Ad56343]
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Stereum hirsutum [Sh168143]
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96
Heterobasidion annosum [Hea147865]
Cryptococcus neoformans [CNAG01900]
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Tremella mesenterica [Tm44834]
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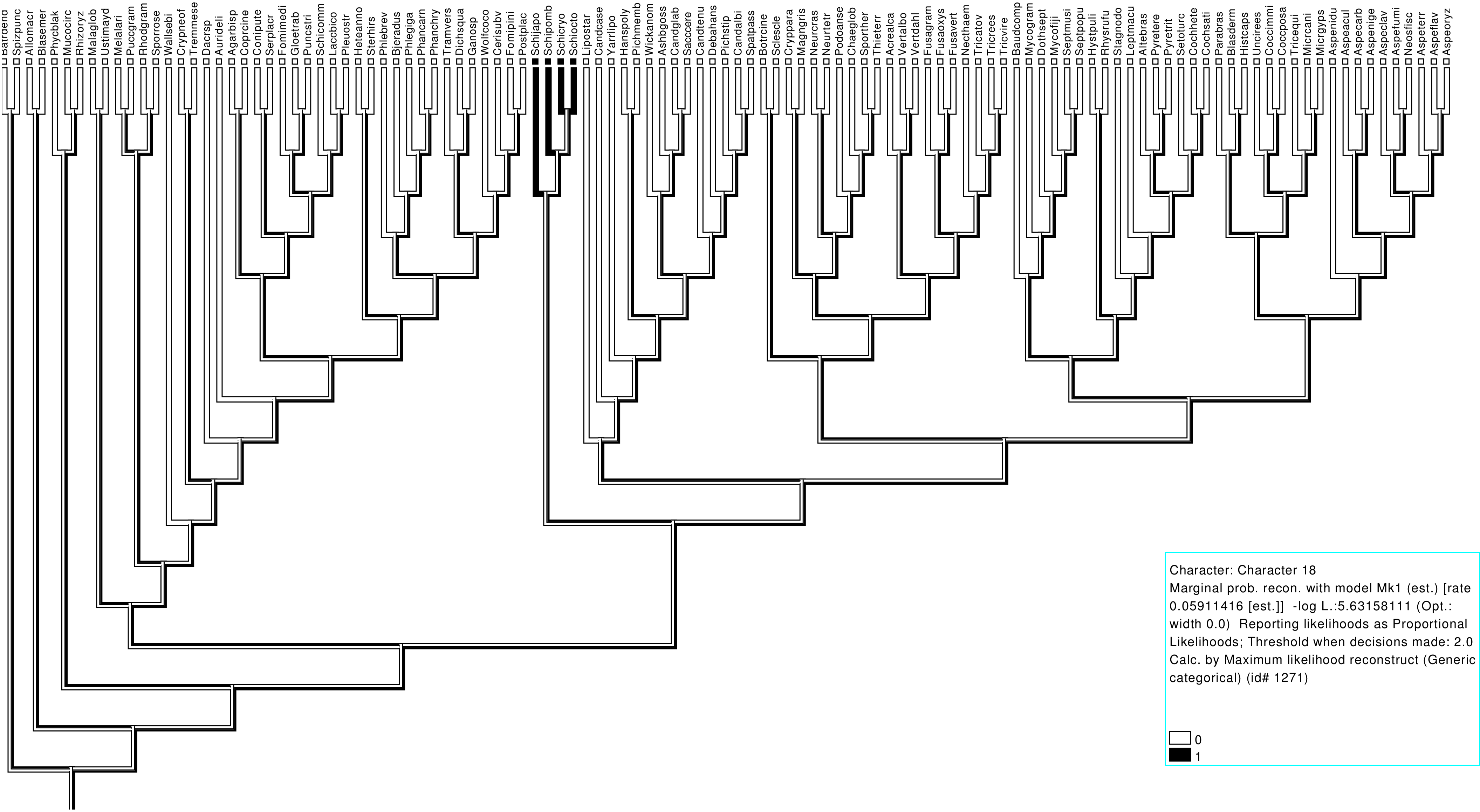

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Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 19

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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TFSEEDNVPREEGTKTVALSAFTLSSLPTPLARKALVKEMWESGAHTLVLMDHNTKEGFESIAQAREYLLRQGRKEVEKS
EAESPSSLEGAYVVAPCPHDSACPLLNSGSNRLVCGFNQRLQRPSFVRLTKHSGIGHEDIGYTYVVIQRGSRPGKVESQL
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VLPGESSLAFYTAKNDSEQDIIGIATYNVTPDRVAPYFSKVECFCFEEQKLLAGEEIDMPLLFFIDKDILEDPACRNVQD
VVLSYTFFRARRNKFGHLEPDATDDAVQSSLGFDKFEHGSSSSSSEKSS
```

2 Annotated Phylograms

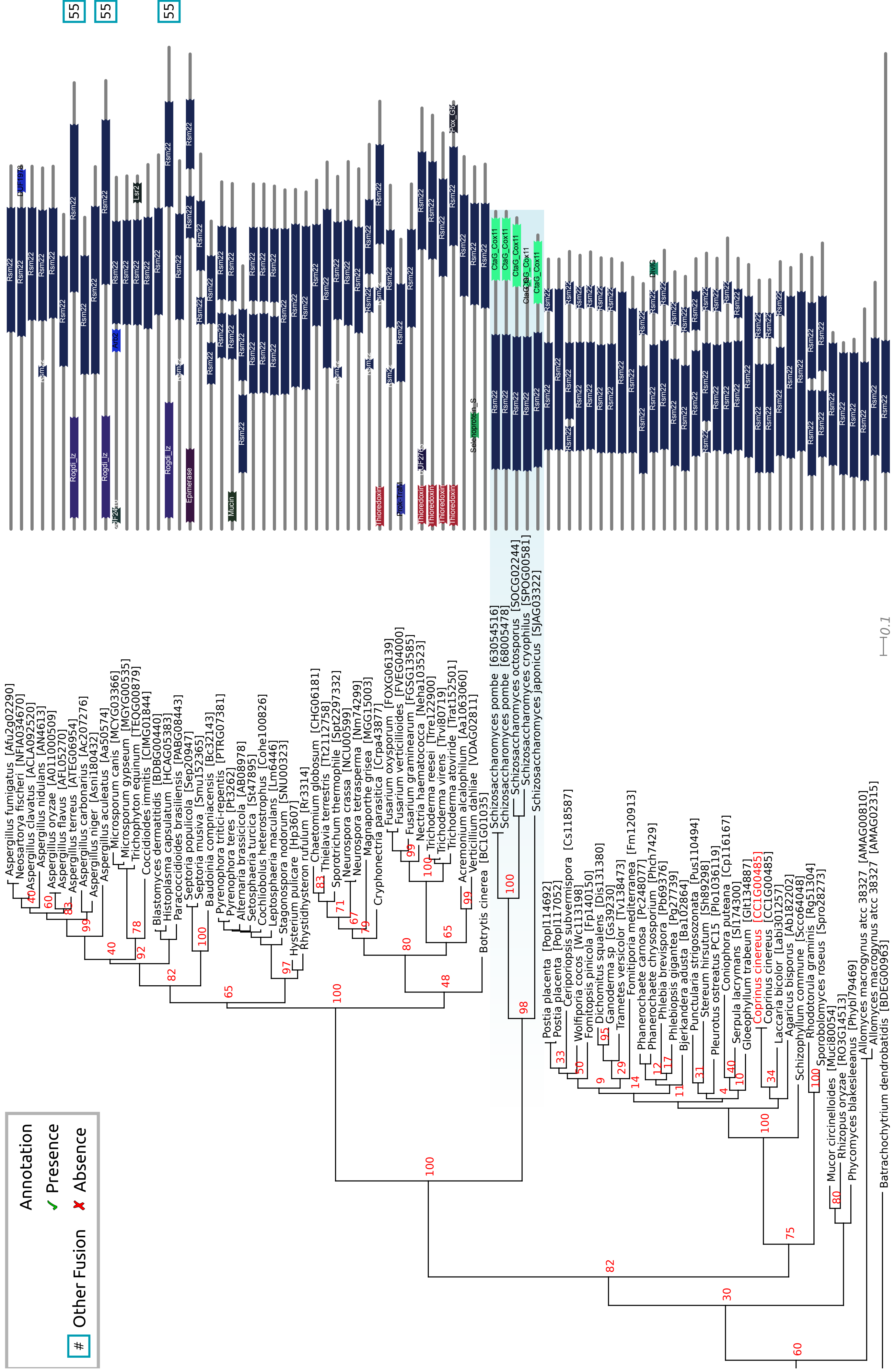
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✗ Absence
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Aspergillus clavatus [ACLA092520]
Aspergillus nidulans [AN4613]
Aspergillus oryzae [AO11000509]
Aspergillus flavus [AFL05270]
Aspergillus terreus [ATEG06954]
Aspergillus carbonarius [Ac207276]
Aspergillus niger [Asni180432]
Aspergillus aculeatus [Aa50574]
Microsporum canis [MCYG03366]
Microsporum gypseum [MGYG00535]
Trichophyton equinum [TEQG00879]
Coccidioides immitis [CIMG01844]
Blastomyces dermatitidis [BDBG00440]
Histoplasma capsulatum [HCAG05383]
Paracoccidioides brasiliensis [PABG08443]
Septoria populicola [Sep20947]
Septoria musiva [Smu152365]
Baudoinia compniacensis [Bc32143]
Pyrenophora tritici-repentis [PTRG07381]
Pyrenophora teres [Pt3262]
Alternaria brassicicola [AB08978]
Setosphaeria turcica [St47895]
Cochliobolus heterostrophus [Cohe100826]
Leptosphaeria maculans [Lm6446]
Stagonospora nodorum [SNU00323]
Hysterium pulicare [Hp3607]
Rhystidhysteron rufulum [Rr3314]
Chaetomium globosum [CHG06181]
Thielavia terrestris [Tt2112758]
Sporotrichum thermophile [Spt2297332]
Neurospora crassa [NCU00599]
Neurospora tetrasperma [Nm74299]
Magnaporthe grisea [MGG15003]
Cryphonectria parasitica [Crpa43877]
Fusarium oxysporum [FOXG06139]
Fusarium verticillioides [FVEG04000]
Fusarium graminearum [FGSG13585]
Nectria haematococca [Neha103523]
Trichoderma reesei [Trre122900]
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Acremonium alcalophilum [Aa10063060]
Verticillium dahliae [VDAG02811]
Botrytis cinerea [BC1G01035]
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Schizosaccharomyces japonicus [SJAG03322]
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Wolfiporia cocos [Wc113198]
Fomitopsis pinicola [Fp140150]
Dichomitus squalens [Dis131380]
Ganoderma sp. [Gs39230]
Trametes versicolor [Tv138473]
Fomitiporia mediterranea [Fm120913]
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Phlebiopsis gigantea [Pg27739]
Bjerkandera adusta [Ba102864]
Punctularia strigosozonata [Pus110494]
Stereum hirsutum [Sh89298]
Pleurotus ostreatus PC15 [Plo1036119]
Coniophora puteana [Cp1161167]
Serpula lacrymans [Sl174300]
Gloeophyllum trabeum [Glt134887]
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Laccaria bicolor [Labi301257]
Agaricus bisporus [Ab182202]
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Rhodotorula graminis [Rg51304]
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Batrachochytrium dendrobatidis [BDEG00963]
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Lsr2
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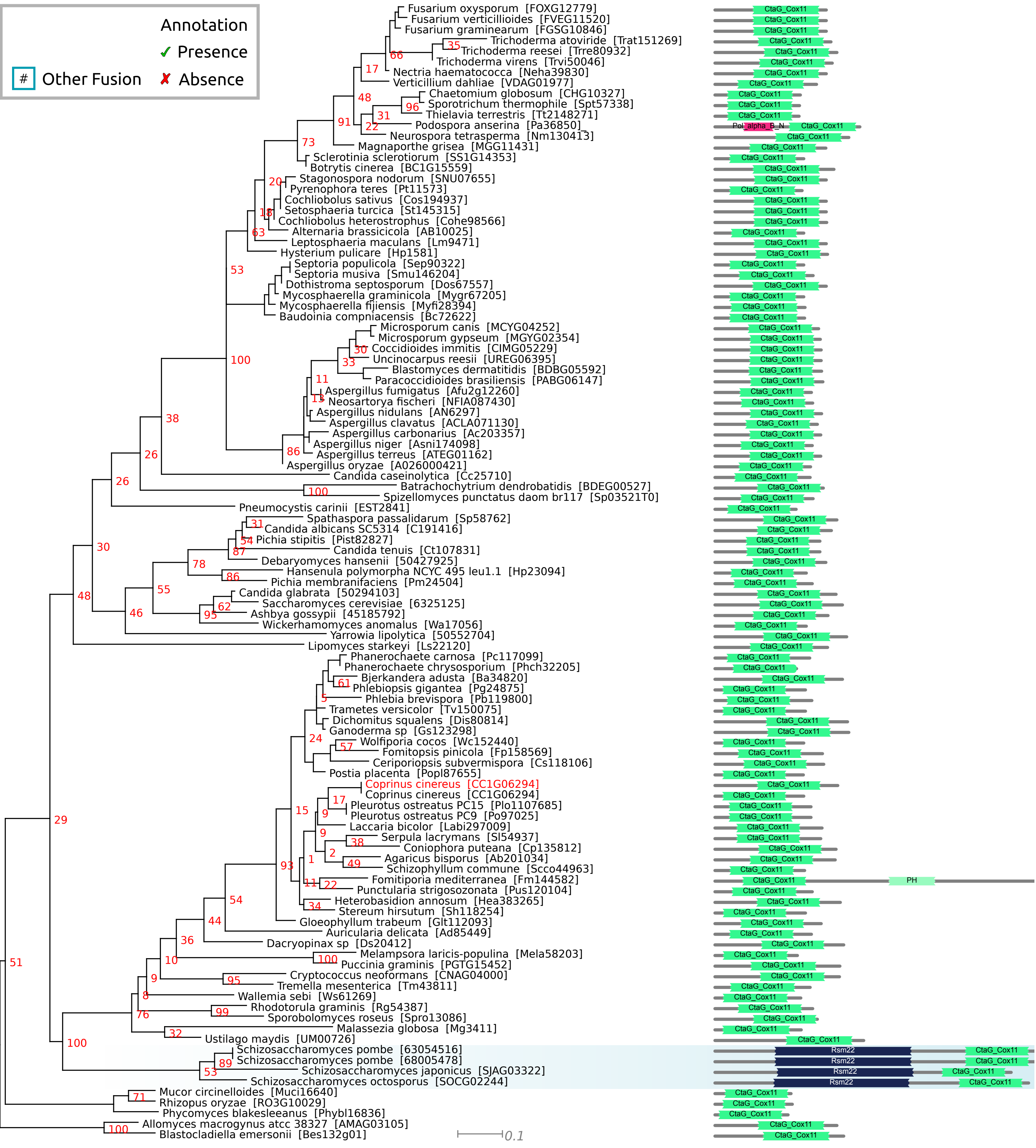
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Thielavia terrestris [Tt2148271]
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Podospora anserina [Pa36850]
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Magnaporthe grisea [MGG11431]
Sclerotinia sclerotiorum [SS1G14353]
Botrytis cinerea [BC1G15559]
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Pyrenophora teres [Pt11573]
Cochliobolus sativus [Cos194937]
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Cochliobolus heterostrophus [Cohe98566]
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Alternaria brassicicola [AB10025]
Leptosphaeria maculans [Lm9471]
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Dothistroma septosporum [Dos67557]
Mycosphaerella graminicola [Mygr67205]
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Baudoinia compniacensis [Bc72622]
Microsporum canis [MCYG04252]
Microsporum gypseum [MGYG02354]
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Uncinocarpus reesii [UREG06395]
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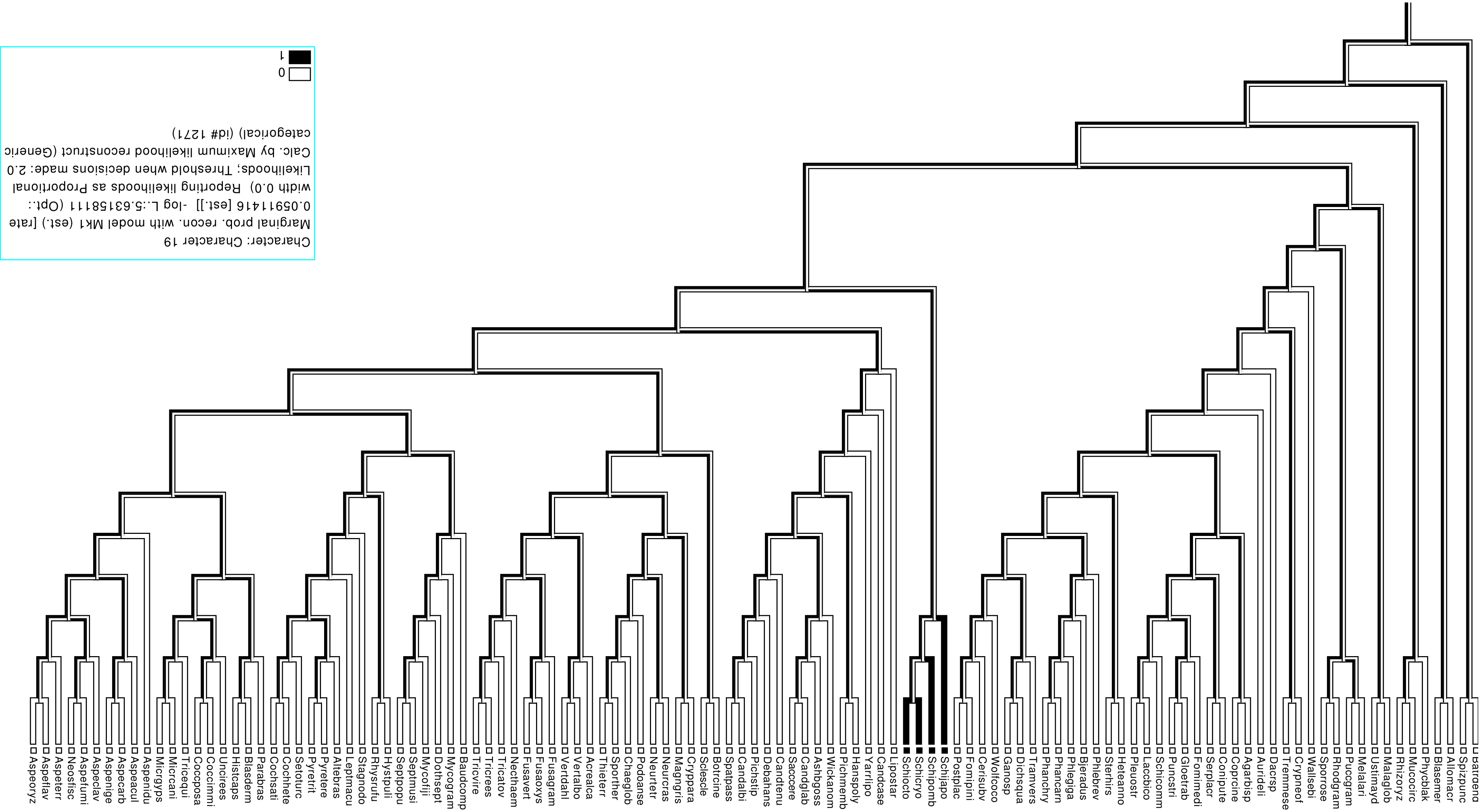
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Aspeflav
Aspeterr
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Aspenidu
Micrgyps
Micrcani
Tricequi
Coccposa
Coccimmi
Uncirees
Histcaps
Blasderm
Parabras
Cochsati
Cochhete
Setoturc
Pyretrit
Pyretere
Altebras
Leptmacu
Stagnodo
Rhysrufu
Hystpuli
Septpopu
Septmusi
Mycofiji
Dothsept
Mycogram
Baudcomp
Tricvire
Tricrees
Tricatov
Necthaem
Fusavert
Fusaoxys
Fusagram
Vertdahl
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Acrealca
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Sporther
Chaeglob
Podoanse
Neurtetr
Neurcras
Magngris
Cryppara
Sclescle
Botrcine
Spatpass
Candalbi
Pichstip
Debahans
Candtenu
Sacccere
Candglab
Ashbgoss
Wickanom
Pichmemb
Hanspoly
Yarrlipo
Candcase
Lipostar
Schiocto
Schicryo
Schipomb
Schijapo
Postplac
Fomipini
Cerisubv
Wolfcoco
Ganosp
Dichsqua
Tramvers
Phanchry
Phancarn
Phlegiga
Bjeradus
Phlebrev
Sterhirs
Heteanno
Pleuostr
Laccbico
Schicomm
Puncstri
Gloetrab
Fomimedi
Serplacr
Conipute
Coprcine
Agarbisp
Aurideli
Dacrsp
Tremmese
Crypneof
Wallsebi
Sporrose
Rhodgram
Puccgram
Melalari
Ustimayd
Malaglob
Rhizoryz
Mucocirc
Phycblak
Blasemer
Allomacr
Spizpunc
Batrdend

Putative Fusion 20

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|Mc138671 unnamed protein product
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HSTPTSDLSMLTSTFSNLPIHAVMVFHDTYDWGRDLQIMLDALCSQDGIIGTRKSDYTIQDVPLYWSNNDLIWSTDFPAP
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TTVWSGASYVFSKDAVRILK
```

2 Annotated Phylograms

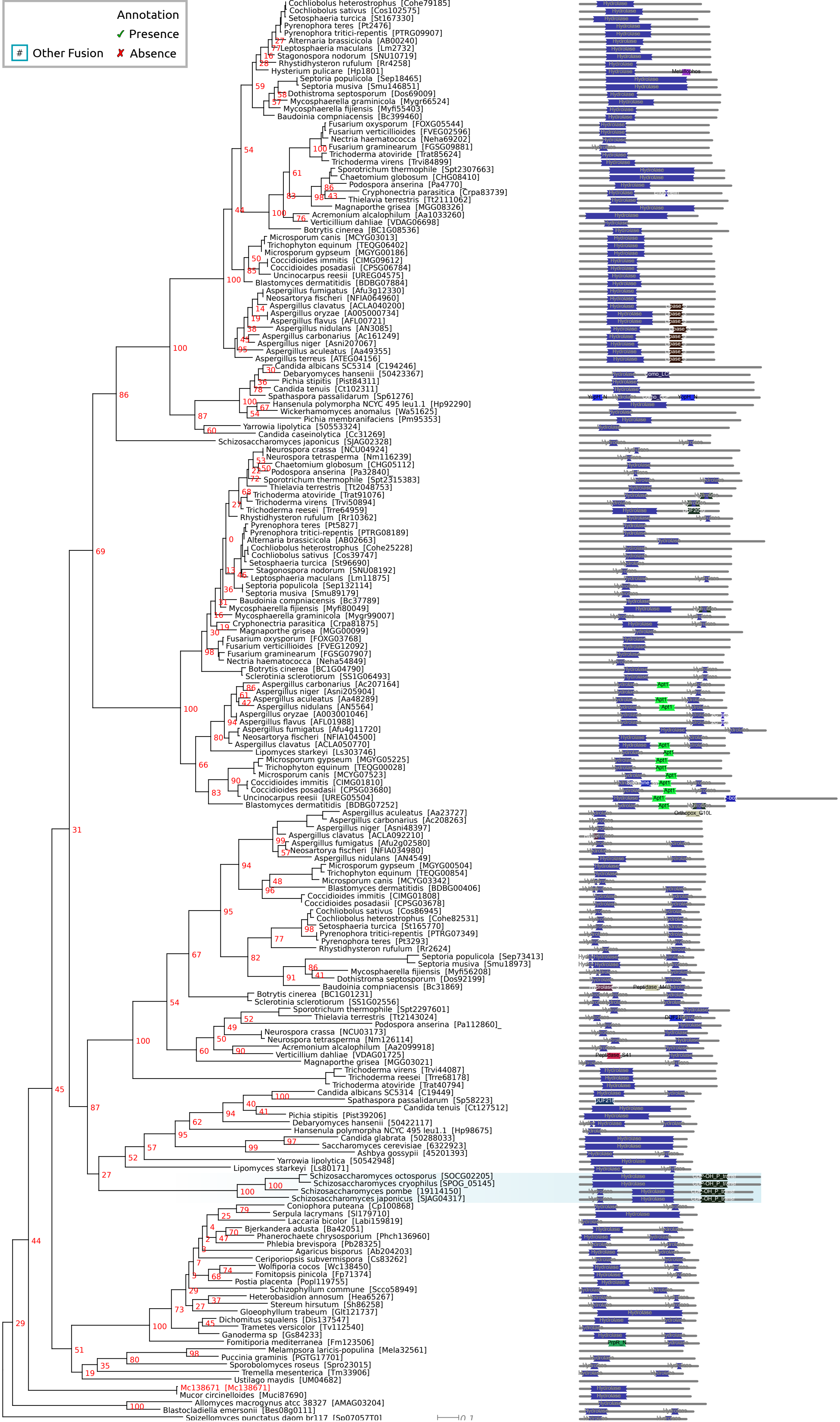
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✗ Absence
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Setosphaeria turcica [St167330]
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Alternaria brassicicola [AB00240]
Leptosphaeria maculans [Lm2732]
Stagonospora nodorum [SNU10719]
Rhystidhysteron rufulum [Rr4258]
Hysterium pulicare [Hp1801]
Septoria populicola [Sep18465]
Septoria musiva [Smu146851]
Dothistroma septosporum [Dos69009]
Mycosphaerella graminicola [Mygr66524]
Mycosphaerella fijiensis [Myfi55403]
Baudoinia compniacensis [Bc399460]
Fusarium oxysporum [FOXG05544]
Fusarium verticillioides [FVEG02596]
Nectria haematococca [Neha69202]
Fusarium graminearum [FGSG09881]
Trichoderma atoviride [Trat85624]
Trichoderma virens [Trvi84899]
Sporotrichum thermophile [Spt2307663]
Chaetomium globosum [CHG08410]
Podospora anserina [Pa4770]
Cryphonectria parasitica [Crpa83739]
Thielavia terrestris [Tt2111062]
Magnaporthe grisea [MGG08326]
Acremonium alcalophilum [Aa1033260]
Verticillium dahliae [VDAG06698]
Botrytis cinerea [BC1G08536]
Microsporum canis [MCYG03013]
Trichophyton equinum [TEQG06402]
Microsporum gypseum [MGYG00186]
Coccidioides immitis [CIMG09612]
Coccidioides posadasii [CPSG06784]
Uncinocarpus reesii [UREG04575]
Blastomyces dermatitidis [BDBG07884]
Aspergillus fumigatus [Afu3g12330]
Neosartorya fischeri [NFIA064960]
Aspergillus clavatus [ACLA040200]
Aspergillus oryzae [A005000734]
Aspergillus flavus [AFL00721]
Aspergillus nidulans [AN3085]
Aspergillus carbonarius [Ac161249]
Aspergillus niger [Asni207067]
Aspergillus aculeatus [Aa49355]
Aspergillus terreus [ATEG04156]
Candida albicans SC5314 [C194246]
Debaryomyces hansenii [50423367]
Pichia stipitis [Pist84311]
Candida tenuis [Ct102311]
Spathaspora passalidarum [Sp61276]
Hansenula polymorpha NCYC 495 leu1.1 [Hp92290]
Wickerhamomyces anomalus [Wa51625]
Pichia membranifaciens [Pm95353]
Yarrowia lipolytica [50553324]
Candida caseinolytica [Cc31269]
Schizosaccharomyces japonicus [SJAG02328]
Neurospora crassa [NCU04924]
Neurospora tetrasperma [Nm116239]
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Podospora anserina [Pa32840]
Sporotrichum thermophile [Spt2315383]
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Trichoderma atoviride [Trat91076]
Trichoderma virens [Trvi50894]
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Rhystidhysteron rufulum [Rr10362]
Pyrenophora teres [Pt5827]
Pyrenophora tritici-repentis [PTRG08189]
Alternaria brassicicola [AB02663]
Cochliobolus heterostrophus [Cohe25228]
Cochliobolus sativus [Cos39747]
Setosphaeria turcica [St96690]
Stagonospora nodorum [SNU08192]
Leptosphaeria maculans [Lm11875]
Septoria populicola [Sep132114]
Septoria musiva [Smu89179]
Baudoinia compniacensis [Bc37789]
Mycosphaerella fijiensis [Myfi80049]
Mycosphaerella graminicola [Mygr99007]
Cryphonectria parasitica [Crpa81875]
Magnaporthe grisea [MGG00099]
Fusarium oxysporum [FOXG03768]
Fusarium verticillioides [FVEG12092]
Fusarium graminearum [FGSG07907]
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Botrytis cinerea [BC1G04790]
Sclerotinia sclerotiorum [SS1G06493]
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Microsporum canis [MCYG07523]
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Coccidioides posadasii [CPSG03680]
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Aspergillus nidulans [AN4549]
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Neurospora crassa [NCU03173]
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Verticillium dahliae [VDAG01725]
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Spathaspora passalidarum [Sp58223]
Candida tenuis [Ct127512]
Pichia stipitis [Pist39206]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp98675]
Candida glabrata [50288033]
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Schizosaccharomyces cryophilus [SPOG_05145]
Schizosaccharomyces pombe [19114150]
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Laccaria bicolor [Labi159819]
Bjerkandera adusta [Ba42051]
Phanerochaete chrysosporium [Phch136960]
Phlebia brevispora [Pb28325]
Agaricus bisporus [Ab204203]
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Fomitopsis pinicola [Fp71374]
Postia placenta [Popl119755]
Schizophyllum commune [Scco58949]
Heterobasidion annosum [Hea65267]
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Dichomitus squalens [Dis137547]
Trametes versicolor [Tv112540]
Ganoderma sp [Gs84233]
Fomitiporia mediterranea [Fm123506]
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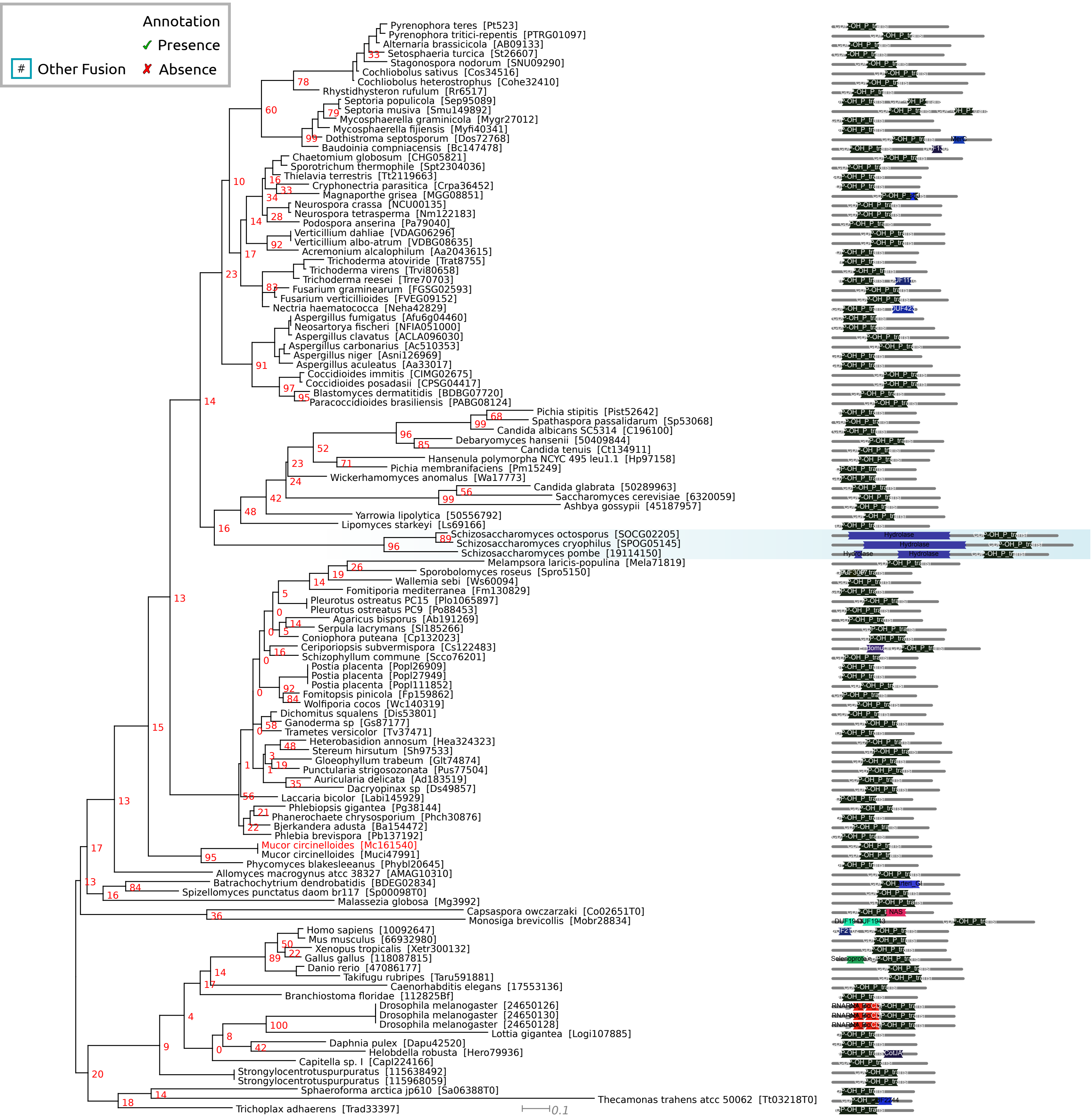
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Other Fusion
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Sporotrichum thermophile [Spt2304036]
Thielavia terrestris [Tt2119663]
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Verticillium albo-atrum [VDBG08635]
Acremonium alcalophilum [Aa2043615]
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Trichoderma virens [Trvi80658]
Trichoderma reesei [Trre70703]
Fusarium graminearum [FGSG02593]
Fusarium verticillioides [FVEG09152]
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Aspergillus fumigatus [Afu6g04460]
Neosartorya fischeri [NFIA051000]
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Aspergillus niger [Asni126969]
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Paracoccidioides brasiliensis [PABG08124]
Pichia stipitis [Pist52642]
Spathaspora passalidarum [Sp53068]
Candida albicans SC5314 [C196100]
Debaryomyces hansenii [50409844]
Candida tenuis [Ct134911]
Hansenula polymorpha NCYC 495 leu1.1 [Hp97158]
Pichia membranifaciens [Pm15249]
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Fomitiporia mediterranea [Fm130829]
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Pleurotus ostreatus PC9 [Po88453]
Agaricus bisporus [Ab191269]
Serpula lacrymans [Sl185266]
Coniophora puteana [Cp132023]
Ceriporiopsis subvermispora [Cs122483]
Schizophyllum commune [Scco76201]
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Fomitopsis pinicola [Fp159862]
Wolfiporia cocos [Wc140319]
Dichomitus squalens [Dis53801]
Ganoderma sp [Gs87177]
Trametes versicolor [Tv37471]
Heterobasidion annosum [Hea324323]
Stereum hirsutum [Sh97533]
Gloeophyllum trabeum [Glt74874]
Punctularia strigosozonata [Pus77504]
Auricularia delicata [Ad183519]
Dacryopinax sp [Ds49857]
Laccaria bicolor [Labi145929]
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Bjerkandera adusta [Ba154472]
Phlebia brevispora [Pb137192]
Mucor circinelloides [Mc161540]
Mucor circinelloides [Muci47991]
Phycomyces blakesleeanus [Phybl20645]
Allomyces macrogynus atcc 38327 [AMAG10310]
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Spizellomyces punctatus daom br117 [Sp00098T0]
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Capsaspora owczarzaki [Co02651T0]
Monosiga brevicollis [Mobr28834]
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Daphnia pulex [Dapu42520]
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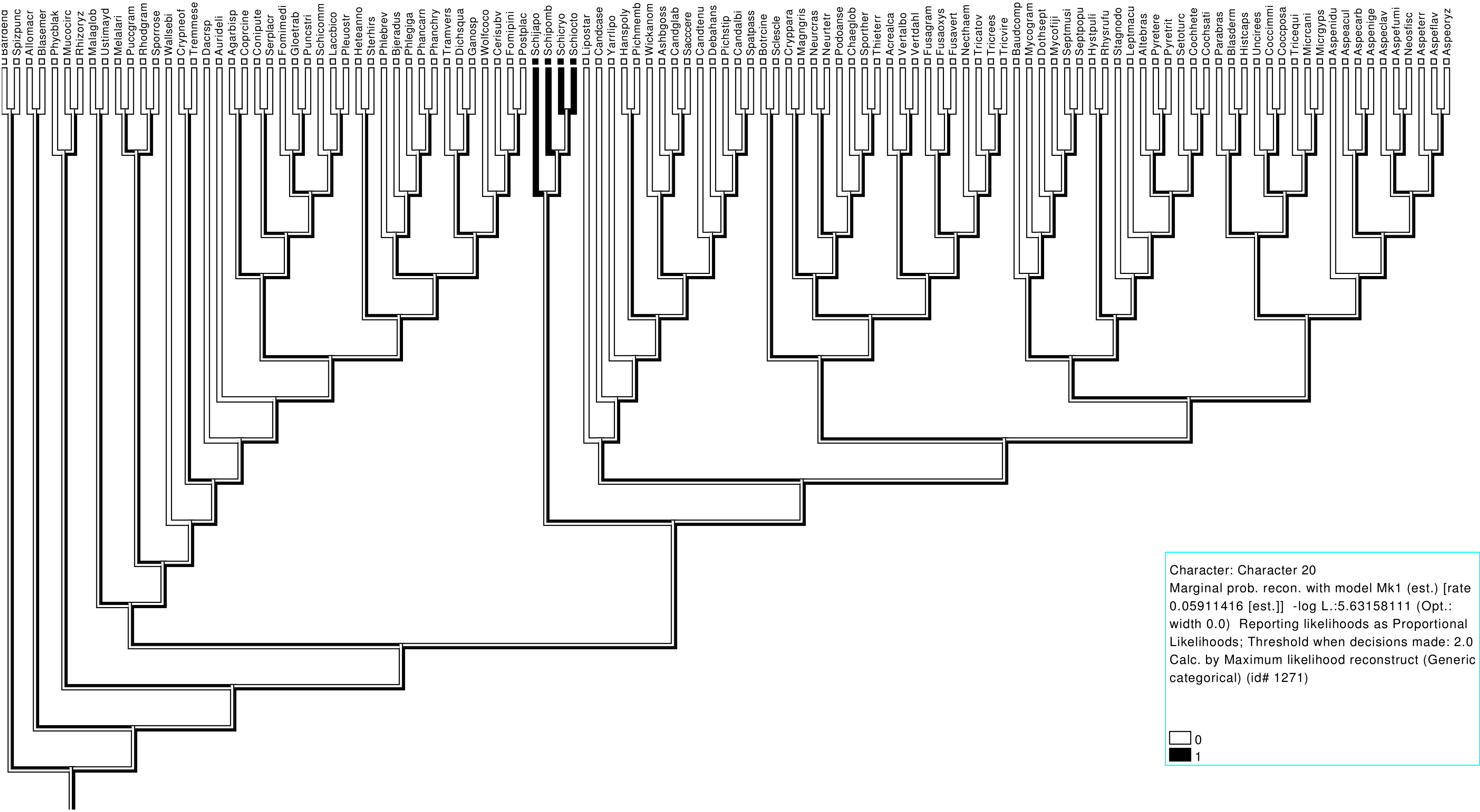

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Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 21

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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RLTTHLGTAFFLYMGMLWTGLEILRECKWIKNPVQAISLFKKLDNPAIGPMRKISLALLAVSFLTAMSGGMVAGLDAGWV
YNTWPKMGERWFPSSRELMDENFCRREDKKDLWWRNLLENPVTVQLVHRTCAYVAFTSVLAAHMYAIKKKAVIPRNAMTS
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TSRLGCQIKMSKDIDGIRVALPQMTRNVNNNDFS
```

2 Annotated Phylograms

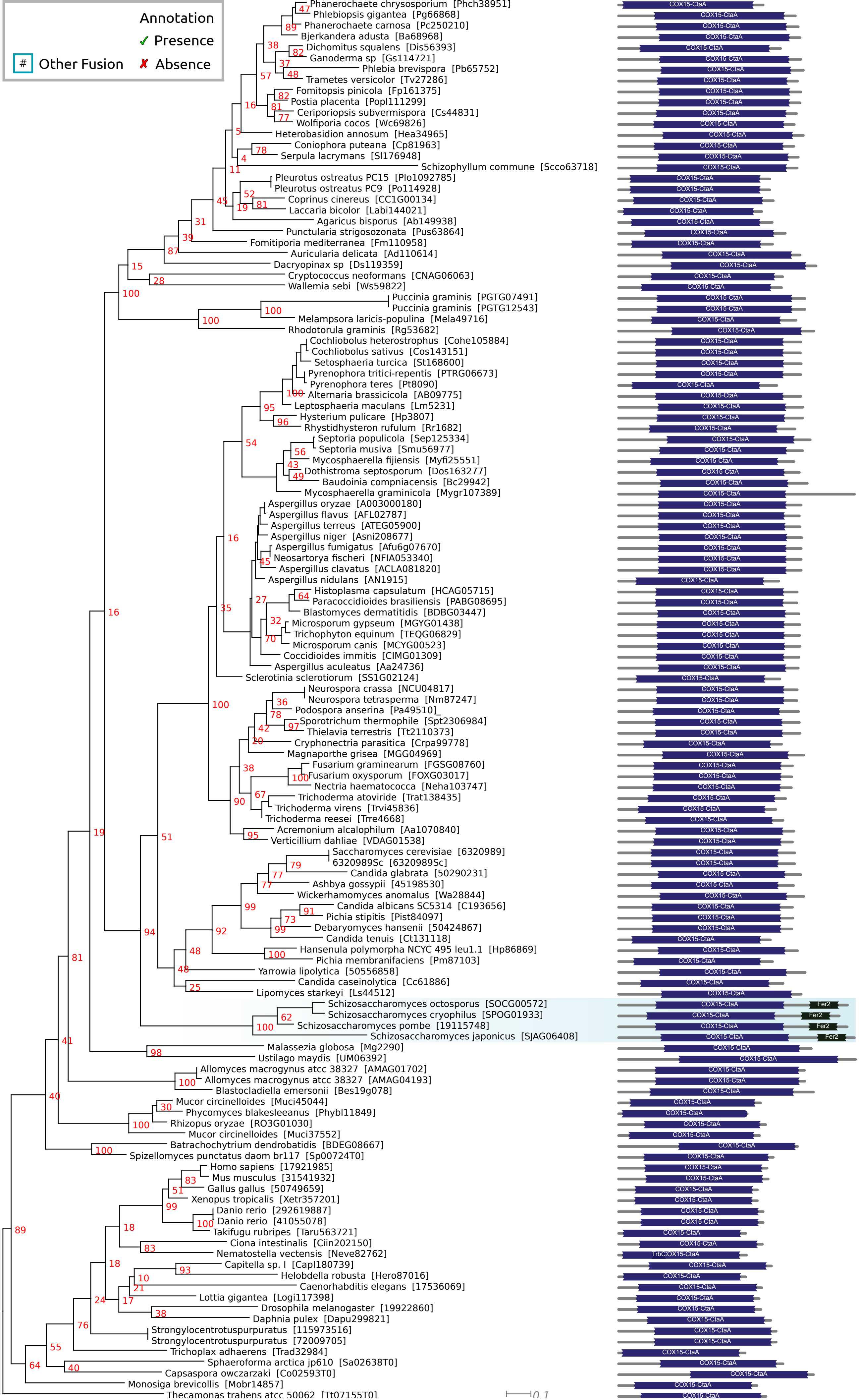
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
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Phlebiopsis gigantea [Pg66868]
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Dichomitus squalens [Dis56393]
Ganoderma sp [Gs114721]
Phlebia brevispora [Pb65752]
Trametes versicolor [Tv27286]
Fomitopsis pinicola [Fp161375]
Postia placenta [Popl111299]
Ceriporiopsis subvermispora [Cs44831]
Wolfiporia cocos [Wc69826]
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Coniophora puteana [Cp81963]
Serpula lacrymans [Sl176948]
Schizophyllum commune [Scco63718]
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Dacryopinax sp [Ds119359]
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Puccinia graminis [PGTG07491]
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Rhodotorula graminis [Rg53682]
Cochliobolus heterostrophus [Cohe105884]
Cochliobolus sativus [Cos143151]
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Pyrenophora tritici-repentis [PTRG06673]
Pyrenophora teres [Pt8090]
Alternaria brassicicola [AB09775]
Leptosphaeria maculans [Lm5231]
Hysterium pulicare [Hp3807]
Rhystidhysteron rufulum [Rr1682]
Septoria populicola [Sep125334]
Septoria musiva [Smu56977]
Mycosphaerella fijiensis [Myfi25551]
Dothistroma septosporum [Dos163277]
Baudoinia compniacensis [Bc29942]
Mycosphaerella graminicola [Mygr107389]
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Aspergillus flavus [AFL02787]
Aspergillus terreus [ATEG05900]
Aspergillus niger [Asni208677]
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Trichophyton equinum [TEQG06829]
Microsporum canis [MCYG00523]
Coccidioides immitis [CIMG01309]
Aspergillus aculeatus [Aa24736]
Sclerotinia sclerotiorum [SS1G02124]
Neurospora crassa [NCU04817]
Neurospora tetrasperma [Nm87247]
Podospora anserina [Pa49510]_
Sporotrichum thermophile [Spt2306984]
Thielavia terrestris [Tt2110373]
Cryphonectria parasitica [Crpa99778]
Magnaporthe grisea [MGG04969]
Fusarium graminearum [FGSG08760]
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Acremonium alcalophilum [Aa1070840]
Verticillium dahliae [VDAG01538]
Saccharomyces cerevisiae [6320989]
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Candida glabrata [50290231]
Ashbya gossypii [45198530]
Wickerhamomyces anomalus [Wa28844]
Candida albicans SC5314 [C193656]
Pichia stipitis [Pist84097]
Debaryomyces hansenii [50424867]
Candida tenuis [Ct131118]
Hansenula polymorpha NCYC 495 leu1.1 [Hp86869]
Pichia membranifaciens [Pm87103]
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Candida caseinolytica [Cc61886]
Lipomyces starkeyi [Ls44512]
Schizosaccharomyces octosporus [SOCG00572]
Schizosaccharomyces cryophilus [SPOG01933]
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Schizosaccharomyces japonicus [SJAG06408]
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Blastocladiella emersonii [Bes19g078]
Mucor circinelloides [Muci45044]
Phycomyces blakesleeanus [Phybl11849]
Rhizopus oryzae [RO3G01030]
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Batrachochytrium dendrobatidis [BDEG08667]
Spizellomyces punctatus daom br117 [Sp00724T0]
Homo sapiens [17921985]
Mus musculus [31541932]
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Xenopus tropicalis [Xetr357201]
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Helobdella robusta [Hero87016]
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Capsaspora owczarzaki [Co02593T0]
Monosiga brevicollis [Mobr14857]
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Fer2
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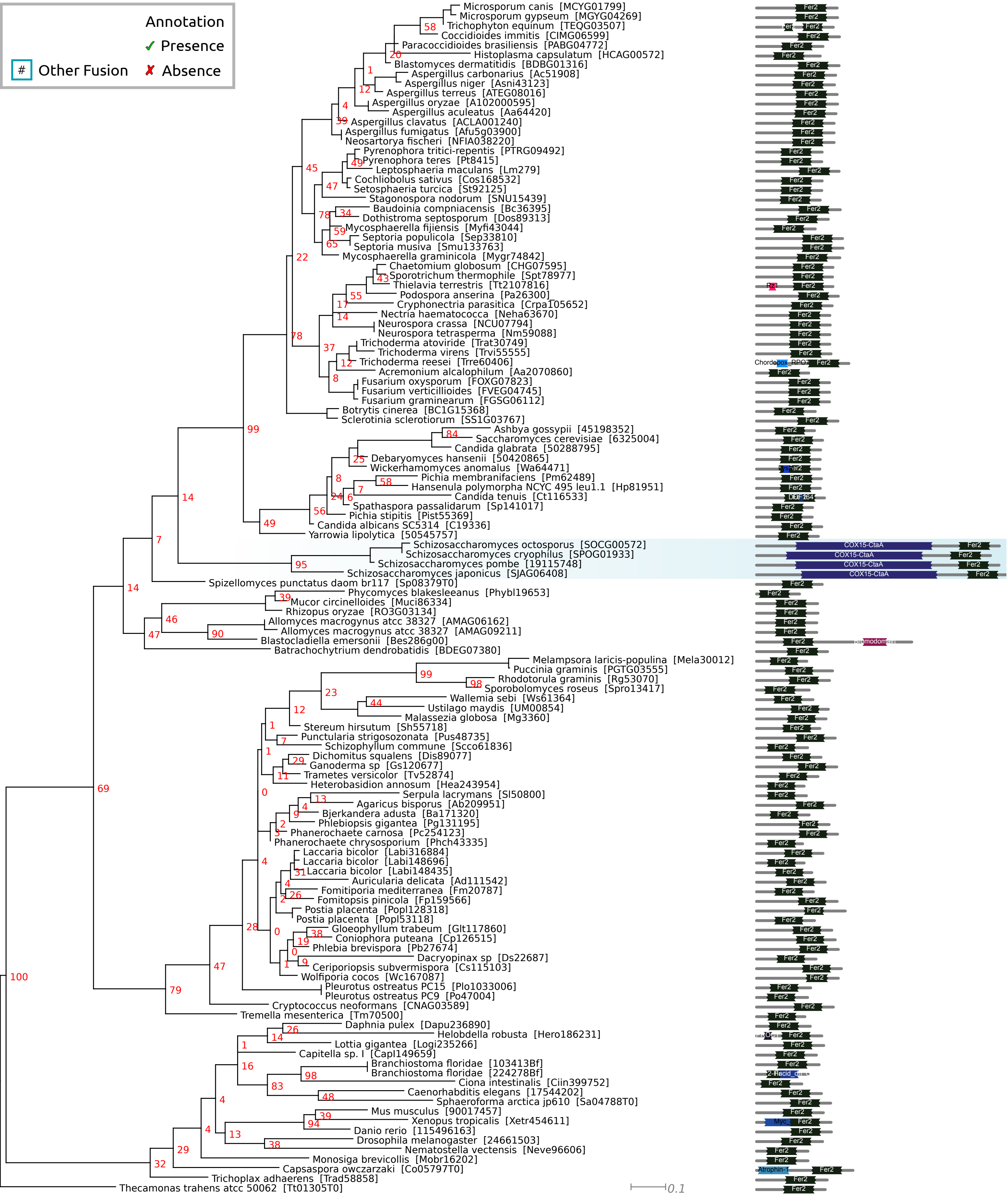
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✗ Absence
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Paracoccidioides brasiliensis [PABG04772]
Histoplasma capsulatum [HCAG00572]
Blastomyces dermatitidis [BDBG01316]
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Neosartorya fischeri [NFIA038220]
Pyrenophora tritici-repentis [PTRG09492]
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Leptosphaeria maculans [Lm279]
Cochliobolus sativus [Cos168532]
Setosphaeria turcica [St92125]
Stagonospora nodorum [SNU15439]
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Dothistroma septosporum [Dos89313]
Mycosphaerella fijiensis [Myfi43044]
Septoria populicola [Sep33810]
Septoria musiva [Smu133763]
Mycosphaerella graminicola [Mygr74842]
Chaetomium globosum [CHG07595]
Sporotrichum thermophile [Spt78977]
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Nectria haematococca [Neha63670]
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Trichoderma atoviride [Trat30749]
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Fusarium graminearum [FGSG06112]
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Wallemia sebi [Ws61364]
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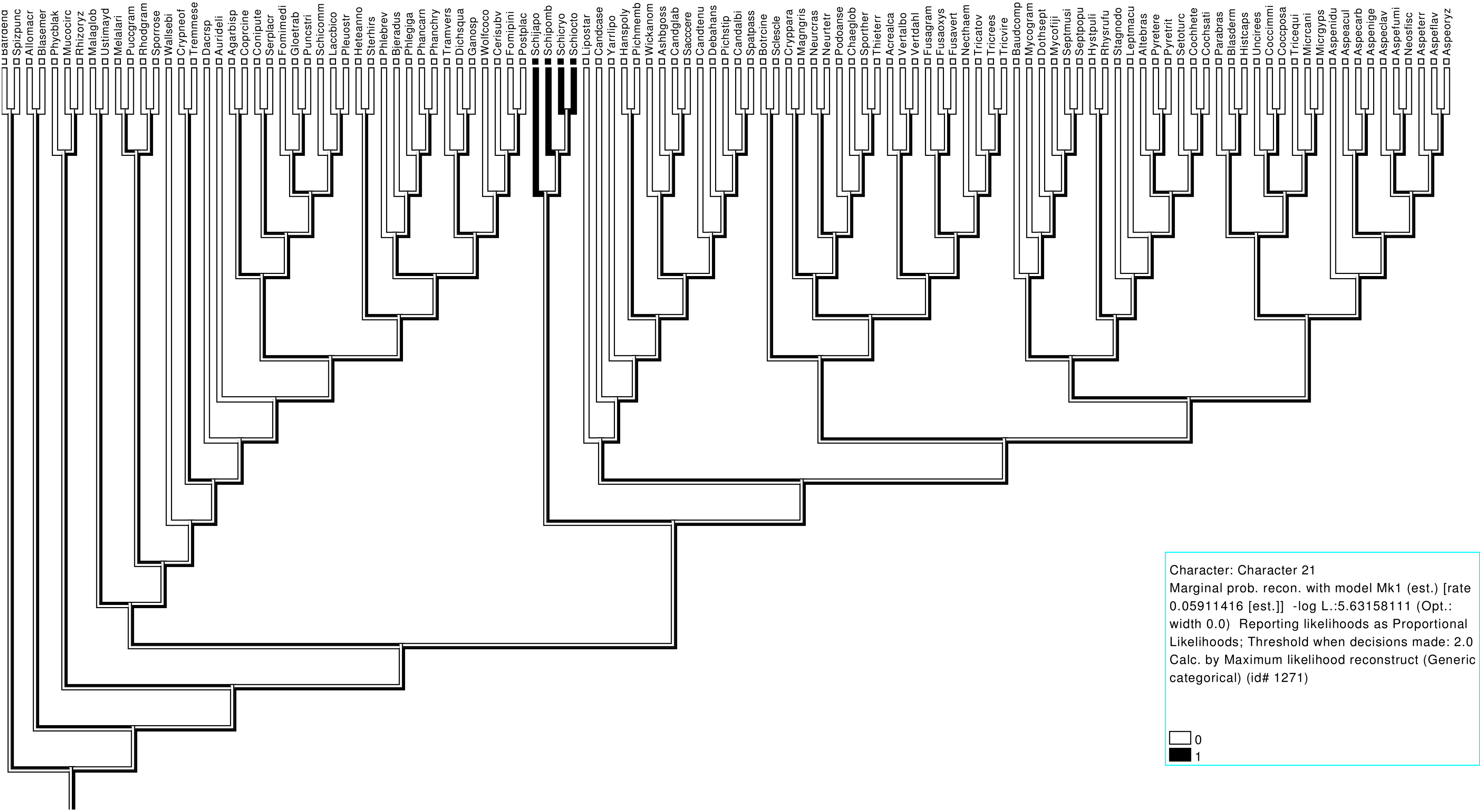
COX15-CtaA
Chordopox
RPO7
DUF
Bromodomain
2-Hacid_dh
Myc
Atrophin-1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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
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Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Marginal prob. recon. with model Mk1 (est.) [rate 0.05911416 [est.]] -log L.:5.63158111 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 22

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|AMAG_11801 unnamed protein product
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RVHLQYHTVAQVLAGTAIGTVVGAVWFALVHPRFPLLPSRPRPAEQHAKQE
```

2 Annotated Phylograms

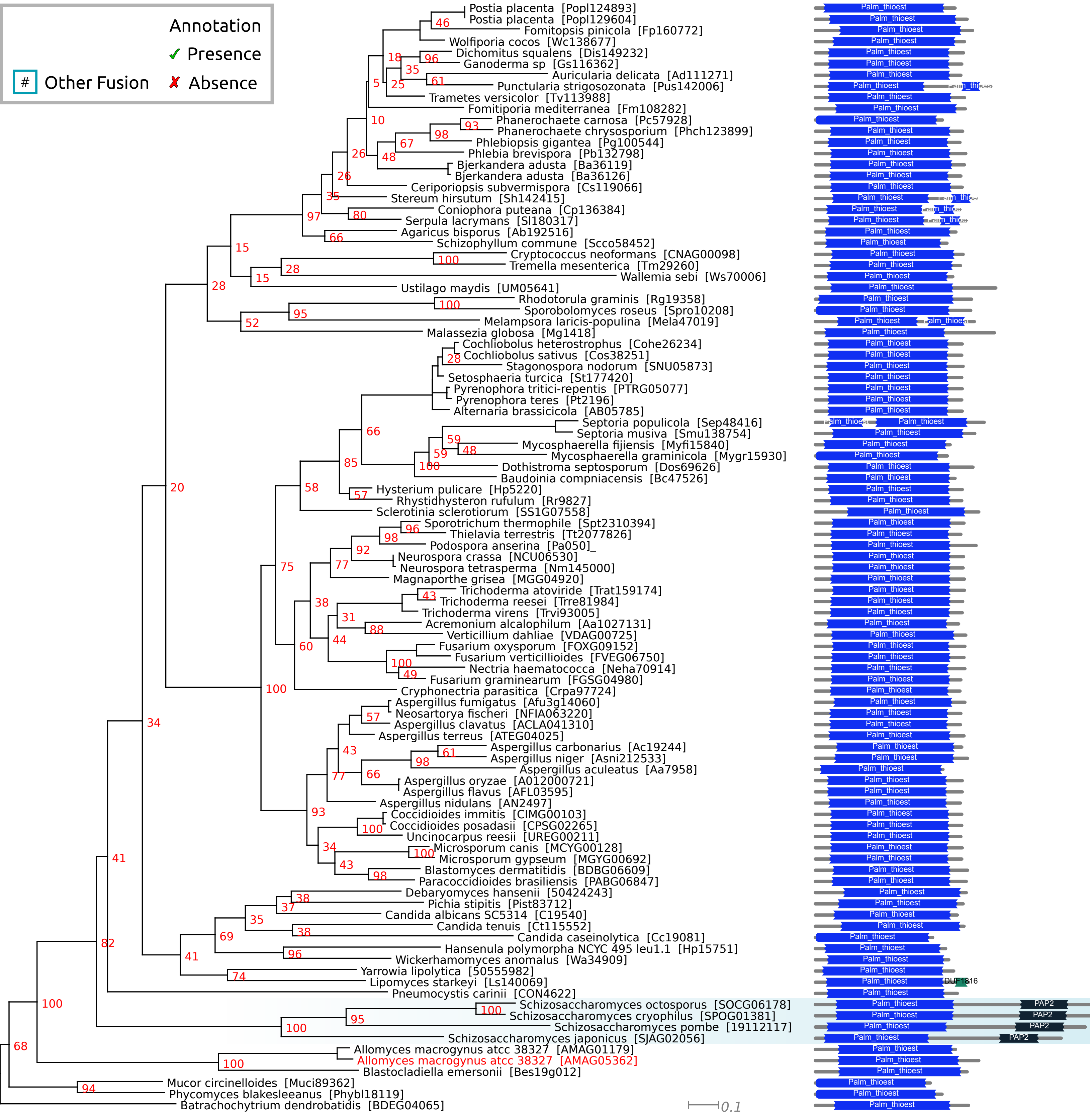
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.



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Other Fusion
✗ Absence
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Fomitopsis pinicola [Fp160772]
Wolfiporia cocos [Wc138677]
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Dichomitus squalens [Dis149232]
Ganoderma sp [Gs116362]
35
Auricularia delicata [Ad111271]
5
61
Punctularia strigosozonata [Pus142006]
25
Trametes versicolor [Tv113988]
Fomitiporia mediterranea [Fm108282]
10
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Phanerochaete carnosa [Pc57928]
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Phanerochaete chrysosporium [Phch123899]
67
Phlebiopsis gigantea [Pg100544]
26
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Phlebia brevispora [Pb132798]
Bjerkandera adusta [Ba36119]
26
Bjerkandera adusta [Ba36126]
Ceriporiopsis subvermispora [Cs119066]
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Stereum hirsutum [Sh142415]
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Coniophora puteana [Cp136384]
Serpula lacrymans [Sl180317]
Agaricus bisporus [Ab192516]
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Schizophyllum commune [Scco58452]
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Cryptococcus neoformans [CNAG00098]
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Tremella mesenterica [Tm29260]
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Septoria populicola [Sep48416]
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Magnaporthe grisea [MGG04920]
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Cryphonectria parasitica [Crpa97724]
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Uncinocarpus reesii [UREG00211]
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Paracoccidioides brasiliensis [PABG06847]
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Pichia stipitis [Pist83712]
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Candida albicans SC5314 [C19540]
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Candida caseinolytica [Cc19081]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp15751]
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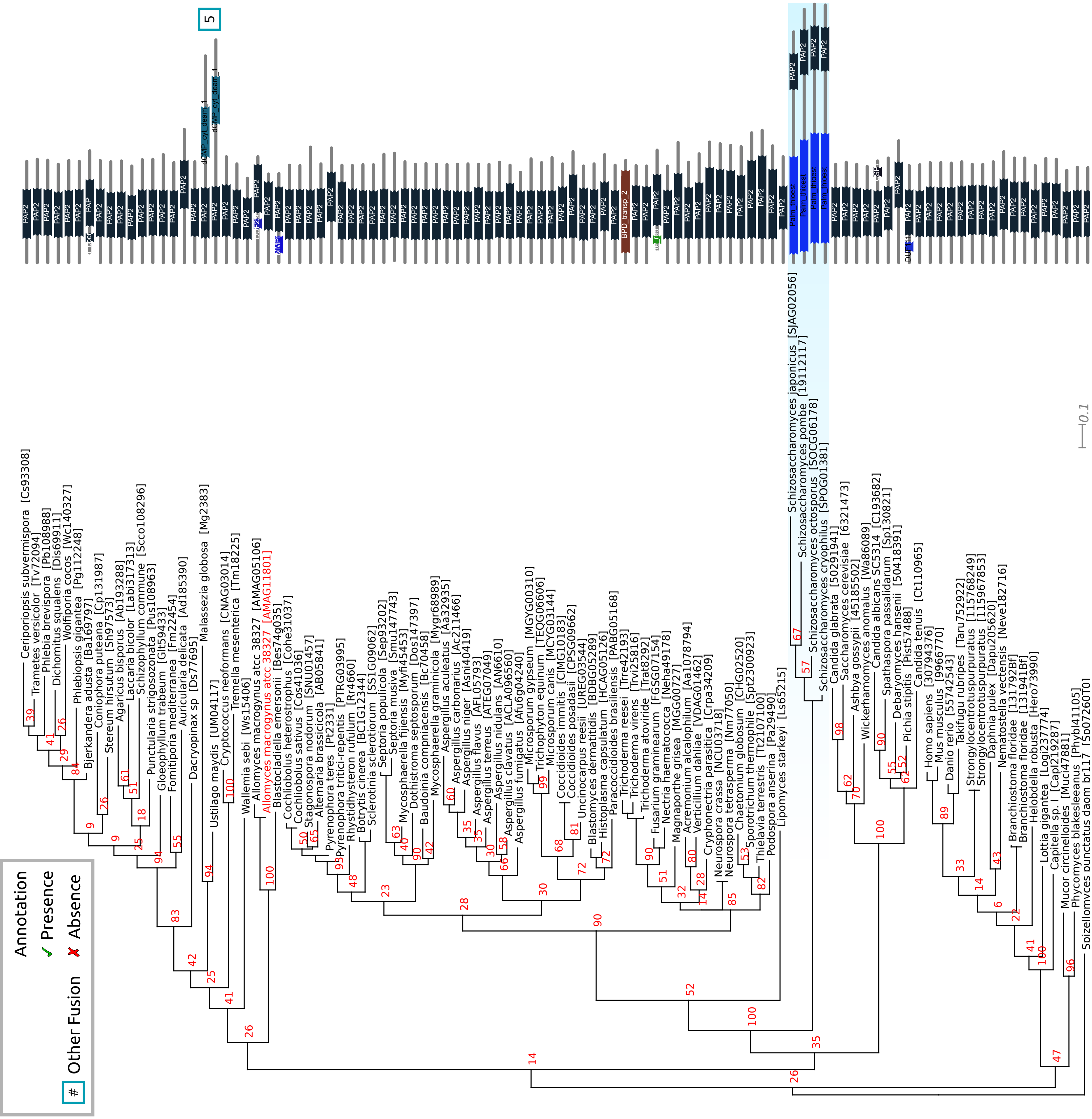
PAP2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✗ Absence
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Phlebia brevispora [Pb108988]
Dichomitus squalens [Dis69911]
Wolfiporia cocos [Wc140327]
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Bjerkandera adusta [Ba169797]
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Fomitiporia mediterranea [Fm22454]
Auricularia delicata [Ad185390]
Dacryopinax sp [Ds77695]
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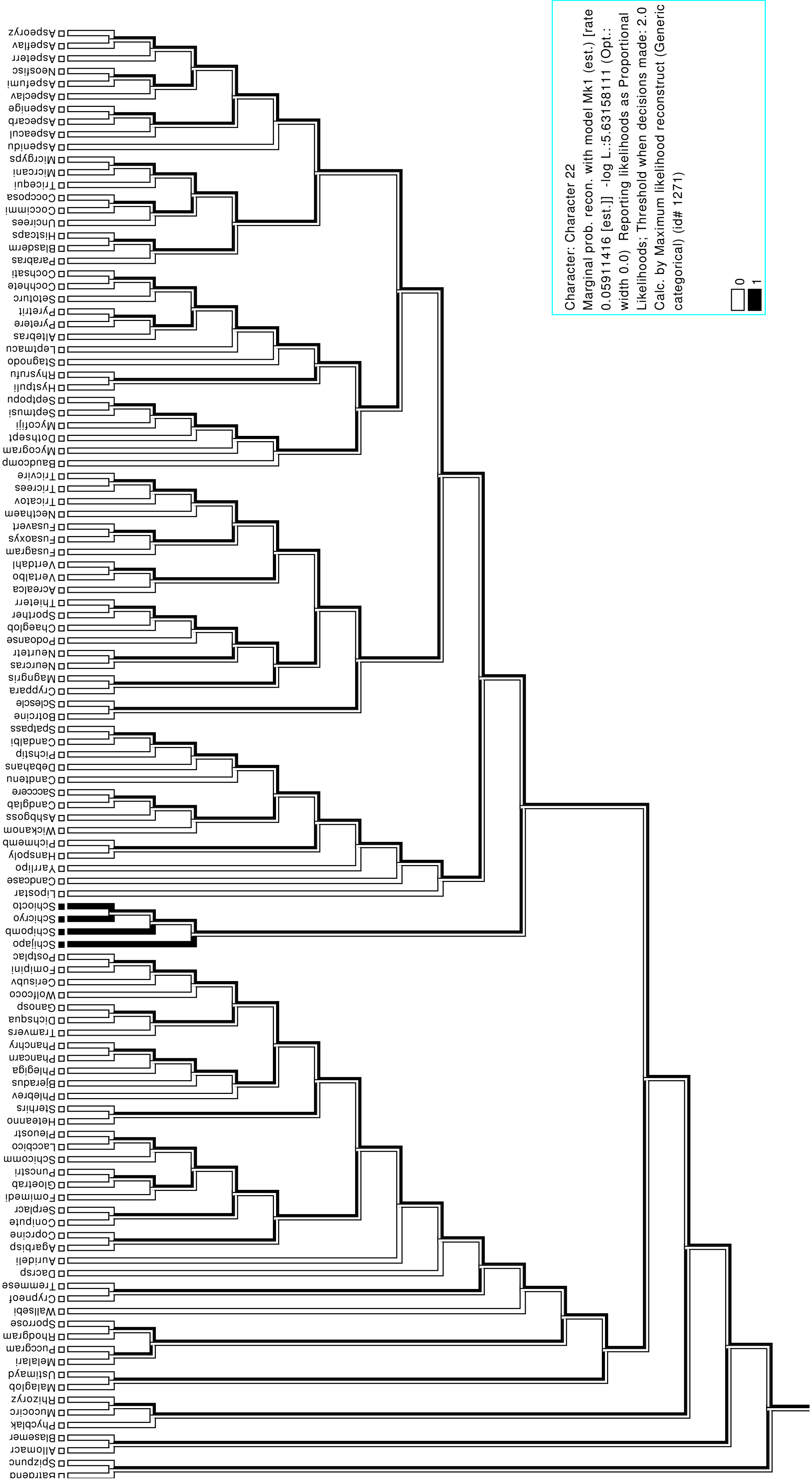
Branchiostoma floridae [131941Bf]
Helobdella robusta [Hero73990]
Lottia gigantea [Logi237774]
Capitella sp. I [Capi219287]
Mucor circinelloides [Muci47881]
Phycomyces blakesleeanus [Phybl41105]
Spizellomyces punctatus daom br117 [Sp07260T0]


Character: Character 22
Marginal prob. recon. with model Mk1 (est.) [rate 0.05911416 [est.]] -log L.:5.63158111 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1
Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucogram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Solescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Nechhaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Cocoposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz

Putative Fusion 23

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
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QFWGPGSGIIHQIVLENFSAPGLMMLGTDSHTPNAGGLGAIAIGVGGADAVDALTGTPWELKAPKILGVKLTGKLNGWST
PKDVITKLAGLLTVRGGTGYIVEYFGEGVSTLSCTGMATICNMGAEIGATTSTFPYQEAHKRYLQATNRAEVAEAADVAL
NKFNFLRADKDAQYDKVIEIDLSAIEPHVNGPFTPDLSTPISQYAEKSLKENWPQKVSAGLIGSCTNSSYQDMSRVVDLV
KQASKAGLKPRIPFFVTPGSEQIRATLERDGIIDIFQENGAKVLANACGPCIGQWNREDVSKTSKETNTIFTSFNRNFRA
RNDGNRNTMNFLTSPEIVTAMSYSGDAQFNPLTDSIKLPNGKDFKFQPPKGDELPKRGFEHGRDKFYPEMDPKPDSNVEI
KVDPNSDRLQLLEPFKPWNGKELKTNVLLKVEGKCTTDHISAAGVWLKYKGHLENISYNTLIGAQNKETGEVNKAYDLDG
TEYDIPGLMMKWKSDGRPWTVIAEHNYGEGSAREHAALSPRFLGGEILLVKSFARIHETNLKKQGVLPLTFANESDYDKI
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KQAEVGDILNMTDVTTLGSRNYKLVGHPINTSLYTLKATVVGKTKRAFQTREVTKRRNRRVRHAKSKGDLTILRISELSM
N
```

2 Annotated Phylograms

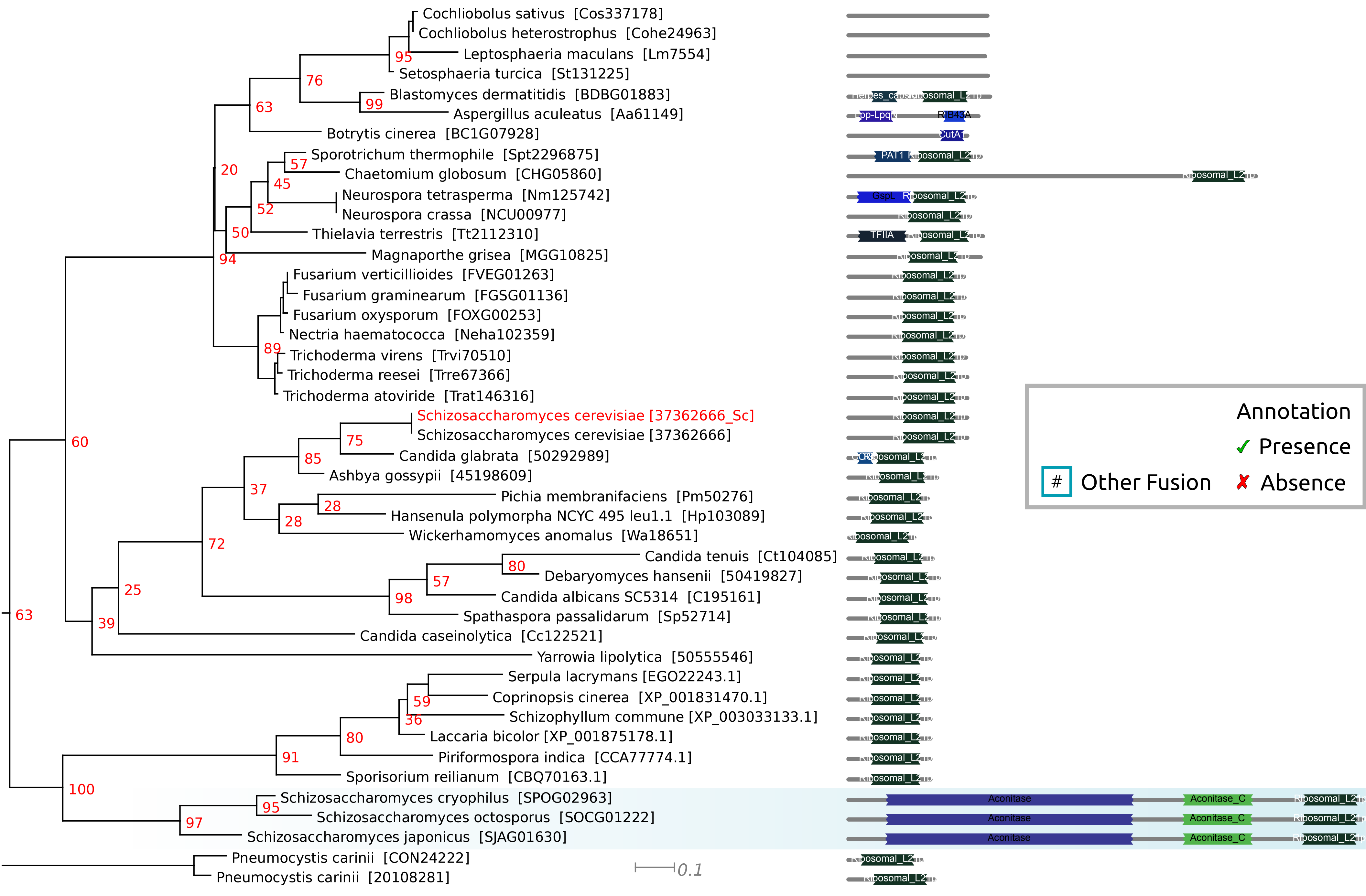
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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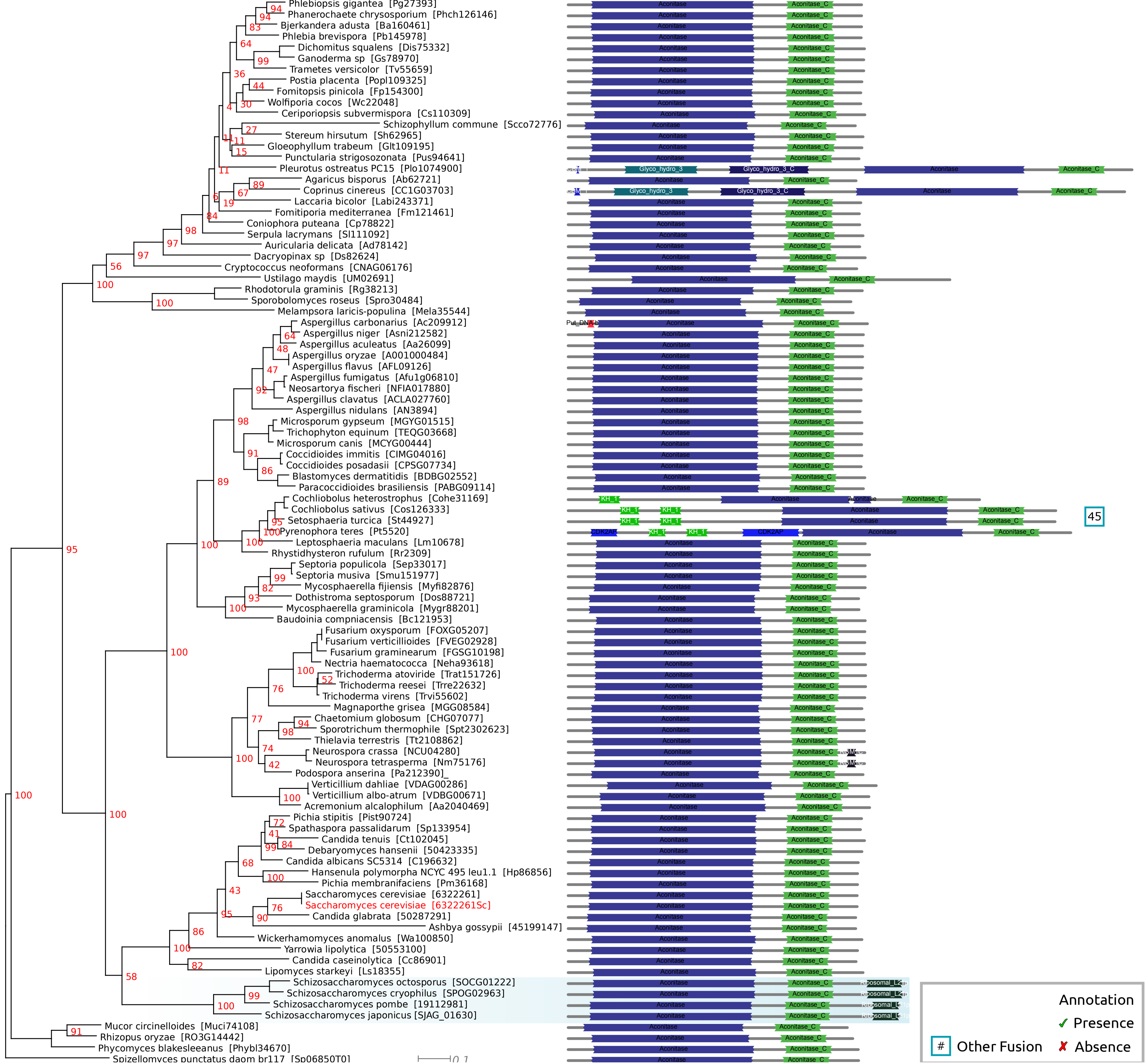
Leptosphaeria maculans [Lm7554]
Setosphaeria turcica [St131225]
Blastomyces dermatitidis [BDBG01883]
Aspergillus aculeatus [Aa61149]
Botrytis cinerea [BC1G07928]
Sporotrichum thermophile [Spt2296875]
Chaetomium globosum [CHG05860]
Neurospora tetrasperma [Nm125742]
Neurospora crassa [NCU00977]
Thielavia terrestris [Tt2112310]
Magnaporthe grisea [MGG10825]
Fusarium verticillioides [FVEG01263]
Fusarium graminearum [FGSG01136]
Fusarium oxysporum [FOXG00253]
Nectria haematococca [Neha102359]
Trichoderma virens [Trvi70510]
Trichoderma reesei [Tre67366]
Trichoderma atoviride [Trat146316]
Schizosaccharomyces cerevisiae [37362666_Sc]
Schizosaccharomyces cerevisiae [37362666]
Candida glabrata [50292989]
Ashbya gossypii [45198609]
Pichia membranifaciens [Pm50276]
Hansenula polymorpha NCYC 495 leu1.1 [Hp103089]
Wickerhamomyces anomalus [Wa18651]
Candida tenuis [Ct104085]
Debaryomyces hansenii [50419827]
Candida albicans SC5314 [C195161]
Spathaspora passalidarum [Sp52714]
Candida caseinolytica [Cc122521]
Yarrowia lipolytica [50555546]
Serpula lacrymans [EGO22243.1]
Coprinopsis cinerea [XP_001831470.1]
Schizophyllum commune [XP_003033133.1]
Laccaria bicolor [XP_001875178.1]
Piriformospora indica [CCA77774.1]
Sporisorium reilianum [CBQ70163.1]
Schizosaccharomyces cryophilus [SPOG02963]
Schizosaccharomyces octosporus [SOCG01222]
Schizosaccharomyces japonicus [SJAG01630]
Pneumocystis carinii [CON24222]
Pneumocystis carinii [20108281]
95
76
99
63
57
45
52
20
50
94
89
60
75
85
37
28
28
72
80
57
98
25
39
63
59
36
80
91
100
95
97
0.1
Ribosomal_L2
Lpp-LpqN
RIB43A
CutA1
PAT1
GspL
TFIIA
Aconitase
Aconitase_C
Annotation
✓ Presence
Other Fusion
✗ Absence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Ganoderma sp [Gs78970]
Trametes versicolor [Tv55659]
Postia placenta [Popl109325]
Fomitopsis pinicola [Fp154300]
Wolfiporia cocos [Wc22048]
Ceriporiopsis subvermispora [Cs110309]
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Gloeophyllum trabeum [Glt109195]
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Agaricus bisporus [Ab62721]
Coprinus cinereus [CC1G03703]
Laccaria bicolor [Labi243371]
Fomitiporia mediterranea [Fm121461]
Coniophora puteana [Cp78822]
Serpula lacrymans [Sl111092]
Auricularia delicata [Ad78142]
Dacryopinax sp [Ds82624]
Cryptococcus neoformans [CNAG06176]
Ustilago maydis [UM02691]
Rhodotorula graminis [Rg38213]
Sporobolomyces roseus [Spro30484]
Melampsora laricis-populina [Mela35544]
Aspergillus carbonarius [Ac209912]
Aspergillus niger [Asni212582]
Aspergillus aculeatus [Aa26099]
Aspergillus oryzae [A001000484]
Aspergillus flavus [AFL09126]
Aspergillus fumigatus [Afu1g06810]
Neosartorya fischeri [NFIA017880]
Aspergillus clavatus [ACLA027760]
Aspergillus nidulans [AN3894]
Microsporum gypseum [MGYG01515]
Trichophyton equinum [TEQG03668]
Microsporum canis [MCYG00444]
Coccidioides immitis [CIMG04016]
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Blastomyces dermatitidis [BDBG02552]
Paracoccidioides brasiliensis [PABG09114]
Cochliobolus heterostrophus [Cohe31169]
Cochliobolus sativus [Cos126333]
Setosphaeria turcica [St44927]
Pyrenophora teres [Pt5520]
Leptosphaeria maculans [Lm10678]
Rhystidhysteron rufulum [Rr2309]
Septoria populicola [Sep33017]
Septoria musiva [Smu151977]
Mycosphaerella fijiensis [Myfi82876]
Dothistroma septosporum [Dos88721]
Mycosphaerella graminicola [Mygr88201]
Baudoinia compniacensis [Bc121953]
Fusarium oxysporum [FOXG05207]
Fusarium verticillioides [FVEG02928]
Fusarium graminearum [FGSG10198]
Nectria haematococca [Neha93618]
Trichoderma atoviride [Trat151726]
Trichoderma reesei [Tre22632]
Trichoderma virens [Trvi55602]
Magnaporthe grisea [MGG08584]
Chaetomium globosum [CHG07077]
Sporotrichum thermophile [Spt2302623]
Thielavia terrestris [Tt2108862]
Neurospora crassa [NCU04280]
Neurospora tetrasperma [Nm75176]
Podospora anserina [Pa212390]
Verticillium dahliae [VDAG00286]
Verticillium albo-atrum [VDBG00671]
Acremonium alcalophilum [Aa2040469]
Pichia stipitis [Pist90724]
Spathaspora passalidarum [Sp133954]
Candida tenuis [Ct102045]
Debaryomyces hansenii [50423335]
Candida albicans SC5314 [C196632]
Hansenula polymorpha NCYC 495 leu1.1 [Hp86856]
Pichia membranifaciens [Pm36168]
Saccharomyces cerevisiae [6322261]
Saccharomyces cerevisiae [6322261Sc]
Candida glabrata [50287291]
Ashbya gossypii [45199147]
Wickerhamomyces anomalus [Wa100850]
Yarrowia lipolytica [50553100]
Candida caseinolytica [Cc86901]
Lipomyces starkeyi [Ls18355]
Schizosaccharomyces octosporus [SOCG01222]
Schizosaccharomyces cryophilus [SPOG02963]
Schizosaccharomyces pombe [19112981]
Schizosaccharomyces japonicus [SJAG_01630]
Mucor circinelloides [Muci74108]
Rhizopus oryzae [RO3G14442]
Phycomyces blakesleeanus [Phybl34670]
Spizellomyces punctatus daom br117 [Sp06850T0]
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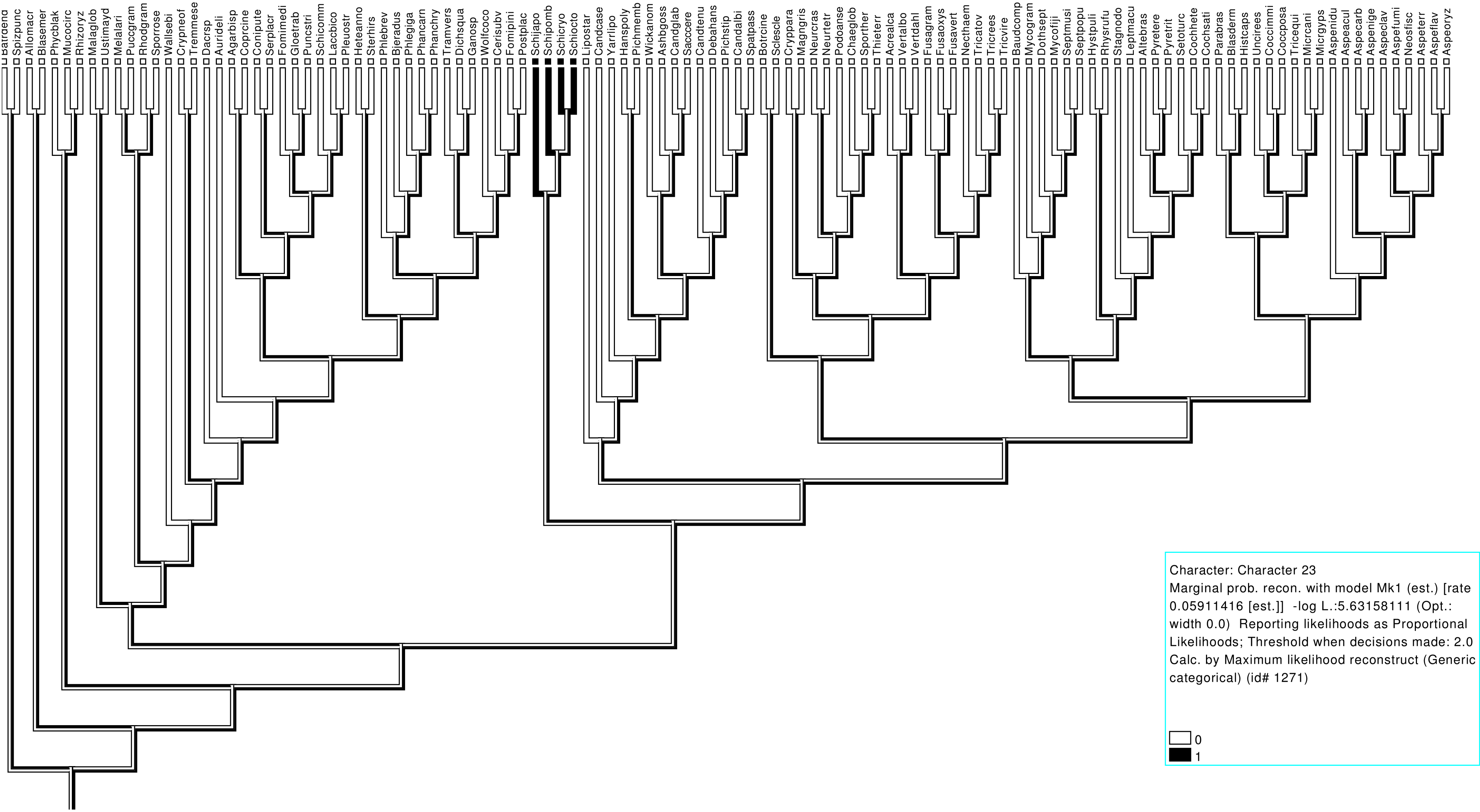
Aconitase_C
Glyco_hydro_3
Glyco_hydro_3_C
Pul_DNA-b
KH_1
CDK2AP
Ribosomal_L2
45
Annotation
✓ Presence
✗ Absence
Other Fusion


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
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Ustimayd
Melalari
Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 23
Marginal prob. recon. with model Mk1 (est.) [rate 0.05911416 [est.]] -log L.:5.63158111 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 24

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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ELGSGTGILSILLSPLVAKYTVTDIEALVPLIQKNINKNFPSDTSRPNISAEPLDWIALHSSTPAQRAKLFSNDPPVDLI
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KGRES
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SYEASSDLSKILECTDVYTTLEPCSIRTSGLSPCADALIKAKVRRCIIGVNEPPDFVKCEGADRLKAAGIEVIWLSGMEE
DCLRVARKGH
```

2 Annotated Phylograms

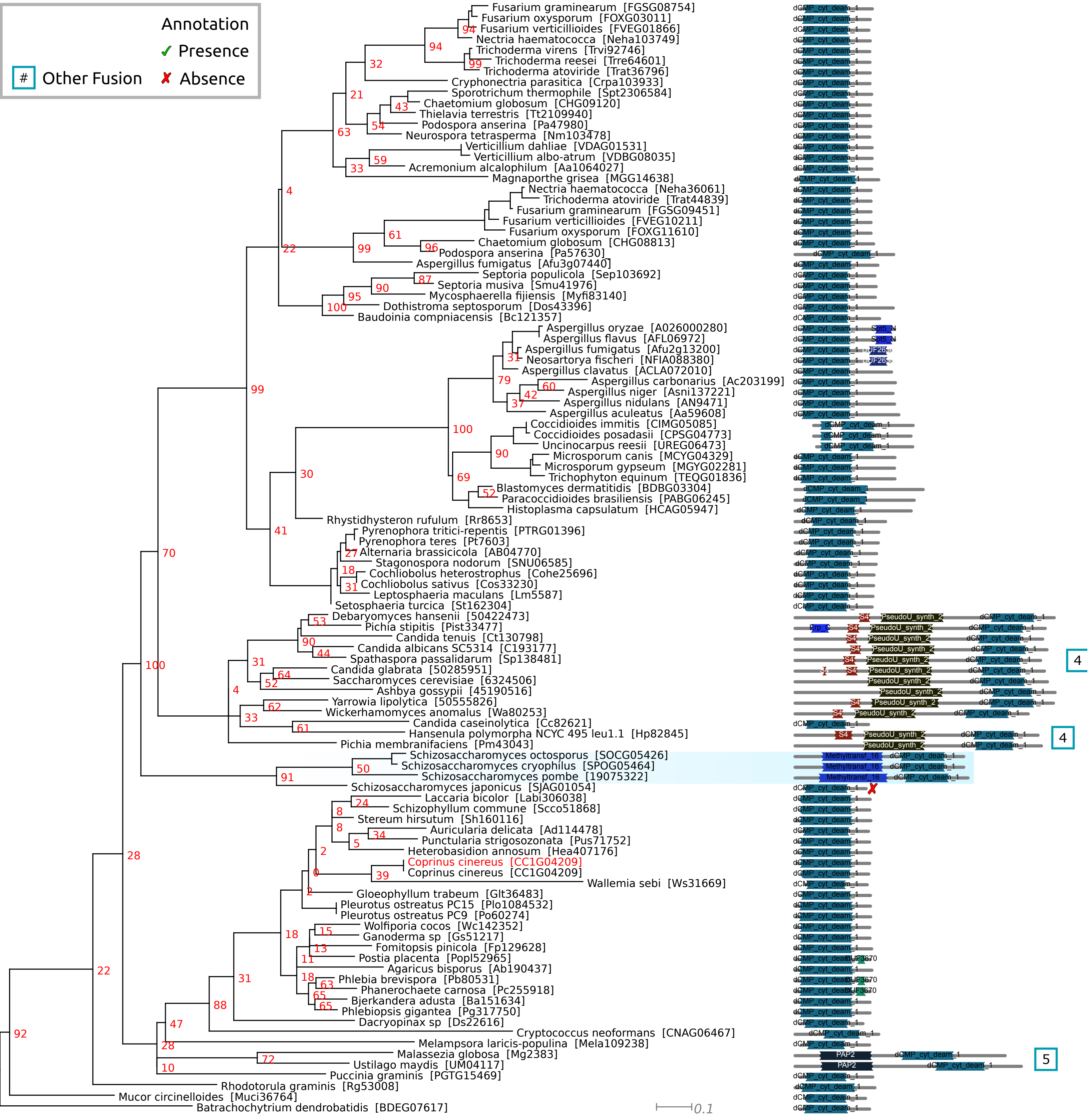
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
✗ Absence
Other Fusion
Fusarium graminearum [FGSG08754]
Fusarium oxysporum [FOXG03011]
Fusarium verticillioides [FVEG01866]
Nectria haematococca [Neha103749]
Trichoderma virens [Trvi92746]
Trichoderma reesei [Tre64601]
Trichoderma atoviride [Trat36796]
Cryphonectria parasitica [Crpa103933]
Sporotrichum thermophile [Spt2306584]
Chaetomium globosum [CHG09120]
Thielavia terrestris [Tt2109940]
Podospora anserina [Pa47980]
Neurospora tetrasperma [Nm103478]
Verticillium dahliae [VDAG01531]
Verticillium albo-atrum [VDBG08035]
Acremonium alcalophilum [Aa1064027]
Magnaporthe grisea [MGG14638]
Nectria haematococca [Neha36061]
Trichoderma atoviride [Trat44839]
Fusarium graminearum [FGSG09451]
Fusarium verticillioides [FVEG10211]
Fusarium oxysporum [FOXG11610]
Chaetomium globosum [CHG08813]
Podospora anserina [Pa57630]
Aspergillus fumigatus [Afu3g07440]
Septoria populicola [Sep103692]
Septoria musiva [Smu41976]
Mycosphaerella fijiensis [Myfi83140]
Dothistroma septosporum [Dos43396]
Baudoinia compniacensis [Bc121357]
Aspergillus oryzae [A026000280]
Aspergillus flavus [AFL06972]
Aspergillus fumigatus [Afu2g13200]
Neosartorya fischeri [NFIA088380]
Aspergillus clavatus [ACLA072010]
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Aspergillus nidulans [AN9471]
Aspergillus aculeatus [Aa59608]
Coccidioides immitis [CIMG05085]
Coccidioides posadasii [CPSG04773]
Uncinocarpus reesii [UREG06473]
Microsporum canis [MCYG04329]
Microsporum gypseum [MGYG02281]
Trichophyton equinum [TEQG01836]
Blastomyces dermatitidis [BDBG03304]
Paracoccidioides brasiliensis [PABG06245]
Histoplasma capsulatum [HCAG05947]
Rhystidhysteron rufulum [Rr8653]
Pyrenophora tritici-repentis [PTRG01396]
Pyrenophora teres [Pt7603]
Alternaria brassicicola [AB04770]
Stagonospora nodorum [SNU06585]
Cochliobolus heterostrophus [Cohe25696]
Cochliobolus sativus [Cos33230]
Leptosphaeria maculans [Lm5587]
Setosphaeria turcica [St162304]
Debaryomyces hansenii [50422473]
Pichia stipitis [Pist33477]
Candida tenuis [Ct130798]
Candida albicans SC5314 [C193177]
Spathaspora passalidarum [Sp138481]
Candida glabrata [50285951]
Saccharomyces cerevisiae [6324506]
Ashbya gossypii [45190516]
Yarrowia lipolytica [50555826]
Wickerhamomyces anomalus [Wa80253]
Candida caseinolytica [Cc82621]
Hansenula polymorpha NCYC 495 leu1.1 [Hp82845]
Pichia membranifaciens [Pm43043]
Schizosaccharomyces octosporus [SOCG05426]
Schizosaccharomyces cryophilus [SPOG05464]
Schizosaccharomyces pombe [19075322]
Schizosaccharomyces japonicus [SJAG01054]
Laccaria bicolor [Labi306038]
Schizophyllum commune [Scco51868]
Stereum hirsutum [Sh160116]
Auricularia delicata [Ad114478]
Punctularia strigosozonata [Pus71752]
Heterobasidion annosum [Hea407176]
Coprinus cinereus [CC1G04209]
Coprinus cinereus [CC1G04209]
Wallemia sebi [Ws31669]
Gloeophyllum trabeum [Glt36483]
Pleurotus ostreatus PC15 [Plo1084532]
Pleurotus ostreatus PC9 [Po60274]
Wolfiporia cocos [Wc142352]
Ganoderma sp [Gs51217]
Fomitopsis pinicola [Fp129628]
Postia placenta [Popl52965]
Agaricus bisporus [Ab190437]
Phlebia brevispora [Pb80531]
Phanerochaete carnosa [Pc255918]
Bjerkandera adusta [Ba151634]
Phlebiopsis gigantea [Pg317750]
Dacryopinax sp [Ds22616]
Cryptococcus neoformans [CNAG06467]
Melampsora laricis-populina [Mela109238]
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Ustilago maydis [UM04117]
Puccinia graminis [PGTG15469]
Rhodotorula graminis [Rg53008]
Mucor circinelloides [Muci36764]
Batrachochytrium dendrobatidis [BDEG07617]
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Spt5_N
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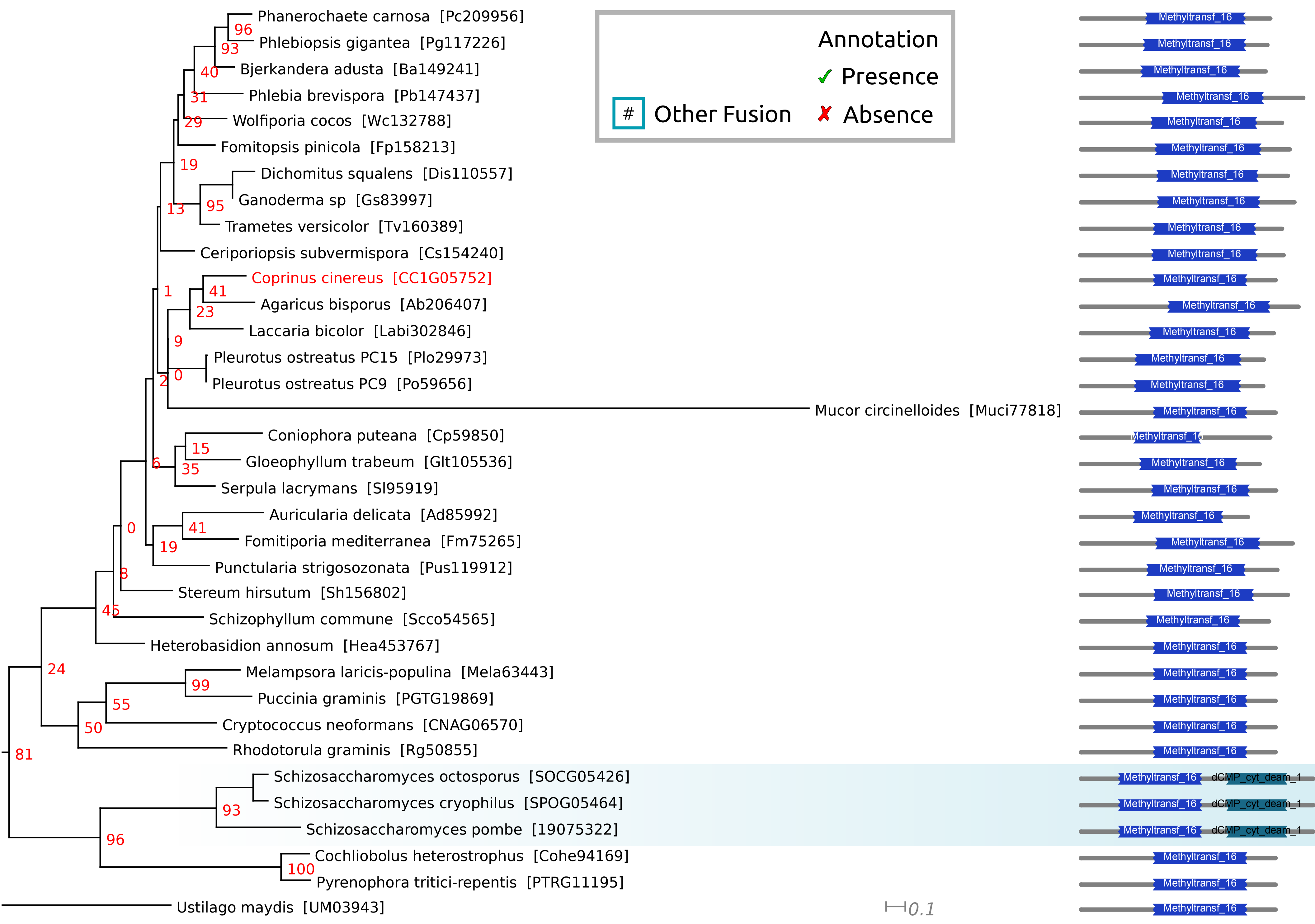
Annotation
✓ Presence
✗ Absence
Other Fusion
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Bjerkandera adusta [Ba149241]
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Wolfiporia cocos [Wc132788]
Fomitopsis pinicola [Fp158213]
Dichomitus squalens [Dis110557]
Ganoderma sp [Gs83997]
Trametes versicolor [Tv160389]
Ceriporiopsis subvermispora [Cs154240]
Coprinus cinereus [CC1G05752]
Agaricus bisporus [Ab206407]
Laccaria bicolor [Labi302846]
Pleurotus ostreatus PC15 [Plo29973]
Pleurotus ostreatus PC9 [Po59656]
Mucor circinelloides [Muci77818]
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Schizosaccharomyces pombe [19075322]
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Ustilago maydis [UM03943]
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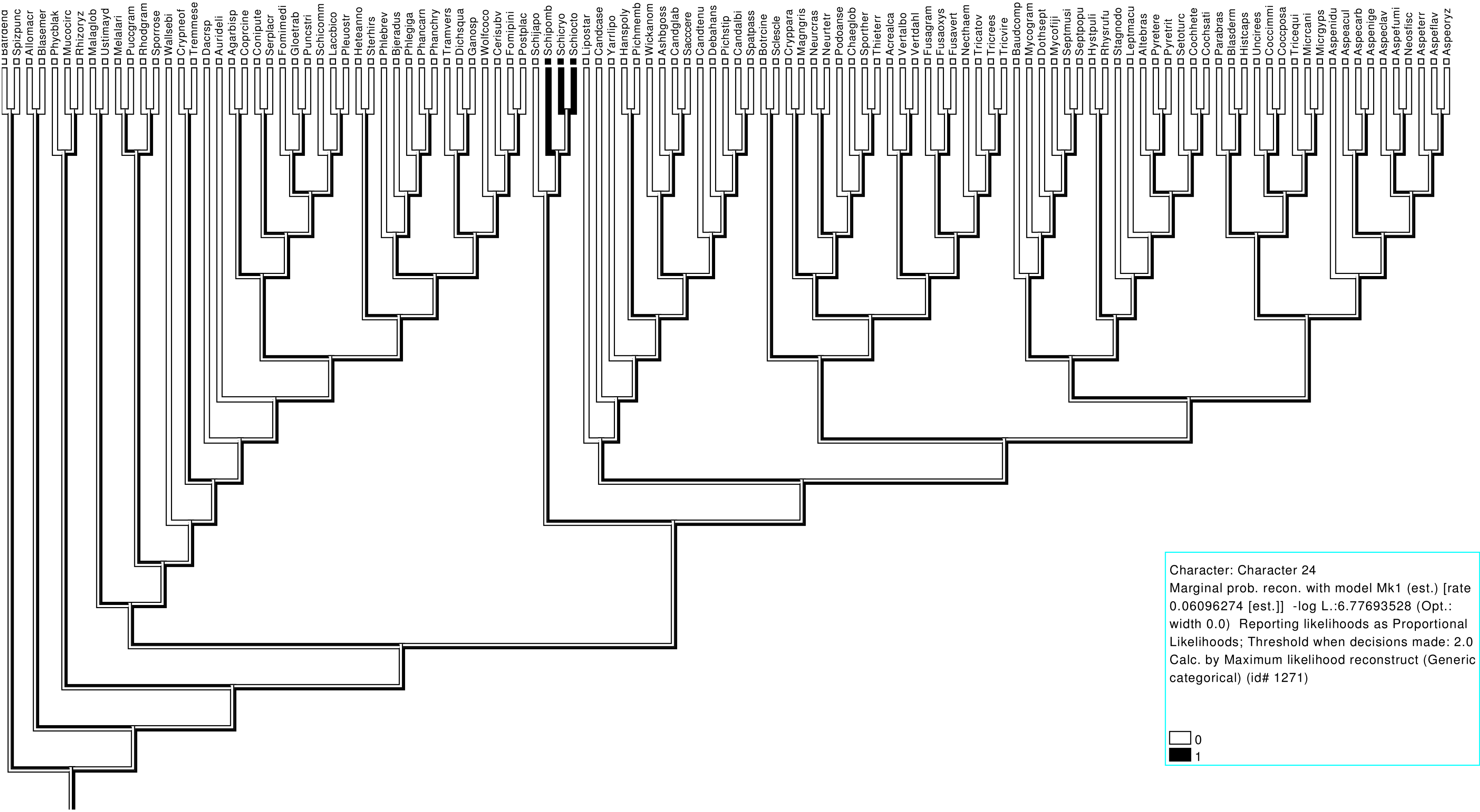
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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
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Debahans
Pichstip
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Botrcine
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Histcaps
Uncirees
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Coccposa
Tricequi
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Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 24
Marginal prob. recon. with model Mk1 (est.) [rate 0.06096274 [est.]] -log L.:6.77693528 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 25

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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KKLEEVFSEQDPAQLKEFLPPKVELPETDCDQRYSLEEKGYCFEFTLYNRK
```

2 Annotated Phylograms

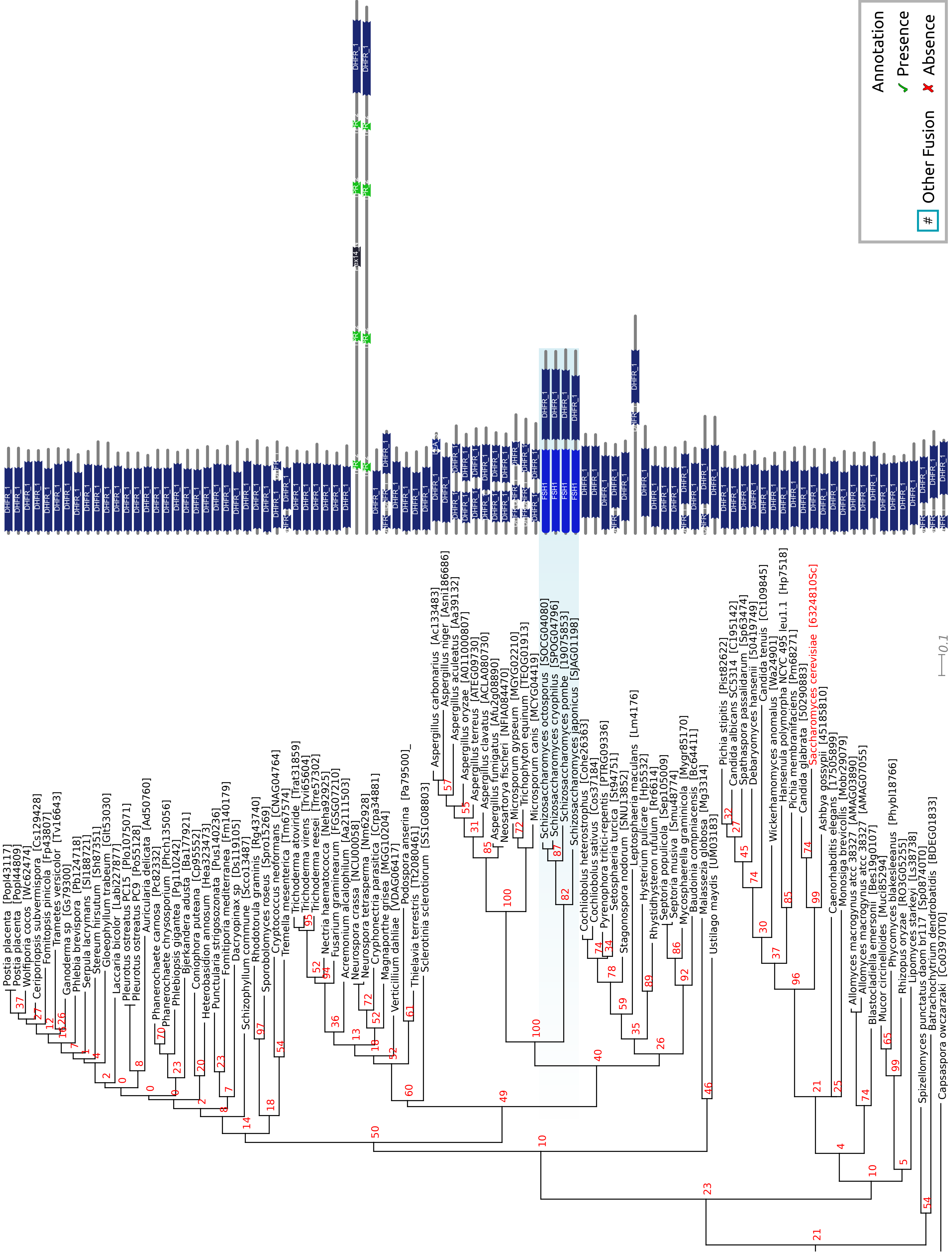
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✗ Absence
Other Fusion
0.1
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Phlebiopsis gigantea [Pg110242]
Bjerkandera adusta [Ba177921]
Coniophora puteana [Cp95552]
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Dacryopinax sp [Ds119105]
Schizophyllum commune [Scco13487]
Rhodotorula graminis [Rg43740]
Sporobolomyces roseus [Spro15269]
Cryptococcus neoformans [CNAG04764]
Tremella mesenterica [Tm67574]
Trichoderma atoviride [Trat31859]
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Trichoderma reesei [Tre57302]
Nectria haematococca [Neha92925]
Fusarium graminearum [FGSG07210]
Acremonium alcalophilum [Aa21115031]
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Cryphonectria parasitica [Crpa34881]
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Verticillium dahliae [VDAG06417]
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Leptosphaeria maculans [Lm4176]
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Rhystidhysteron rufulum [Rr6614]
Septoria populicola [Sep105009]
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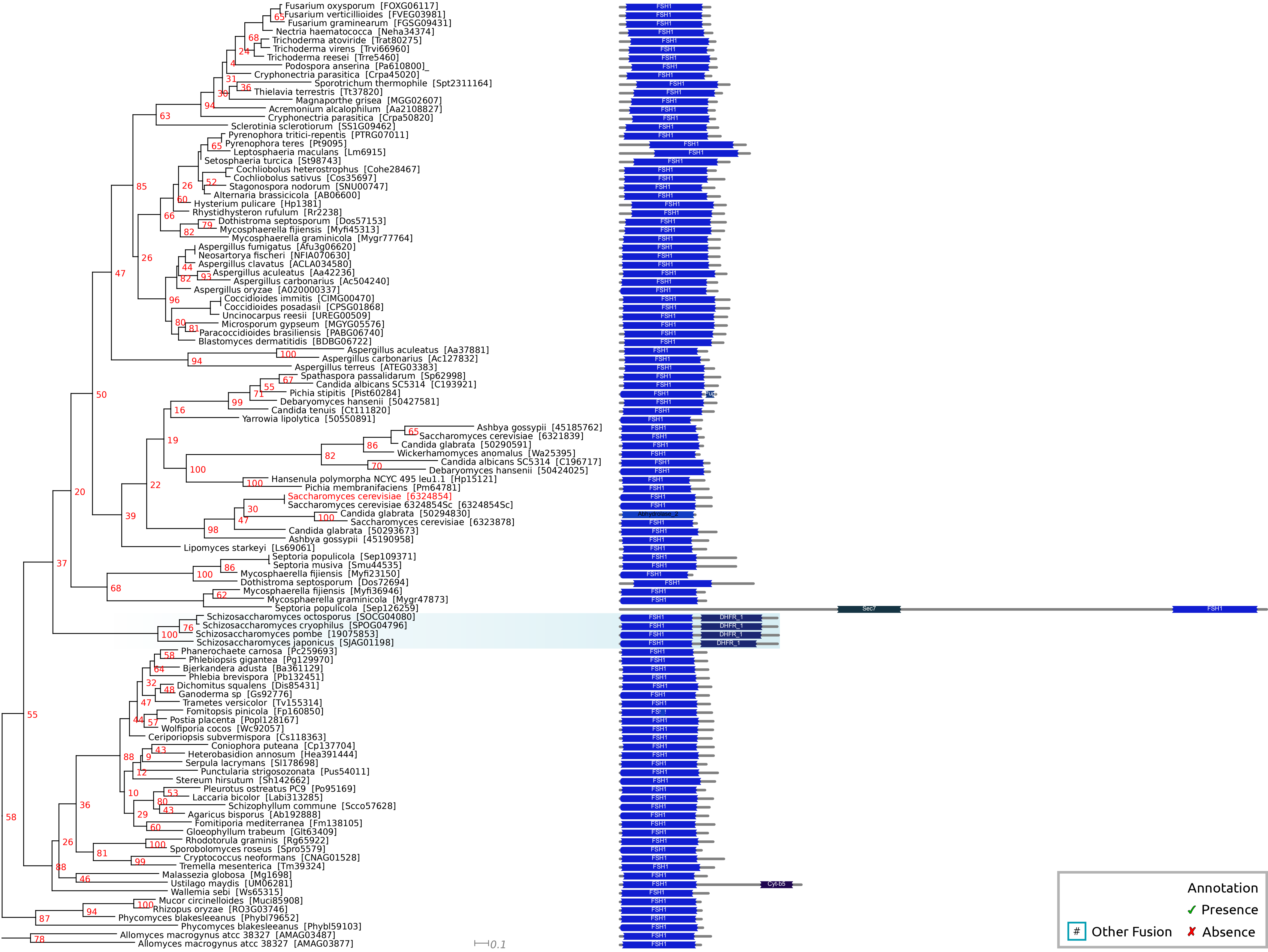
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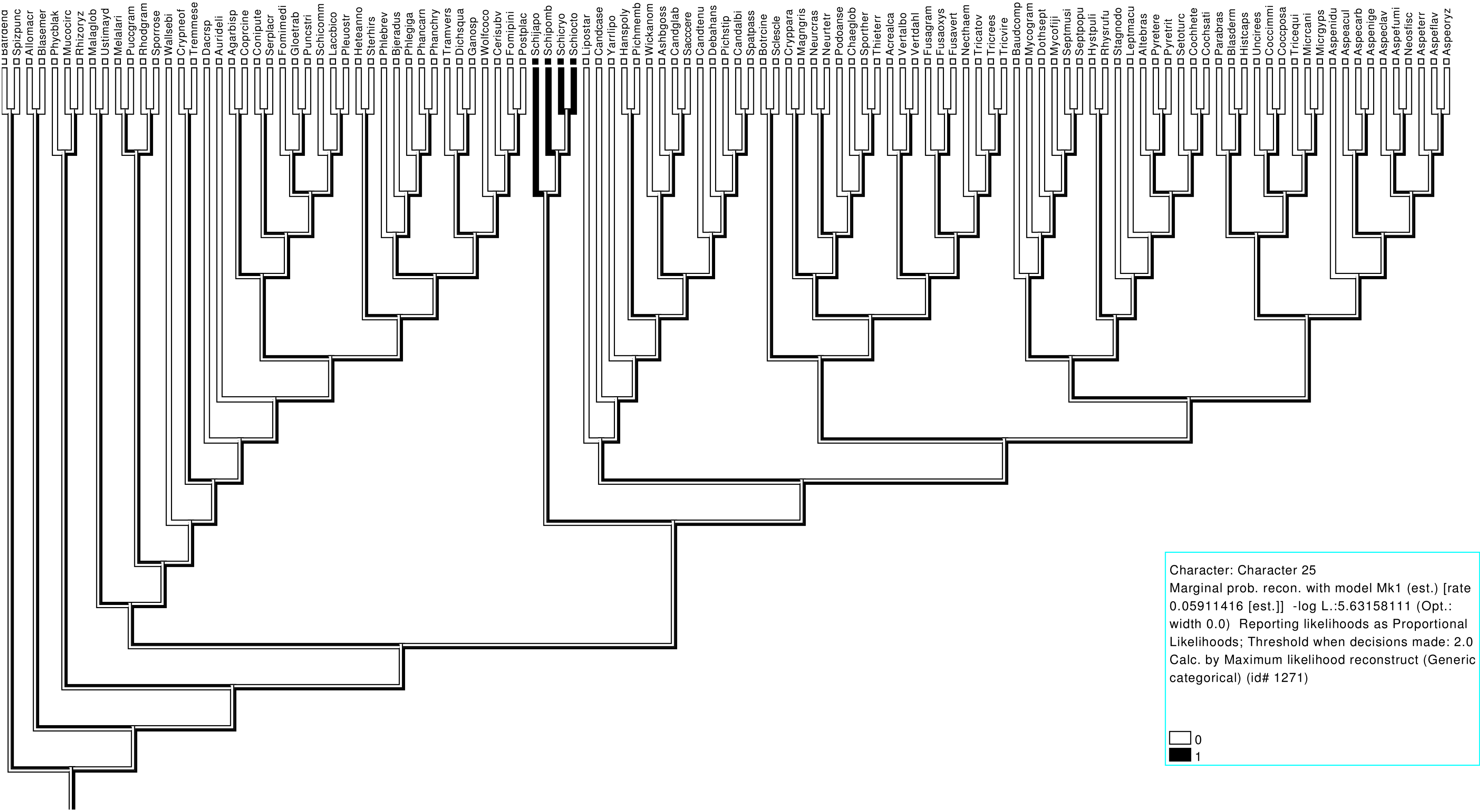
✗ Absence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Septpopu
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Rhysrufu
Stagnodo
Leptmacu
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Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 25
Marginal prob. recon. with model Mk1 (est.) [rate 0.05911416 [est.]] -log L.:5.63158111 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0
Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 26

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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2 Annotated Phylograms

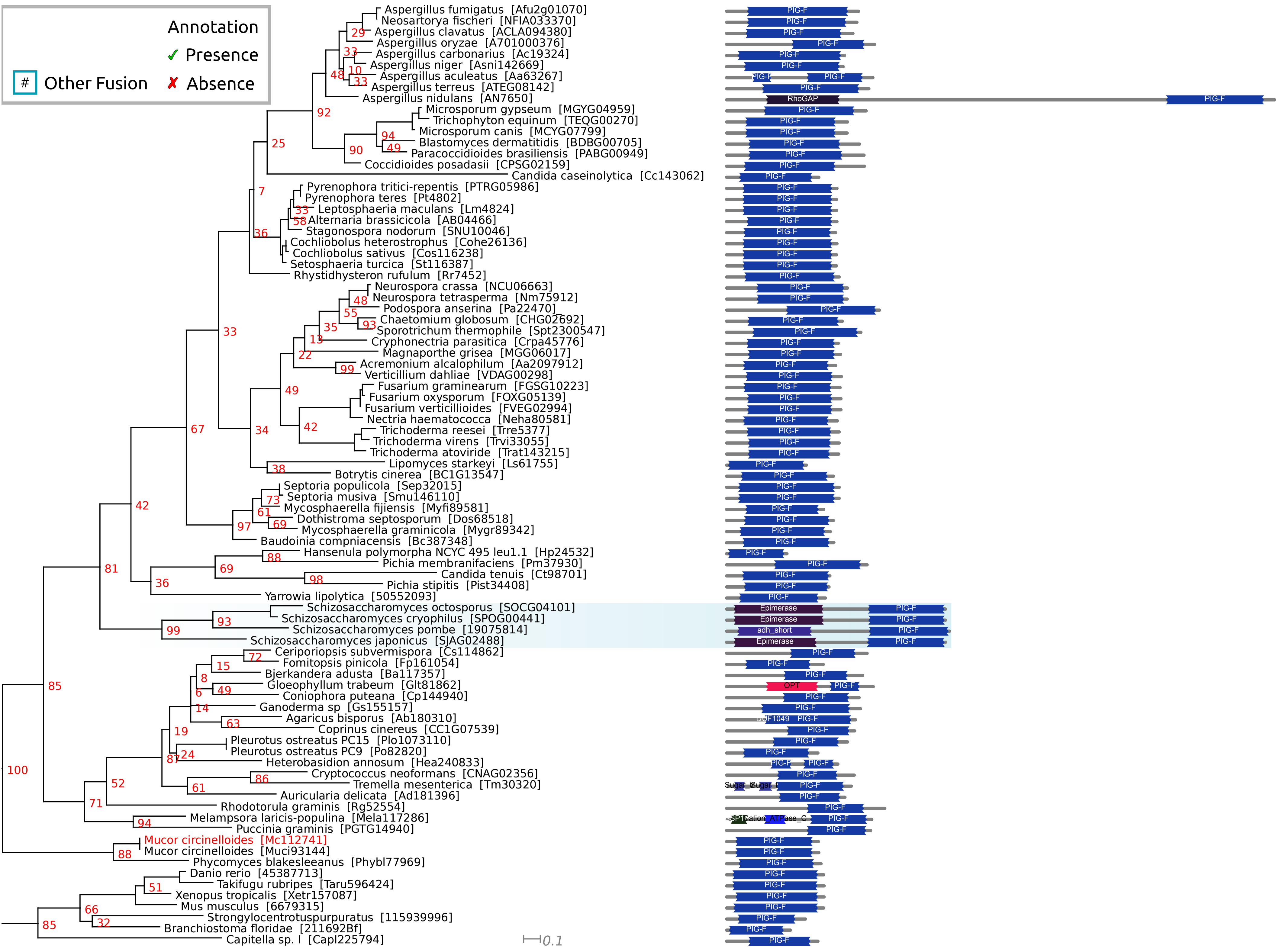
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a ”1/0/-” nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an ”Mk1” or ”Assym. 2 param model.” (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Aspergillus fumigatus [Afu2g01070]
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Microsporum gypseum [MGYG04959]
Trichophyton equinum [TEQG00270]
Microsporum canis [MCYG07799]
Blastomyces dermatitidis [BDBG00705]
Paracoccidioides brasiliensis [PABG00949]
Coccidioides posadasii [CPSG02159]
Candida caseinolytica [Cc143062]
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Pyrenophora teres [Pt4802]
Leptosphaeria maculans [Lm4824]
Alternaria brassicicola [AB04466]
Stagonospora nodorum [SNU10046]
Cochliobolus heterostrophus [Cohe26136]
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Setosphaeria turcica [St116387]
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Podospora anserina [Pa22470]
Chaetomium globosum [CHG02692]
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Ganoderma sp [Gs155157]
Agaricus bisporus [Ab180310]
Coprinus cinereus [CC1G07539]
Pleurotus ostreatus PC15 [Plo1073110]
Pleurotus ostreatus PC9 [Po82820]
Heterobasidion annosum [Hea240833]
Cryptococcus neoformans [CNAG02356]
Tremella mesenterica [Tm30320]
Auricularia delicata [Ad181396]
Rhodotorula graminis [Rg52554]
Melampsora laricis-populina [Mela117286]
Puccinia graminis [PGTG14940]
Mucor circinelloides [Mc112741]
Mucor circinelloides [Muci93144]
Phycomyces blakesleeanus [Phybl77969]
Danio rerio [45387713]
Takifugu rubripes [Taru596424]
Xenopus tropicalis [Xetr157087]
Mus musculus [6679315]
Strongylocentrotuspurpuratus [115939996]
Branchiostoma floridae [211692Bf]
Capitella sp. I [CapI225794]
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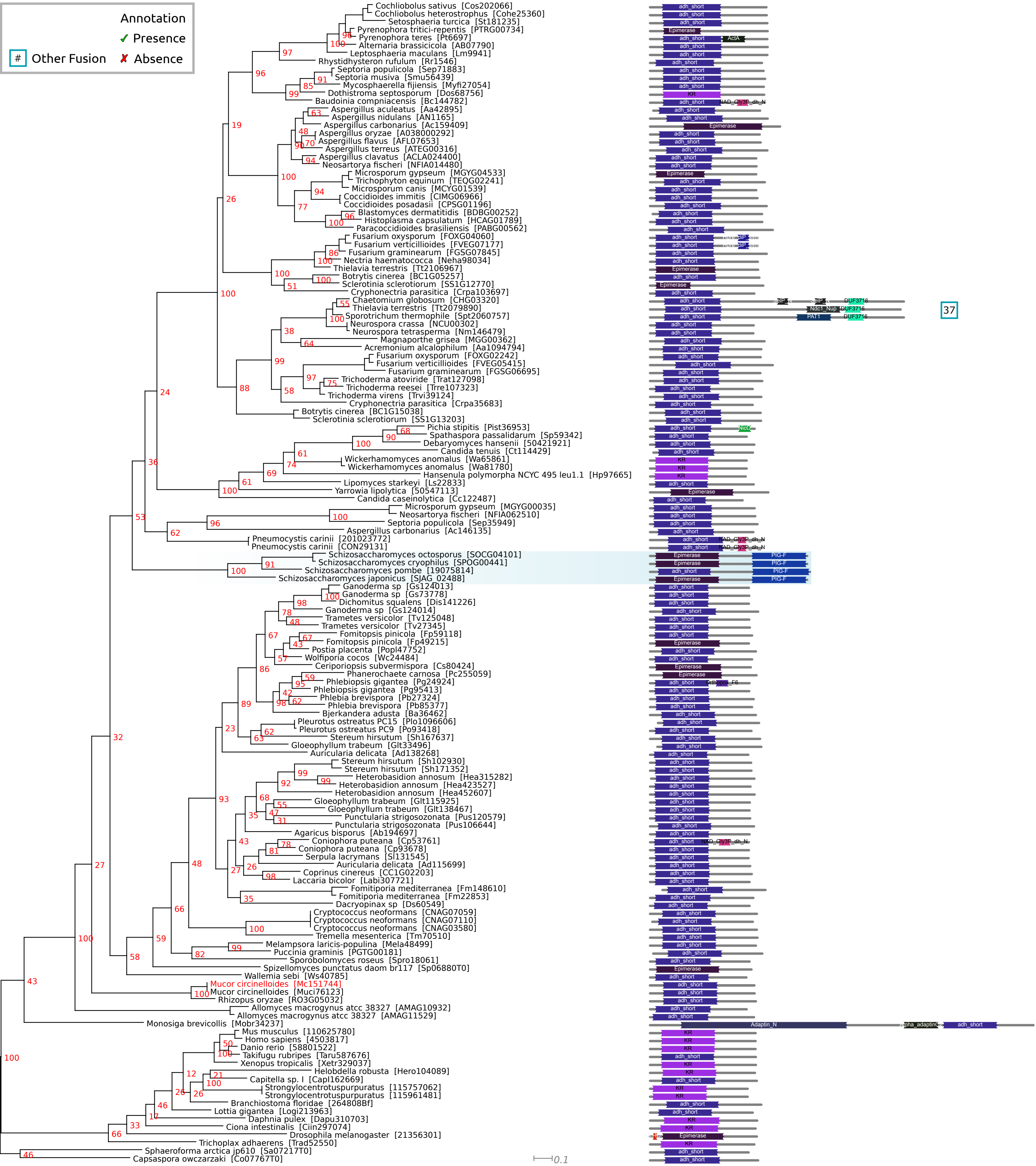
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Septoria populicola [Sep71883]
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Dothistroma septosporum [Dos68756]
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Aspergillus carbonarius [Ac159409]
Aspergillus oryzae [A038000292]
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Aspergillus clavatus [ACLA024400]
Neosartorya fischeri [NFIA014480]
Microsporum gypseum [MGYG04533]
Trichophyton equinum [TEQG02241]
Microsporum canis [MCYG01539]
Coccidioides immitis [CIMG06966]
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Blastomyces dermatitidis [BDBG00252]
Histoplasma capsulatum [HCAG01789]
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Fusarium oxysporum [FOXG04060]
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Fusarium graminearum [FGSG07845]
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Pleurotus ostreatus PC9 [Po93418]
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Puccinia graminis [PGTG00181]
Sporobolomyces roseus [Spro18061]
Spizellomyces punctatus daom br117 [Sp06880T0]
Wallemia sebi [Ws40785]
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Rhizopus oryzae [RO3G05032]
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Takifugu rubripes [Taru587676]
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Daphnia pulex [Dapu310703]
Ciona intestinalis [Ciin297074]
Drosophila melanogaster [21356301]
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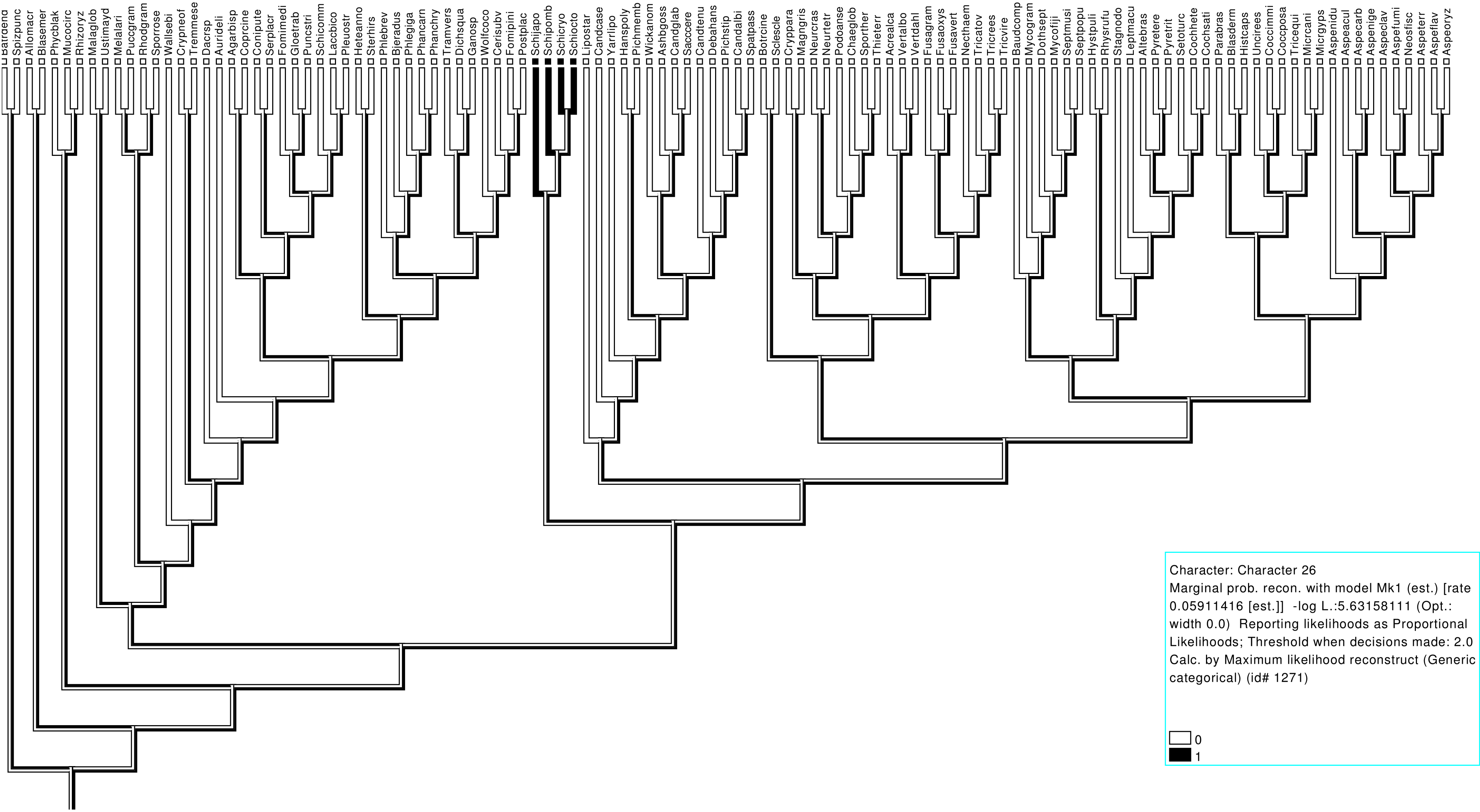

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☐ 0
■ 1

Putative Fusion 27

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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DKCTALQWLNSKQTKGGKPYVFSQLEAIHARSLFPCFDTPSVKSTFTASIESPLPVVFSGIRIEDTSKDTNIYRFEQKVP
IPAYLIGIASGDLSSAPIGPRSTVYTEPFRLKDCQWEFENDVEKFIQTAEKIIFEYEWGTYDILVNVDSYPYGGMESPNM
TFATPTLIAHDRSNIDVIAHELAHSWSGNLVTNCSWNHFWLNEGWTVYLERRIIGAIHGEPTRHFSALIGWSDLQNSIDS
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SQNKFTPEQCENGVWQVIGFKEFLPWLTGKTDDNTVKLEDCIERMKTRTRQYAKRQVKWIKKMLIPDIKGDIYLLDATDL
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RRHKSNLKRNTRQADFEKWKINKKETVE
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Dichomitus squalens [Dis109731]
Ganoderma sp [Gs147529]
Trametes versicolor [Tv140546]
Ceriporiopsis subvermispora [Cs110061]
Postia placenta [Popl125530]
Wolfiporia cocos [Wc147267]
Fomitopsis pinicola [Fp140962]
Phanerochaete carnosa [Pc203757]
Phanerochaete chrysosporium [Phch136966]
Phlebiopsis gigantea [Pg112533]
Bjerkandera adusta [Ba41912]
Phlebiopsis gigantea [Pg424654]
Phanerochaete carnosa [Pc246632]
Phlebiopsis gigantea [Pg127715]
Bjerkandera adusta [Ba72137]
Heterobasidion annosum [Hea153339]
Stereum hirsutum [Sh88669]
Pleurotus ostreatus PC15 [Plo154934]
Pleurotus ostreatus PC9 [Po100752]
Agaricus bisporus [Ab198496]
Coniophora puteana [Cp124530]
Serpula lacrymans [Sl188178]
Fomitiporia mediterranea [Fm107254]
Fomitiporia mediterranea [Fm83411]
Schizophyllum commune [Scco255314]
Punctularia strigosozonata [Pus78766]
Coprinus cinereus [CC1G04794]
Laccaria bicolor [Labi253885]
Serpula lacrymans [Sl127308]
Gloeophyllum trabeum [Glt53987]
Coniophora puteana [Cp94541]
Auricularia delicata [Ad178815]
Cryptococcus neoformans [CNAG02076]
Tremella mesenterica [Tm64668]
Wallemia sebi [Ws29203]
Melampsora laricis-populina [Mela96062]
Puccinia graminis [PGTG09219]
Rhodotorula graminis [Rg55163]
Sporobolomyces roseus [Spro12605]
Malassezia globosa [Mg3297]
Ustilago maydis [UM00170]
Cochliobolus heterostrophus [Cohe100190]
Cochliobolus sativus [Cos200756]
Setosphaeria turcica [St164340]
Pyrenophora tritici-repentis [PTRG11101]
Pyrenophora teres [Pt10660]
Alternaria brassicicola [AB02373]
Leptosphaeria maculans [Lm11535]
Stagonospora nodorum [SNU12761]
Rhystidhysteron rufulum [Rr4489]
Septoria populicola [Sep97074]
Septoria musiva [Smu127360]
Mycosphaerella fijiensis [Myfi51051]
Mycosphaerella graminicola [Mygr41538]
Dothistroma septosporum [Dos44570]
Baudoinia compniacensis [Bc150912]
Botrytis cinerea [BC1G09514]
Sclerotinia sclerotiorum [SS1G05513]
Aspergillus carbonarius [Ac152824]
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Aspergillus niger [Asni202191]
Aspergillus aculeatus [Aa38958]
Aspergillus nidulans [AN5812]
Aspergillus oryzae [A011000940]
Aspergillus flavus [AFL05644]
Aspergillus fumigatus [Afu2g07520]
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Coccidioides immitis [CIMG05732]
Coccidioides posadasii [CPSG08028]
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Sporotrichum thermophile [Spt2302478]
Thielavia terrestris [Tt2108732]
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Neurospora tetrasperma [Nm127403]
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Trichoderma reesei [Trre108592]
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Trichoderma atoviride [Trat151712]
Acremonium alcalophilum [Aa1055092]
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Candida tenuis [Ct117851]
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Saccharomyces cerevisiae [6324283]
Wickerhamomyces anomalus [Wa35312]
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Mucor circinelloides [Muci29021]
Allomyces macrogynus atcc 38327 [AMAG07733]
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Spizellomyces punctatus daom br117 [Sp07835T0]
Mus musculus [116734870]
Homo sapiens [4505029]
Gallus gallus [57525373]
Xenopus tropicalis [Xetr175855]
Danio rerio [47086915]
Takifugu rubripes [Taru302330]
Branchiostoma floridae [215361Bf]
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Daphnia pulex [Dapu313156]
Drosophila melanogaster [45550350]
Capitella sp. I [Capl162472]
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Other Fusion
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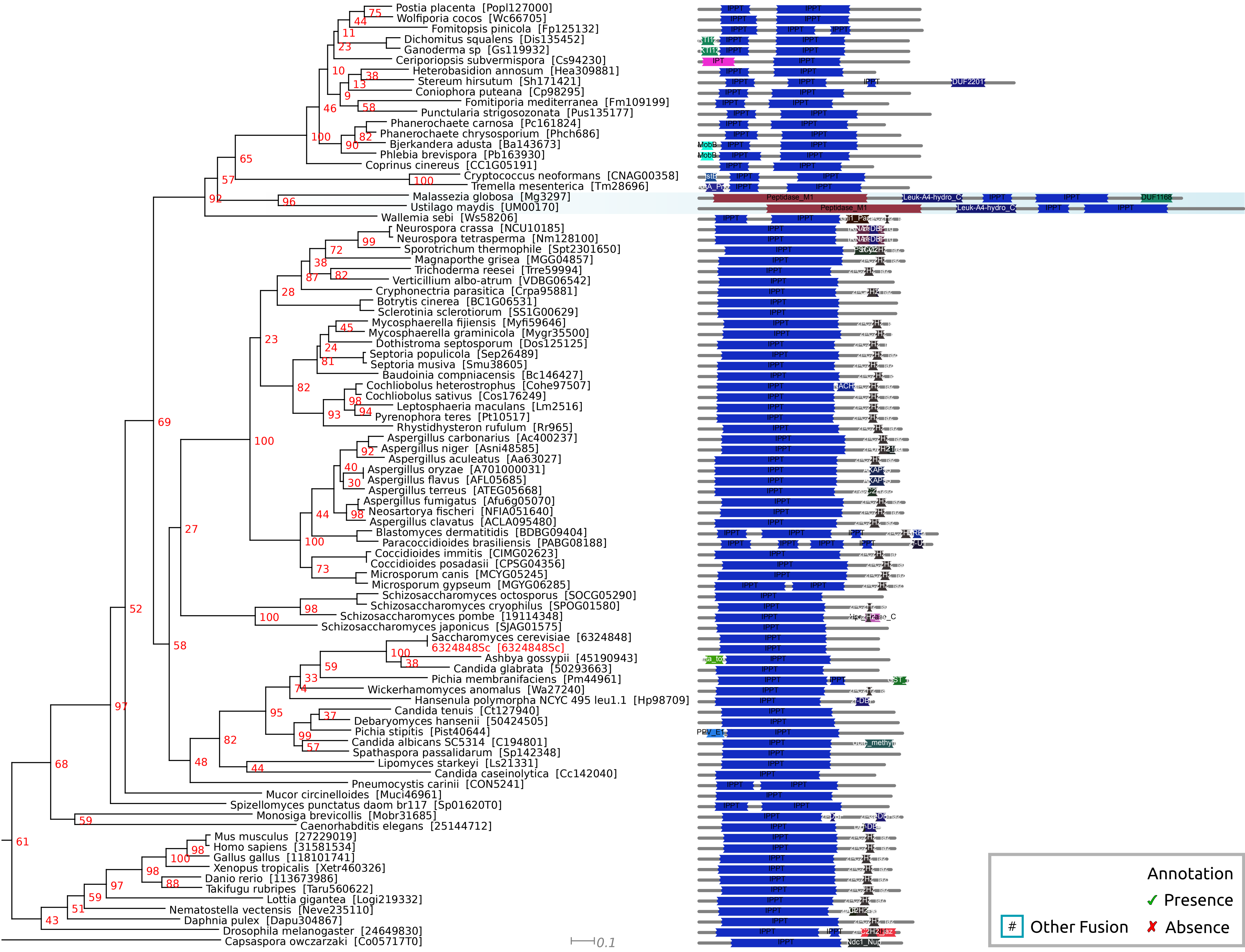
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Cryptococcus neoformans [CNAG00358]
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Malassezia globosa [Mg3297]
Ustilago maydis [UM00170]
Wallemia sebi [Ws58206]
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Leptosphaeria maculans [Lm2516]
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Rhystidhysteron rufulum [Rr965]
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Daphnia pulex [Dapu304867]
Drosophila melanogaster [24649830]
Capsaspora owczarzaki [Co05717T0]
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✗ Absence
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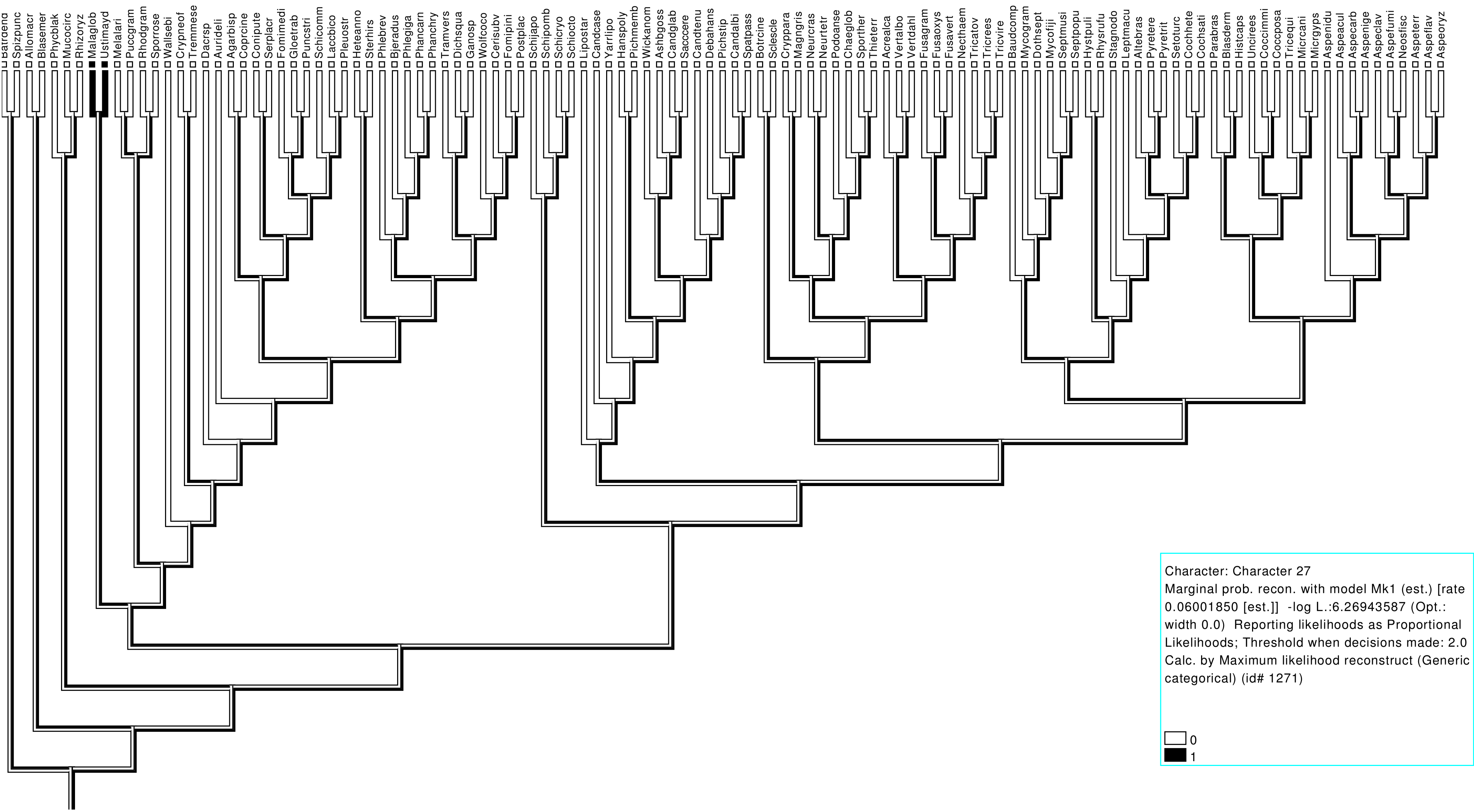

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□ 0
■ 1

Putative Fusion 28

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|83578104Sc unnamed protein product
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HTLGDAHVYKDHIDALKEQITRNPRPFPKLKIKRDVKDIDDFKLTDFEIEDYNPHPRIQMKMSV
```

2 Annotated Phylograms

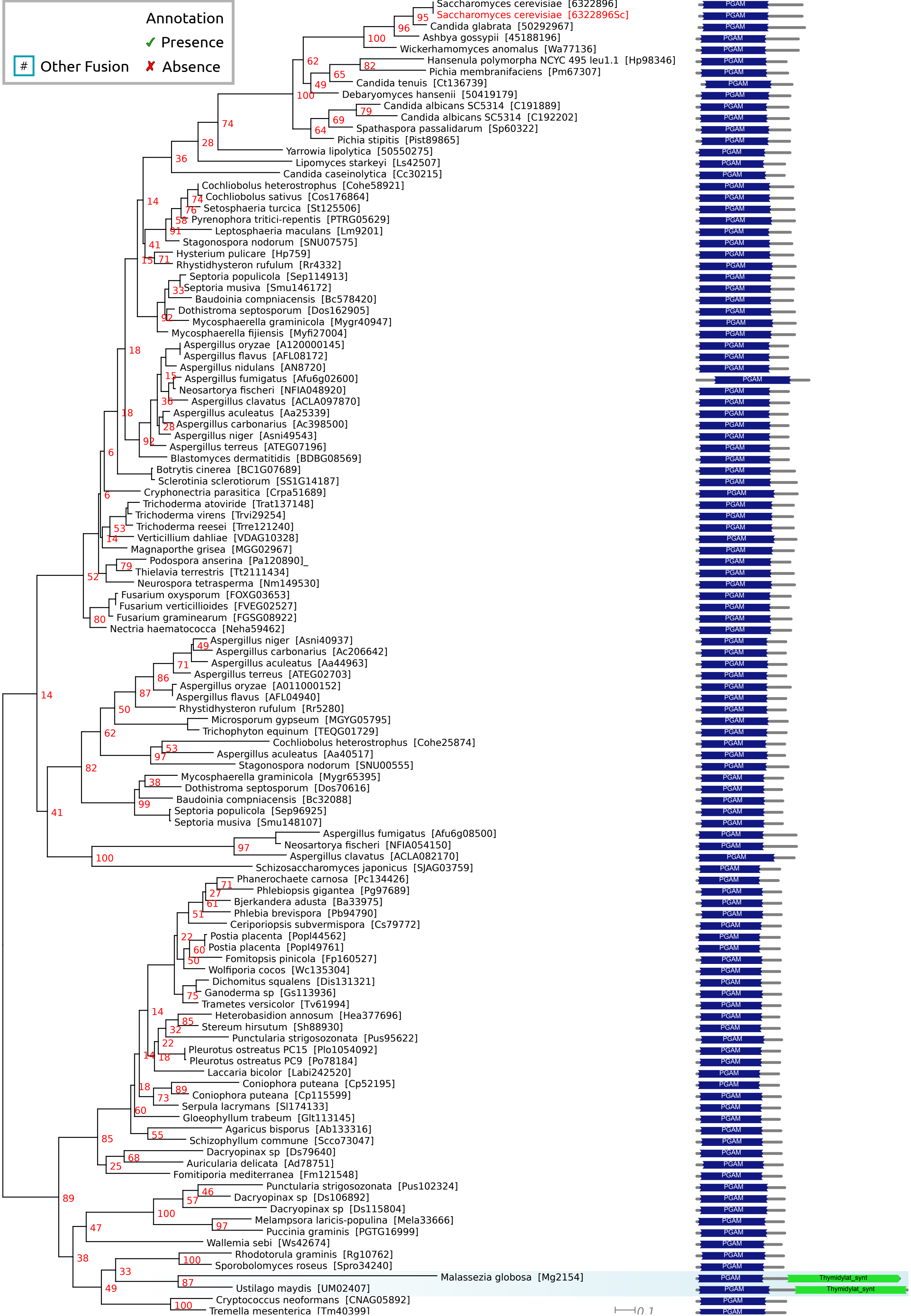
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✓ Presence
Other Fusion
✗ Absence
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Hansenula polymorpha NCYC 495 leu1.1 [Hp98346]
Pichia membranifaciens [Pm67307]
Candida tenuis [Ct136739]
Debaryomyces hansenii [50419179]
Candida albicans SC5314 [C191889]
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Spathaspora passalidarum [Sp60322]
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Lipomyces starkeyi [Ls42507]
Candida caseinolytica [Cc30215]
Cochliobolus heterostrophus [Cohe58921]
Cochliobolus sativus [Cos176864]
Setosphaeria turcica [St125506]
Pyrenophora tritici-repentis [PTRG05629]
Leptosphaeria maculans [Lm9201]
Stagonospora nodorum [SNU07575]
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Trichoderma atoviride [Trat137148]
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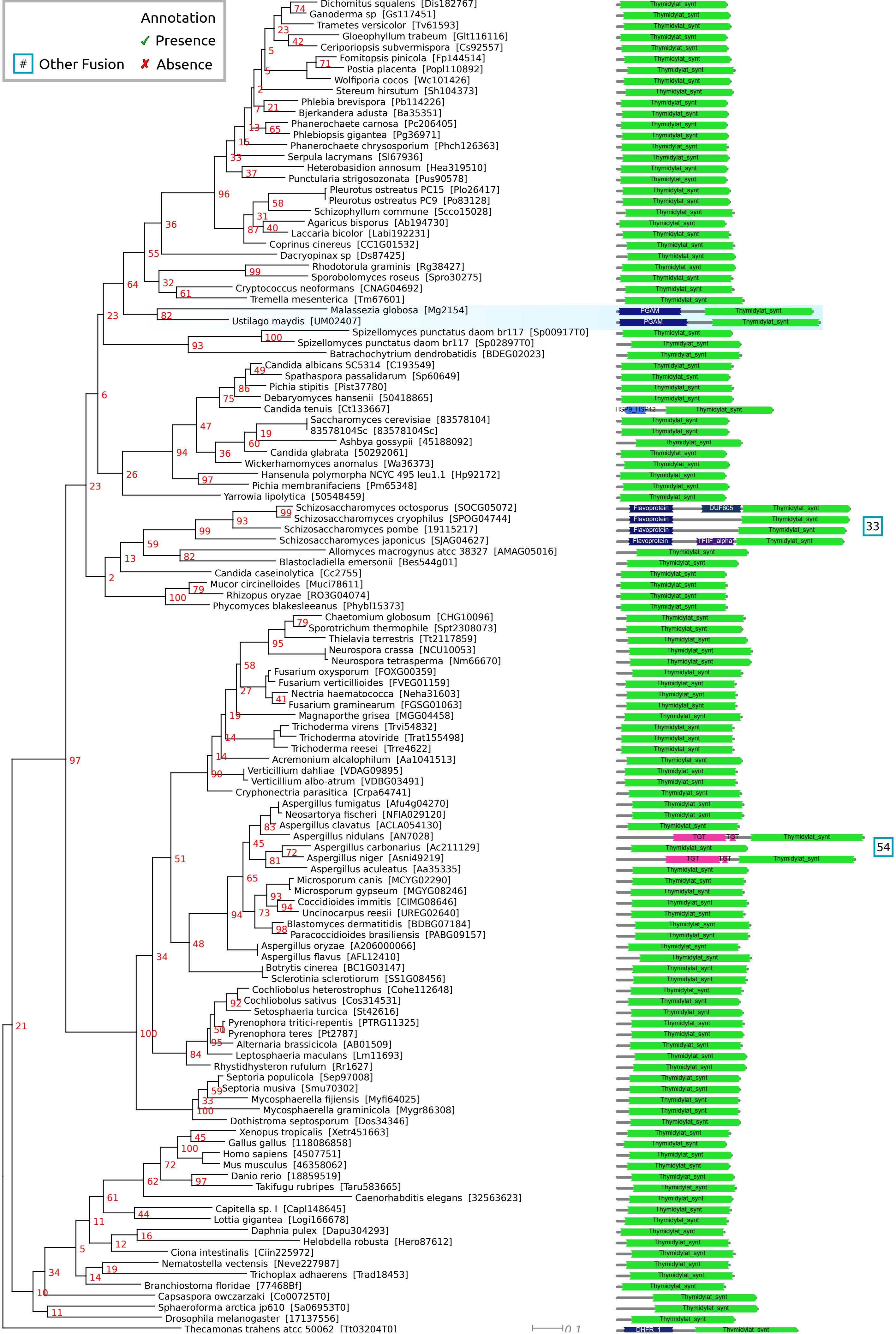
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Fusarium verticillioides [FVEG01159]
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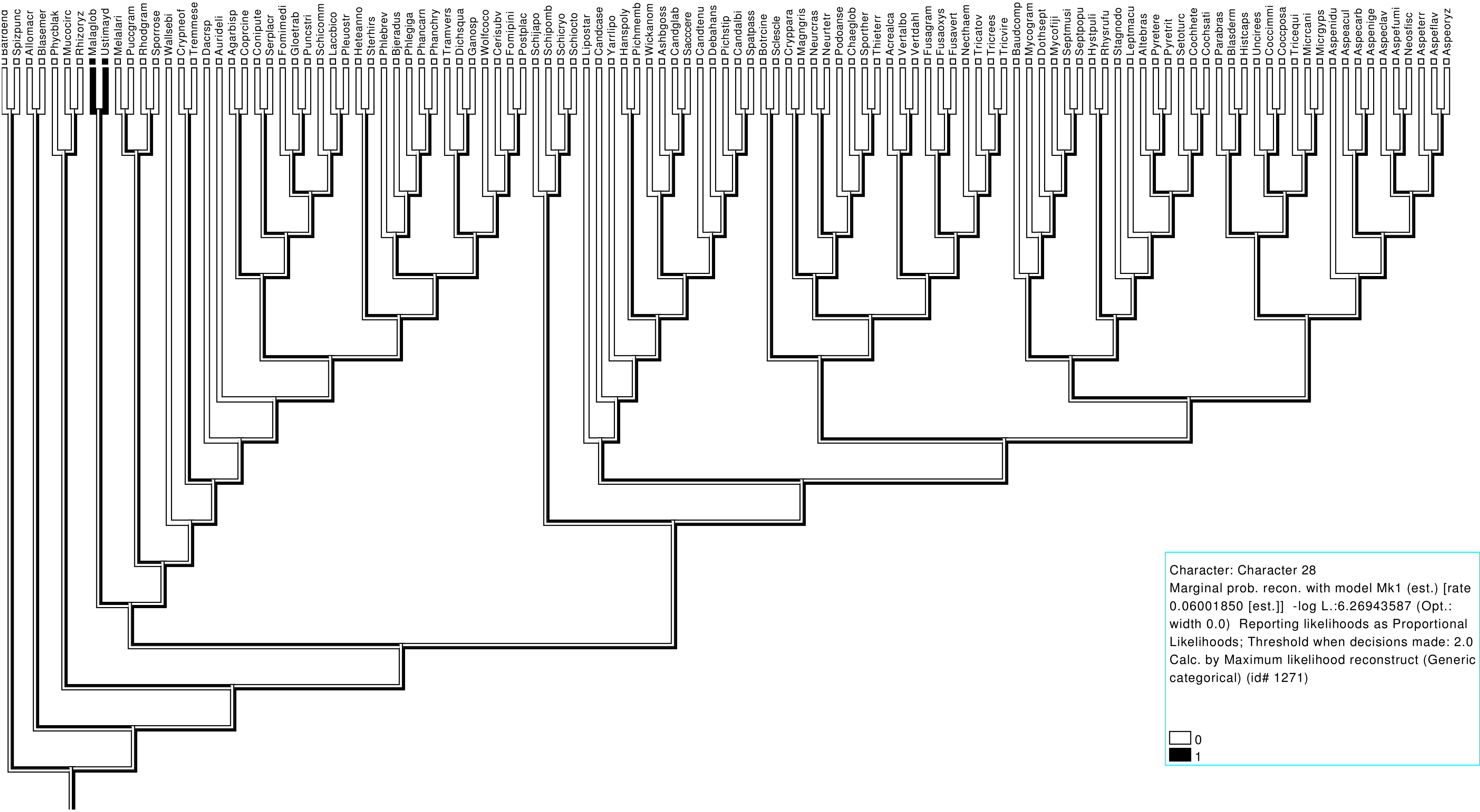
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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 28
Marginal prob. recon. with model Mk1 (est.) [rate 0.06001850 [est.]] -log L.:6.26943587 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
□ 0
■ 1

Putative Fusion 29

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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AESLWGHQQETVNLWDELIKARPAMPV
```

2 Annotated Phylograms

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```
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    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

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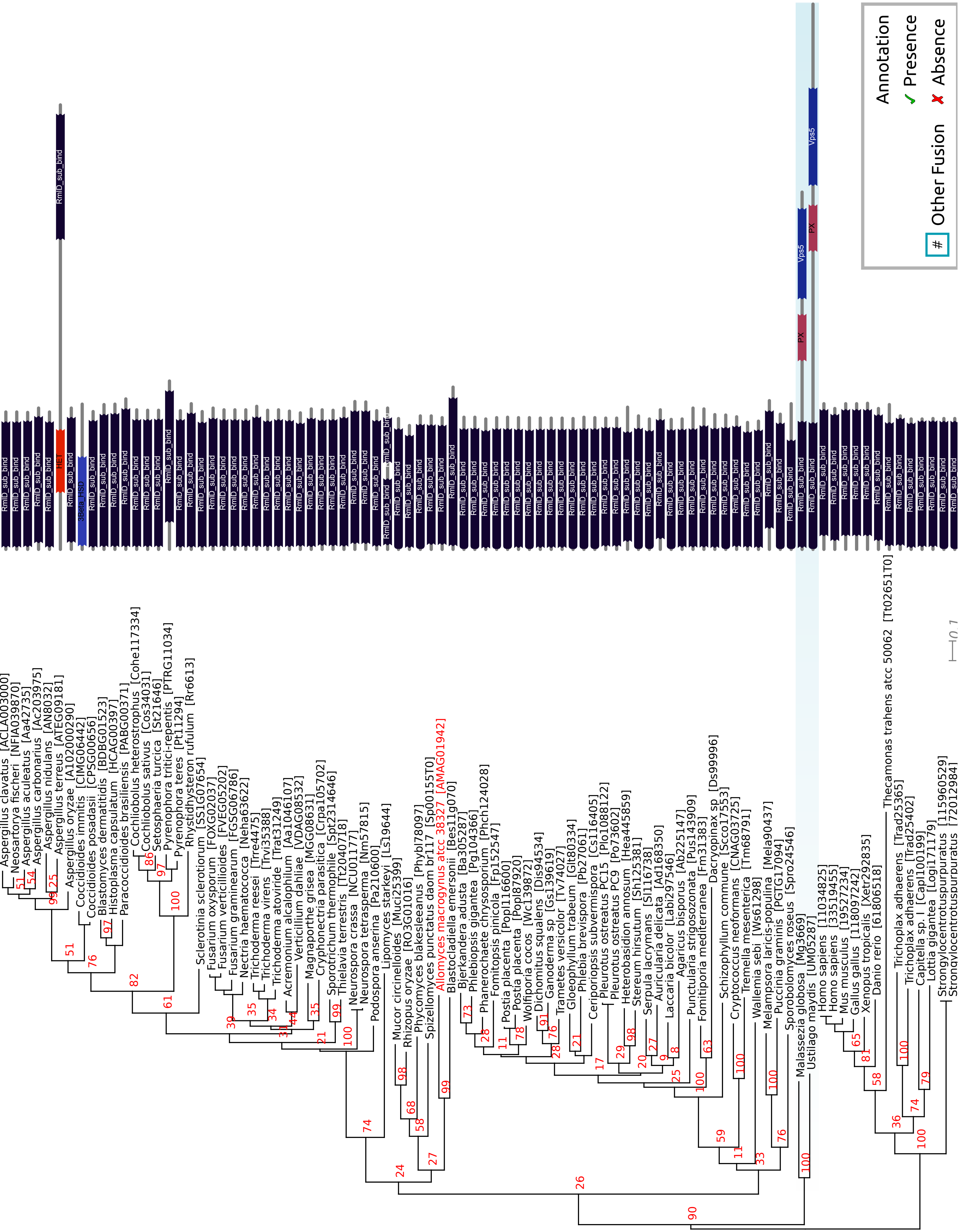
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Melampsora laricis-populina [Mela90437]
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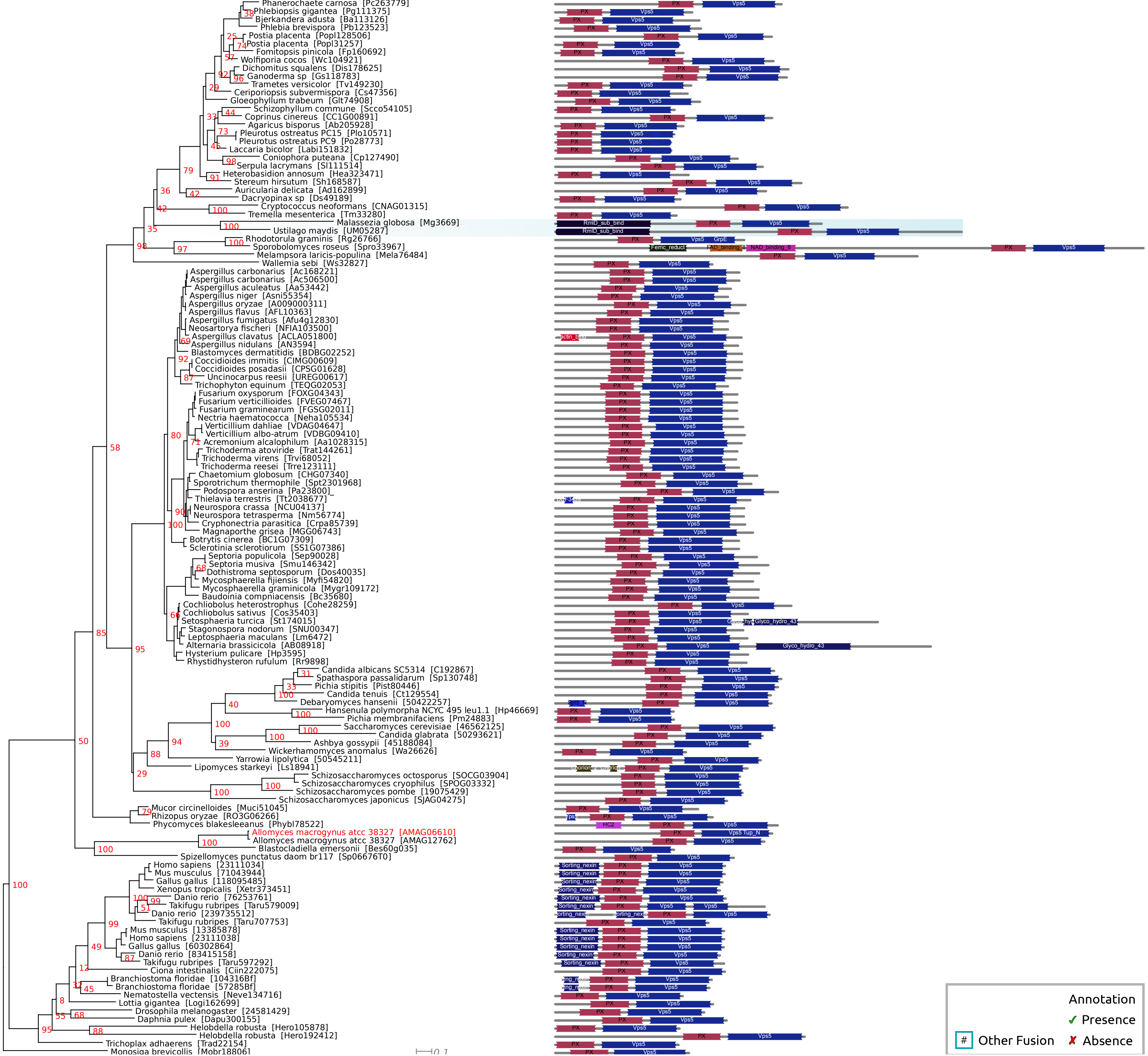
Other Fusion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Fomitopsis pinicola [Fp160692]
Wolfiporia cocos [Wc104921]
Dichomitus squalens [Dis178625]
Ganoderma sp [Gs118783]
Trametes versicolor [Tv149230]
Ceriporiopsis subvermispora [Cs47356]
Gloeophyllum trabeum [Glt74908]
Schizophyllum commune [Scco54105]
Coprinus cinereus [CC1G00891]
Agaricus bisporus [Ab205928]
Pleurotus ostreatus PC15 [Plo10571]
Pleurotus ostreatus PC9 [Po28773]
Laccaria bicolor [Labi151832]
Coniophora puteana [Cp127490]
Serpula lacrymans [Sl111514]
Heterobasidion annosum [Hea323471]
Stereum hirsutum [Sh168587]
Auricularia delicata [Ad162899]
Dacryopinax sp [Ds49189]
Cryptococcus neoformans [CNAG01315]
Tremella mesenterica [Tm33280]
Malassezia globosa [Mg3669]
Ustilago maydis [UM05287]
Rhodotorula graminis [Rg26766]
Sporobolomyces roseus [Spro33967]
Melampsora laricis-populina [Mela76484]
Wallemia sebi [Ws32827]
Aspergillus carbonarius [Ac168221]
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Aspergillus aculeatus [Aa53442]
Aspergillus niger [Asni55354]
Aspergillus oryzae [A009000311]
Aspergillus flavus [AFL10363]
Aspergillus fumigatus [Afu4g12830]
Neosartorya fischeri [NFIA103500]
Aspergillus clavatus [ACLA051800]
Aspergillus nidulans [AN3594]
Blastomyces dermatitidis [BDBG02252]
Coccidioides immitis [CIMG00609]
Coccidioides posadasii [CPSG01628]
Uncinocarpus reesii [UREG00617]
Trichophyton equinum [TEQG02053]
Fusarium oxysporum [FOXG04343]
Fusarium verticillioides [FVEG07467]
Fusarium graminearum [FGSG02011]
Nectria haematococca [Neha105534]
Verticillium dahliae [VDAG04647]
Verticillium albo-atrum [VDBG09410]
Acremonium alcalophilum [Aa1028315]
Trichoderma atoviride [Trat144261]
Trichoderma virens [Trvi68052]
Trichoderma reesei [Trre123111]
Chaetomium globosum [CHG07340]
Sporotrichum thermophile [Spt2301968]
Podospora anserina [Pa23800]
Thielavia terrestris [Tt2038677]
Neurospora crassa [NCU04137]
Neurospora tetrasperma [Nm56774]
Cryphonectria parasitica [Crpa85739]
Magnaporthe grisea [MGG06743]
Botrytis cinerea [BC1G07309]
Sclerotinia sclerotiorum [SS1G07386]
Septoria populicola [Sep90028]
Septoria musiva [Smu146342]
Dothistroma septosporum [Dos40035]
Mycosphaerella fijiensis [Myfi54820]
Mycosphaerella graminicola [Mygr109172]
Baudoinia compniacensis [Bc35680]
Cochliobolus heterostrophus [Cohe28259]
Cochliobolus sativus [Cos35403]
Setosphaeria turcica [St174015]
Stagonospora nodorum [SNU00347]
Leptosphaeria maculans [Lm6472]
Alternaria brassicicola [AB08918]
Hysterium pulicare [Hp3595]
Rhystidhysteron rufulum [Rr9898]
Candida albicans SC5314 [C192867]
Spathaspora passalidarum [Sp130748]
Pichia stipitis [Pist80446]
Candida tenuis [Ct129554]
Debaryomyces hansenii [50422257]
Hansenula polymorpha NCYC 495 leu1.1 [Hp46669]
Pichia membranifaciens [Pm24883]
Saccharomyces cerevisiae [46562125]
Candida glabrata [50293621]
Ashbya gossypii [45188084]
Wickerhamomyces anomalus [Wa26626]
Yarrowia lipolytica [50545211]
Lipomyces starkeyi [Ls18941]
Schizosaccharomyces octosporus [SOCG03904]
Schizosaccharomyces cryophilus [SPOG03332]
Schizosaccharomyces pombe [19075429]
Schizosaccharomyces japonicus [SJAG04275]
Mucor circinelloides [Muci51045]
Rhizopus oryzae [RO3G06266]
Phycomyces blakesleeanus [Phybl78522]
Allomyces macrogynus atcc 38327 [AMAG06610]
Allomyces macrogynus atcc 38327 [AMAG12762]
Blastocladiella emersonii [Bes60g035]
Spizellomyces punctatus daom br117 [Sp06676T0]
Homo sapiens [23111034]
Mus musculus [71043944]
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Xenopus tropicalis [Xetr373451]
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Takifugu rubripes [Taru597292]
Ciona intestinalis [Ciin222075]
Branchiostoma floridae [104316Bf]
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Nematostella vectensis [Neve134716]
Lottia gigantea [Logi162699]
Drosophila melanogaster [24581429]
Daphnia pulex [Dapu300155]
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Trichoplax adhaerens [Trad22154]
Monosiga brevicollis [Mobr18806]
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FAD_binding_8
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actin_bind
Glyco_hydro_43
HC2
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Sorting_nexin
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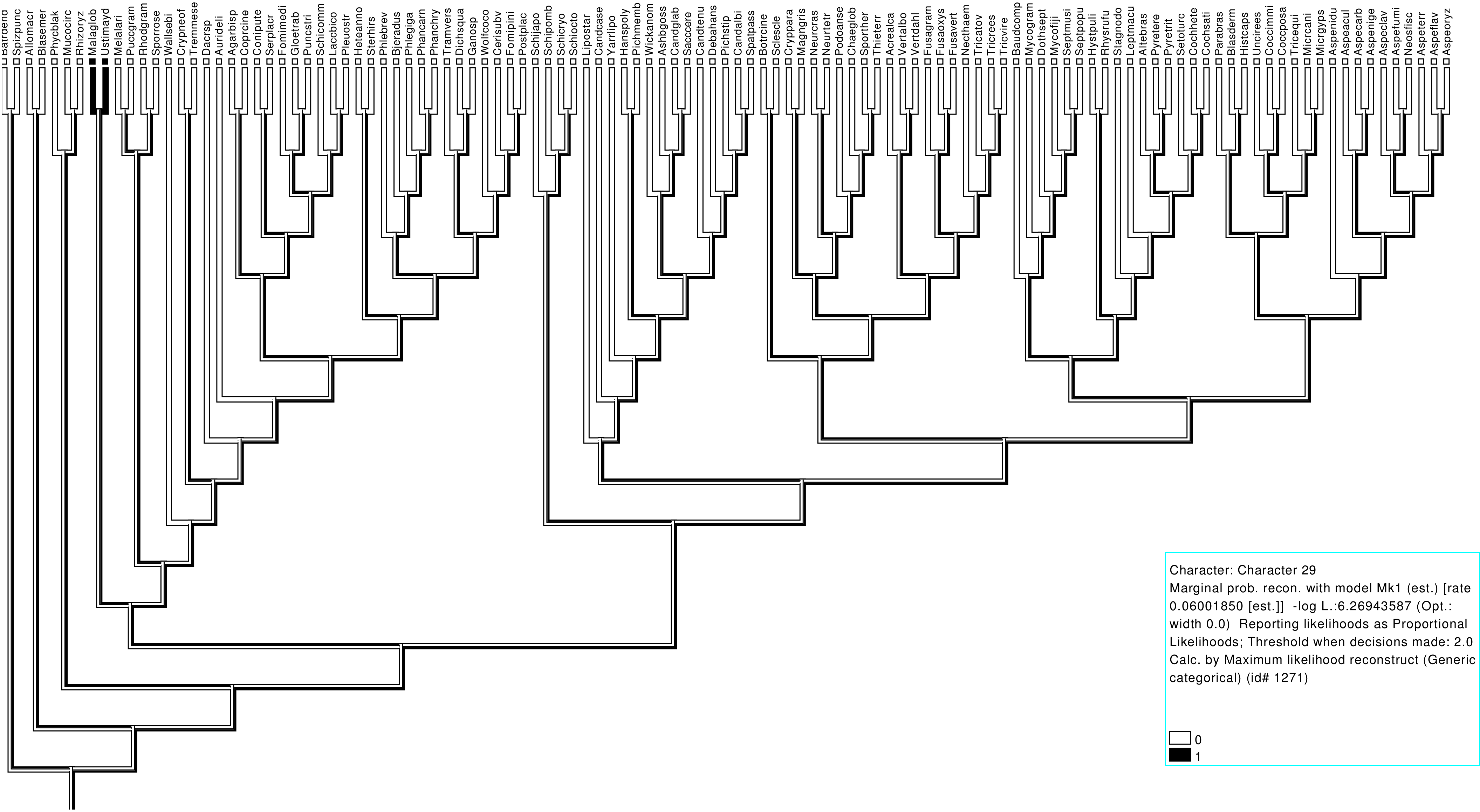
✓ Presence
Other Fusion
✗ Absence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Spizpunc
Allomacr
Blasemer
Phycblak
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Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Marginal prob. recon. with model Mk1 (est.) [rate 0.06001850 [est.]] -log L.:6.26943587 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 30

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>NCU04237
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ANTLAKIVNGMSDNLLTSVIRAWDTDSSIDNKKKVIMVAPAMNSAMWRHPITAKQIRVLQEEWGVRDPEP
SEGDTAGVAVANGWFQVIMDSCMW
>NCU10053
MTVTTSEPVAPAQSQSQTSSRTNPTSKRHEEYQYLDLVRQILDEGELREDRTGTGTYSIFAPTPLKFALS
RPSSSSPSSGSSSDPSSPDYTYTPILPLLTTKRVFTKAVLLELLWFISASTSSTTLSAQGVKIWDGNGSR
AFLDMLGLSHRKEGDLGPVYGFQWRHFGAEYVDCETDYTGQGVDQLQRIIDTLRNNPYDRRLILSAWNPK
DMSQMVLPPCHMFAQFYVSYPGSRTRGGATQTQNKEGELDTPPKEKKPRGHLHCQLYQRSCDMGLGVPFN
IASYALLTHMLAHVCDLVPGSLTHVMGDAHVYLNHVDALKTQLEREPREFPTLEIQREKGGSIDGWKAED
FVIKGYEPHKTIAMEMSV
```

2 Annotated Phylograms

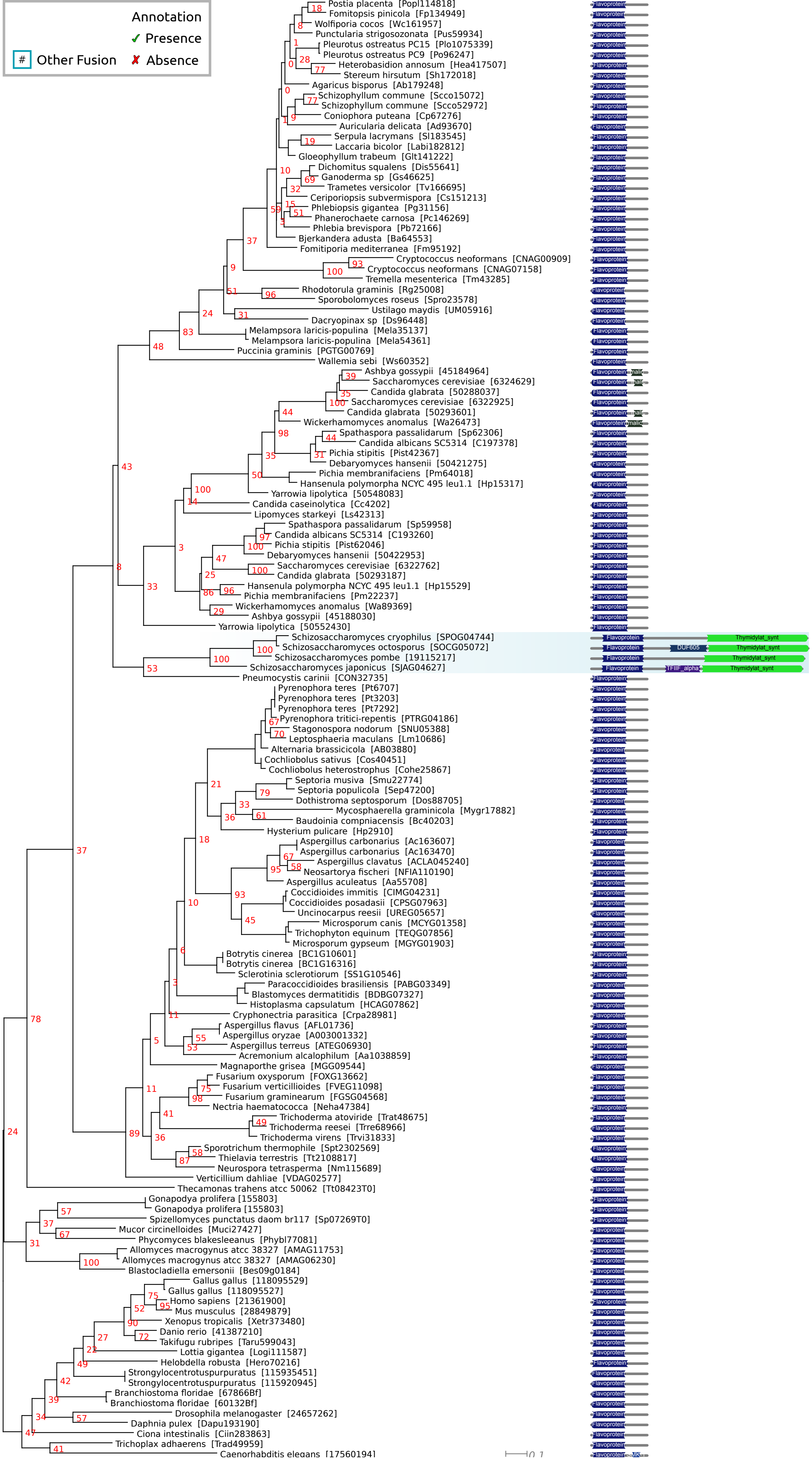
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Postia placenta [Popl114818]
Fomitopsis pinicola [Fp134949]
Wolfiporia cocos [Wc161957]
Punctularia strigosozonata [Pus59934]
Pleurotus ostreatus PC15 [Plo1075339]
Pleurotus ostreatus PC9 [Po96247]
Heterobasidion annosum [Hea417507]
Stereum hirsutum [Sh172018]
Agaricus bisporus [Ab179248]
Schizophyllum commune [Scco15072]
Schizophyllum commune [Scco52972]
Coniophora puteana [Cp67276]
Auricularia delicata [Ad93670]
Serpula lacrymans [Sl183545]
Laccaria bicolor [Labi182812]
Gloeophyllum trabeum [Glt141222]
Dichomitus squalens [Dis55641]
Ganoderma sp [Gs46625]
Trametes versicolor [Tv166695]
Ceriporiopsis subvermispora [Cs151213]
Phlebiopsis gigantea [Pg31156]
Phanerochaete carnosa [Pc146269]
Phlebia brevispora [Pb72166]
Bjerkandera adusta [Ba64553]
Fomitiporia mediterranea [Fm95192]
Cryptococcus neoformans [CNAG00909]
Cryptococcus neoformans [CNAG07158]
Tremella mesenterica [Tm43285]
Rhodotorula graminis [Rg25008]
Sporobolomyces roseus [Spro23578]
Ustilago maydis [UM05916]
Dacryopinax sp [Ds96448]
Melampsora laricis-populina [Mela35137]
Melampsora laricis-populina [Mela54361]
Puccinia graminis [PGTG00769]
Wallemia sebi [Ws60352]
Ashbya gossypii [45184964]
Saccharomyces cerevisiae [6324629]
Candida glabrata [50288037]
Saccharomyces cerevisiae [6322925]
Candida glabrata [50293601]
Wickerhamomyces anomalus [Wa26473]
Spathaspora passalidarum [Sp62306]
Candida albicans SC5314 [C197378]
Pichia stipitis [Pist42367]
Debaryomyces hansenii [50421275]
Pichia membranifaciens [Pm64018]
Hansenula polymorpha NCYC 495 leu1.1 [Hp15317]
Yarrowia lipolytica [50548083]
Candida caseinolytica [Cc4202]
Lipomyces starkeyi [Ls42313]
Spathaspora passalidarum [Sp59958]
Candida albicans SC5314 [C193260]
Pichia stipitis [Pist62046]
Debaryomyces hansenii [50422953]
Saccharomyces cerevisiae [6322762]
Candida glabrata [50293187]
Hansenula polymorpha NCYC 495 leu1.1 [Hp15529]
Pichia membranifaciens [Pm22237]
Wickerhamomyces anomalus [Wa89369]
Ashbya gossypii [45188030]
Yarrowia lipolytica [50552430]
Schizosaccharomyces cryophilus [SPOG04744]
Schizosaccharomyces octosporus [SOCG05072]
Schizosaccharomyces pombe [19115217]
Schizosaccharomyces japonicus [SJAG04627]
Pneumocystis carinii [CON32735]
Pyrenophora teres [Pt6707]
Pyrenophora teres [Pt3203]
Pyrenophora teres [Pt7292]
Pyrenophora tritici-repentis [PTRG04186]
Stagonospora nodorum [SNU05388]
Leptosphaeria maculans [Lm10686]
Alternaria brassicicola [AB03880]
Cochliobolus sativus [Cos40451]
Cochliobolus heterostrophus [Cohe25867]
Septoria musiva [Smu22774]
Septoria populicola [Sep47200]
Dothistroma septosporum [Dos88705]
Mycosphaerella graminicola [Mygr17882]
Baudoinia compniacensis [Bc40203]
Hysterium pulicare [Hp2910]
Aspergillus carbonarius [Ac163607]
Aspergillus carbonarius [Ac163470]
Aspergillus clavatus [ACLA045240]
Neosartorya fischeri [NFIA110190]
Aspergillus aculeatus [Aa55708]
Coccidioides immitis [CIMG04231]
Coccidioides posadasii [CPSG07963]
Uncinocarpus reesii [UREG05657]
Microsporum canis [MCYG01358]
Trichophyton equinum [TEQG07856]
Microsporum gypseum [MGYG01903]
Botrytis cinerea [BC1G10601]
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Sclerotinia sclerotiorum [SS1G10546]
Paracoccidioides brasiliensis [PABG03349]
Blastomyces dermatitidis [BDBG07327]
Histoplasma capsulatum [HCAG07862]
Cryphonectria parasitica [Crpa28981]
Aspergillus flavus [AFL01736]
Aspergillus oryzae [A003001332]
Aspergillus terreus [ATEG06930]
Acremonium alcalophilum [Aa1038859]
Magnaporthe grisea [MGG09544]
Fusarium oxysporum [FOXG13662]
Fusarium verticillioides [FVEG11098]
Fusarium graminearum [FGSG04568]
Nectria haematococca [Neha47384]
Trichoderma atoviride [Trat48675]
Trichoderma reesei [Trre68966]
Trichoderma virens [Trvi31833]
Sporotrichum thermophile [Spt2302569]
Thielavia terrestris [Tt2108817]
Neurospora tetrasperma [Nm115689]
Verticillium dahliae [VDAG02577]
Thecamonas trahens atcc 50062 [Tt08423T0]
Gonapodya prolifera [155803]
Gonapodya prolifera [155803]
Spizellomyces punctatus daom br117 [Sp07269T0]
Mucor circinelloides [Muci27427]
Phycomyces blakesleeanus [Phybl77081]
Allomyces macrogynus atcc 38327 [AMAG11753]
Allomyces macrogynus atcc 38327 [AMAG06230]
Blastocladiella emersonii [Bes09g0184]
Gallus gallus [118095529]
Gallus gallus [118095527]
Homo sapiens [21361900]
Mus musculus [28849879]
Xenopus tropicalis [Xetr373480]
Danio rerio [41387210]
Takifugu rubripes [Taru599043]
Lottia gigantea [Logi111587]
Helobdella robusta [Hero70216]
Strongylocentrotuspurpuratus [115935451]
Strongylocentrotuspurpuratus [115920945]
Branchiostoma floridae [67866Bf]
Branchiostoma floridae [60132Bf]
Drosophila melanogaster [24657262]
Daphnia pulex [Dapu193190]
Ciona intestinalis [Ciin283863]
Trichoplax adhaerens [Trad49959]
Caenorhabditis elegans [17560194]
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TFIIF_alpha
Thymidylat_synt
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Annotation
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Other Fusion
✗ Absence
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Daphnia pulex [Dapu304293]
Homo sapiens [4507751]
Mus musculus [46358062]
Gallus gallus [118086858]
Xenopus tropicalis [Xetr451663]
Caenorhabditis elegans [32563623]
Danio rerio [18859519]
Takifugu rubripes [Taru583665]
Helobdella robusta [Hero87612]
Capitella sp. I [CapI148645]
Lottia gigantea [Logi166678]
Nematostella vectensis [Neve227987]
Trichoplax adhaerens [Trad18453]
Branchiostoma floridae [77468Bf]
Capsaspora owczarzaki [Co00725T0]
Drosophila melanogaster [17137556]
Sphaeroforma arctica jp610 [Sa06953T0]
Thecamonas trahens atcc 50062 [Tt03204T0]
Neurospora tetrasperma [Nm66670]
NCU10053T0f36 [NCU10053T0_f36_]_
Neurospora crassa [NCU10053]
Chaetomium globosum [CHG10096]
Sporotrichum thermophile [Spt2308073]
Thielavia terrestris [Tt2117859]
Fusarium oxysporum [FOXG00359]
Fusarium verticillioides [FVEG01159]
Fusarium graminearum [FGSG01063]
Nectria haematococca [Neha31603]
Trichoderma reesei [Trre4622]
Trichoderma atoviride [Trat155498]
Trichoderma virens [Trvi54832]
Acremonium alcalophilum [Aa1041513]
Verticillium dahliae [VDAG09895]
Verticillium albo-atrum [VDBG03491]
Cryphonectria parasitica [Crpa64741]
Magnaporthe grisea [MGG04458]
Aspergillus fumigatus [Afu4g04270]
Neosartorya fischeri [NFIA029120]
Aspergillus clavatus [ACLA054130]
Aspergillus nidulans [AN7028]
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Microsporum canis [MCYG02290]
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Coccidioides immitis [CIMG08646]
Uncinocarpus reesii [UREG02640]
Blastomyces dermatitidis [BDBG07184]
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Aspergillus oryzae [A206000066]
Aspergillus flavus [AFL12410]
Botrytis cinerea [BC1G03147]
Sclerotinia sclerotiorum [SS1G08456]
Cochliobolus heterostrophus [Cohe112648]
Cochliobolus sativus [Cos314531]
Setosphaeria turcica [St42616]
Pyrenophora tritici-repentis [PTRG11325]
Pyrenophora teres [Pt2787]
Alternaria brassicicola [AB01509]
Leptosphaeria maculans [Lm11693]
Rhystidhysteron rufulum [Rr1627]
Septoria populicola [Sep97008]
Septoria musiva [Smu70302]
Mycosphaerella fijiensis [Myfi64025]
Dothistroma septosporum [Dos34346]
Mycosphaerella graminicola [Mygr86308]
Lipomyces starkeyi [Ls38472]
Spathaspora passalidarum [Sp60649]
Candida albicans SC5314 [C193549]
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Debaryomyces hansenii [50418865]
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Saccharomyces cerevisiae [83578104]
Ashbya gossypii [45188092]
Candida glabrata [50292061]
Wickerhamomyces anomalus [Wa36373]
Hansenula polymorpha NCYC 495 leu1.1 [Hp92172]
Pichia membranifaciens [Pm65348]
Candida caseinolytica [Cc2755]
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Schizosaccharomyces pombe [19115217]
Schizosaccharomyces japonicus [SJAG04627]
Allomyces macrogynus atcc 38327 [AMAG05016]
Blastocladiella emersonii [Bes544g01]
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Phycomyces blakesleeanus [Phybl15373]
Yarrowia lipolytica [50548459]
Fomitopsis pinicola [Fp144514]
Postia placenta [Popl110892]
Wolfiporia cocos [Wc101426]
Gloeophyllum trabeum [Glt116116]
Ceriporiopsis subvermispora [Cs92557]
Dichomitus squalens [Dis182767]
Ganoderma sp [Gs117451]
Trametes versicolor [Tv61593]
Phlebia brevispora [Pb114226]
Phanerochaete carnosa [Pc206405]
Phlebiopsis gigantea [Pg36971]
Bjerkandera adusta [Ba35351]
Fomitiporia mediterranea [Fm124123]
Stereum hirsutum [Sh104373]
Phanerochaete chrysosporium [Phch126363]
Serpula lacrymans [Sl67936]
Punctularia strigosozonata [Pus90578]
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Laccaria bicolor [Labi192231]
Schizophyllum commune [Scco15028]
Coprinus cinereus [CC1G01532]
Pleurotus ostreatus PC15 [Plo26417]
Pleurotus ostreatus PC9 [Po83128]
Coniophora puteana [Cp106381]
Melampsora laricis-populina [Mela51590]
Puccinia graminis [PGTG15305]
Wallemia sebi [Ws40970]
Rhodotorula graminis [Rg38427]
Sporobolomyces roseus [Spro30275]
Cryptococcus neoformans [CNAG04692]
Tremella mesenterica [Tm67601]
Dacryopinax sp [Ds87425]
Malassezia globosa [Mg2154]
Ustilago maydis [UM02407]
Spizellomyces punctatus daom br117 [Sp00917T0]
Spizellomyces punctatus daom br117 [Sp02897T0]
Batrachochytrium dendrobatidis [BDEG02023]
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HSP9_HSP12
Flavoprotein
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TFIIF_alpha
PGAM
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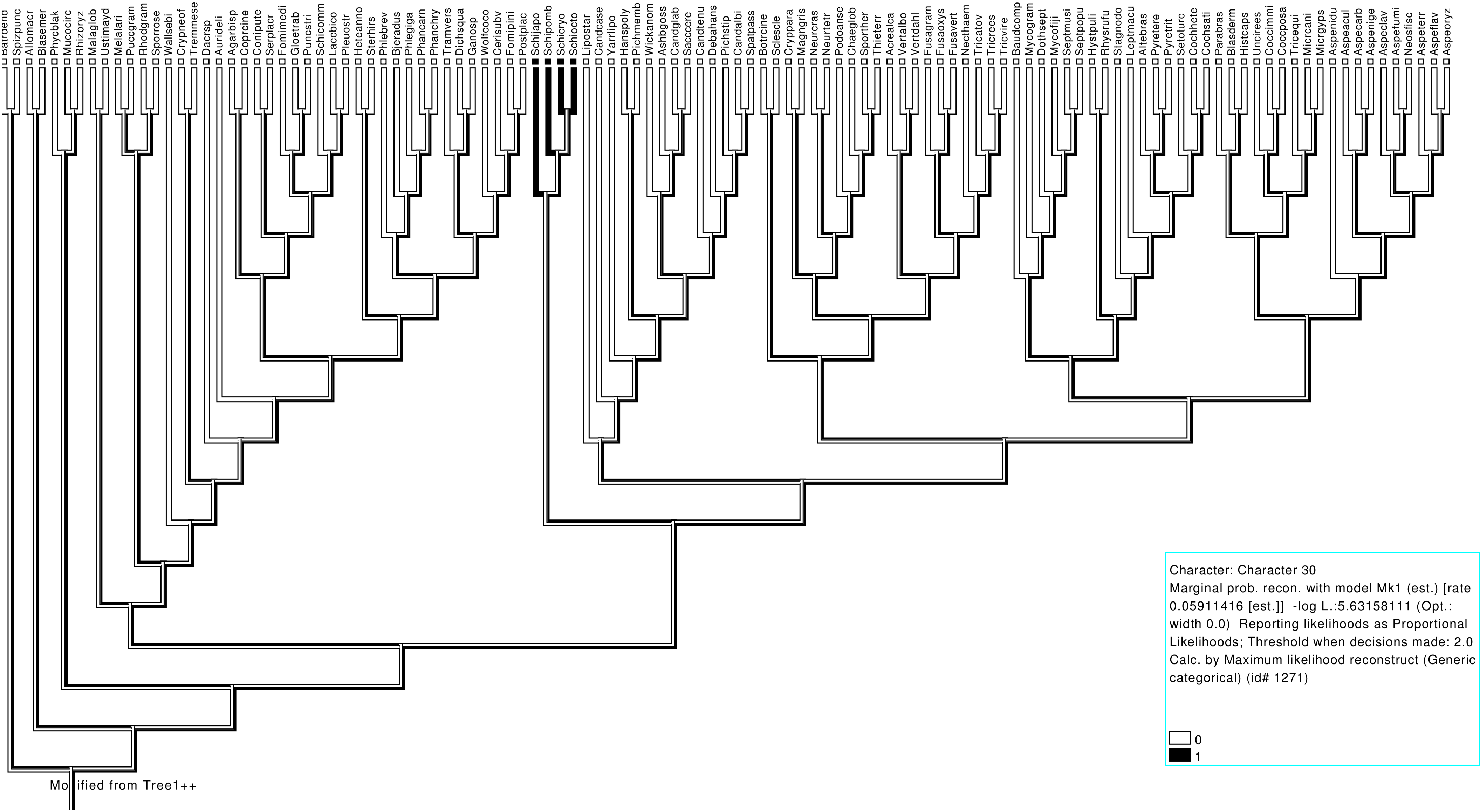
0.1



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□ 0
■ 1

Putative Fusion 31

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>lcl|6319631Sc unnamed protein product
MSSVNANGGYTKPQKYVPGPGDPELPPQLSEFKDKTSDEILKEMNRMPFFMTKLDETDGAGGENVELEALKALAYEGEPH
EIAENFKKQGNELYKAKRFKDARELYSKGLAVECEDKSINESLYANRAACELELKNYRRCIEDCSKALTINPKNVKCYYR
TSKAFFQLNKLEEAKSAATFANQRIDPENKSILNMLSVIDRKEQELKAKEEKQQREAQERENKKIMLESAMTLRNITNIK
THSPVELLNEGKIRLEDPMDFESQLIYPALIMYPTQDEFDFVGEVSELTTVQELVDLVLEGPQERFKKEGKENFTPKKVL
VFMETKAGGLIKAGKKLTFHDILKKESPDVPLFDNALKIYIVPKVESEGWISKWDKQKALERRSV
>lcl|6324670Sc unnamed protein product
MSAPQAKILSQAPTELELQVAQAFVELENSSPELKAELRPLQFKSIREIDVAGGKKALAIFVPVPSLAGFHKVQTKLTRE
LEKKFQDRHVIFLAERRILPKPSRTSRQVQKRPRSRTLTAVHDKILEDLVFPTEIVGKRVRYLVGGNKIQKVLLDSKDVQ
QIDYKLESFQAVYNKLTGKQIVFEIPSETH
```

2 Annotated Phylograms

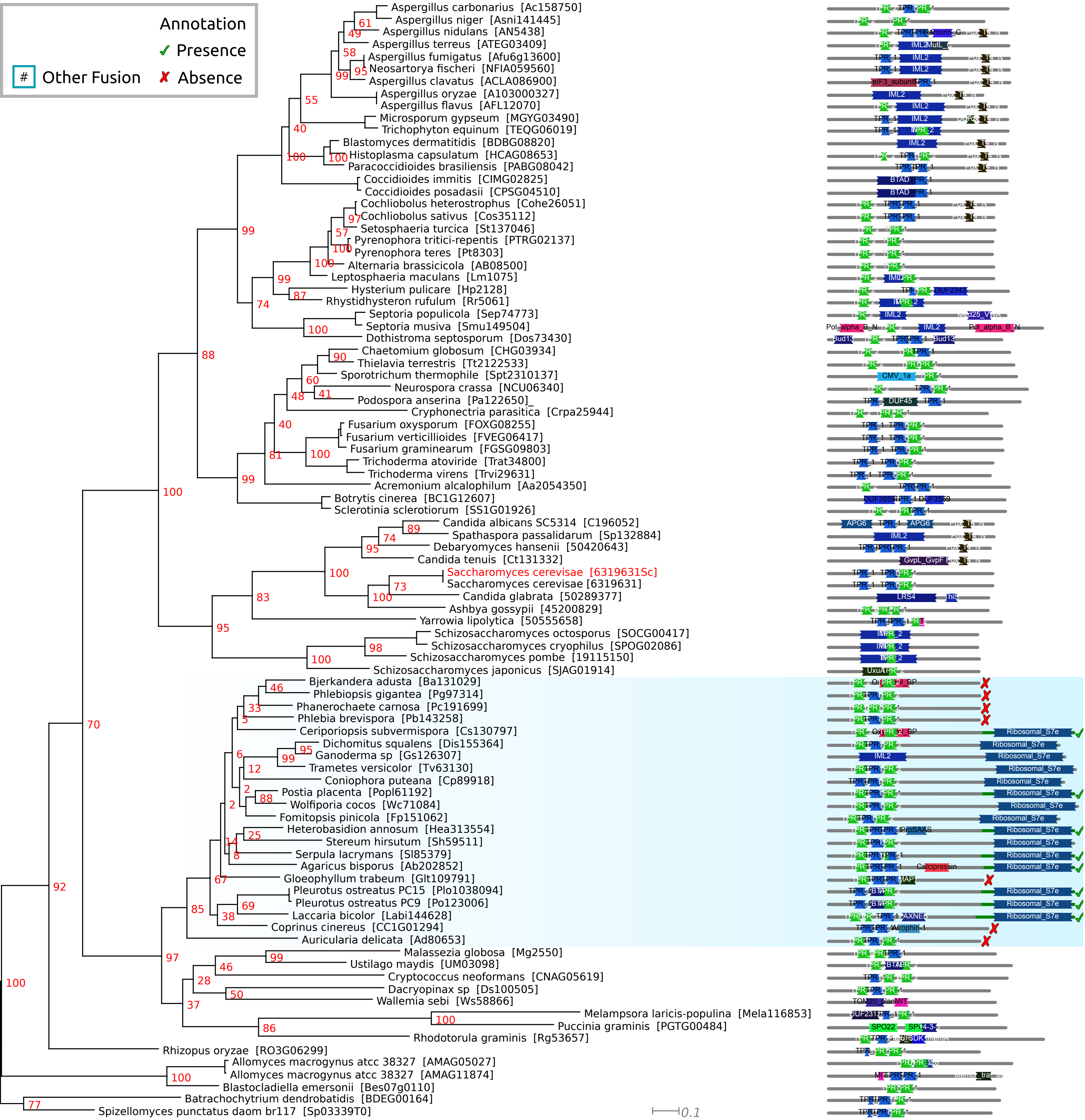
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
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Aspergillus niger [Asni141445]
Aspergillus nidulans [AN5438]
Aspergillus terreus [ATEG03409]
Aspergillus fumigatus [Afu6g13600]
Neosartorya fischeri [NFIA059560]
Aspergillus clavatus [ACLA086900]
Aspergillus oryzae [A103000327]
Aspergillus flavus [AFL12070]
Microsporum gypseum [MGYG03490]
Trichophyton equinum [TEQG06019]
Blastomyces dermatitidis [BDBG08820]
Histoplasma capsulatum [HCAG08653]
Paracoccidioides brasiliensis [PABG08042]
Coccidioides immitis [CIMG02825]
Coccidioides posadasii [CPSG04510]
Cochliobolus heterostrophus [Cohe26051]
Cochliobolus sativus [Cos35112]
Setosphaeria turcica [St137046]
Pyrenophora tritici-repentis [PTRG02137]
Pyrenophora teres [Pt8303]
Alternaria brassicicola [AB08500]
Leptosphaeria maculans [Lm1075]
Hysterium pulicare [Hp2128]
Rhystidhysteron rufulum [Rr5061]
Septoria populicola [Sep74773]
Septoria musiva [Smu149504]
Dothistroma septosporum [Dos73430]
Chaetomium globosum [CHG03934]
Thielavia terrestris [Tt2122533]
Sporotrichum thermophile [Spt2310137]
Neurospora crassa [NCU06340]
Podospora anserina [Pa122650]_
Cryphonectria parasitica [Crpa25944]
Fusarium oxysporum [FOXG08255]
Fusarium verticillioides [FVEG06417]
Fusarium graminearum [FGSG09803]
Trichoderma atoviride [Trat34800]
Trichoderma virens [Trvi29631]
Acremonium alcalophilum [Aa2054350]
Botrytis cinerea [BC1G12607]
Sclerotinia sclerotiorum [SS1G01926]
Candida albicans SC5314 [C196052]
Spathaspora passalidarum [Sp132884]
Debaryomyces hansenii [50420643]
Candida tenuis [Ct131332]
Saccharomyces cerevisae [6319631Sc]
Saccharomyces cerevisae [6319631]
Candida glabrata [50289377]
Ashbya gossypii [45200829]
Yarrowia lipolytica [50555658]
Schizosaccharomyces octosporus [SOCG00417]
Schizosaccharomyces cryophilus [SPOG02086]
Schizosaccharomyces pombe [19115150]
Schizosaccharomyces japonicus [SJAG01914]
Bjerkandera adusta [Ba131029]
Phlebiopsis gigantea [Pg97314]
Phanerochaete carnosa [Pc191699]
Phlebia brevispora [Pb143278]
Ceriporiopsis subvermispora [Cs130797]
Dichomitus squalens [Dis155364]
Ganoderma sp [Gs126307]
Trametes versicolor [Tv63130]
Coniophora puteana [Cp89918]
Postia placenta [Popl61192]
Wolfiporia cocos [Wc71084]
Fomitopsis pinicola [Fp151062]
Heterobasidion annosum [Hea313554]
Stereum hirsutum [Sh59511]
Serpula lacrymans [Sl85379]
Agaricus bisporus [Ab202852]
Gloeophyllum trabeum [Glt109791]
Pleurotus ostreatus PC15 [Plo1038094]
Pleurotus ostreatus PC9 [Po123006]
Laccaria bicolor [Labi144628]
Coprinus cinereus [CC1G01294]
Auricularia delicata [Ad80653]
Malassezia globosa [Mg2550]
Ustilago maydis [UM03098]
Cryptococcus neoformans [CNAG05619]
Dacryopinax sp [Ds100505]
Wallemia sebi [Ws58866]
Melampsora laricis-populina [Mela116853]
Puccinia graminis [PGTG00484]
Rhodotorula graminis [Rg53657]
Rhizopus oryzae [RO3G06299]
Allomyces macrogynus atcc 38327 [AMAG05027]
Allomyces macrogynus atcc 38327 [AMAG11874]
Blastocladiella emersonii [Bes07g0110]
Batrachochytrium dendrobatidis [BDEG00164]
Spizellomyces punctatus daom br117 [Sp03339T0]
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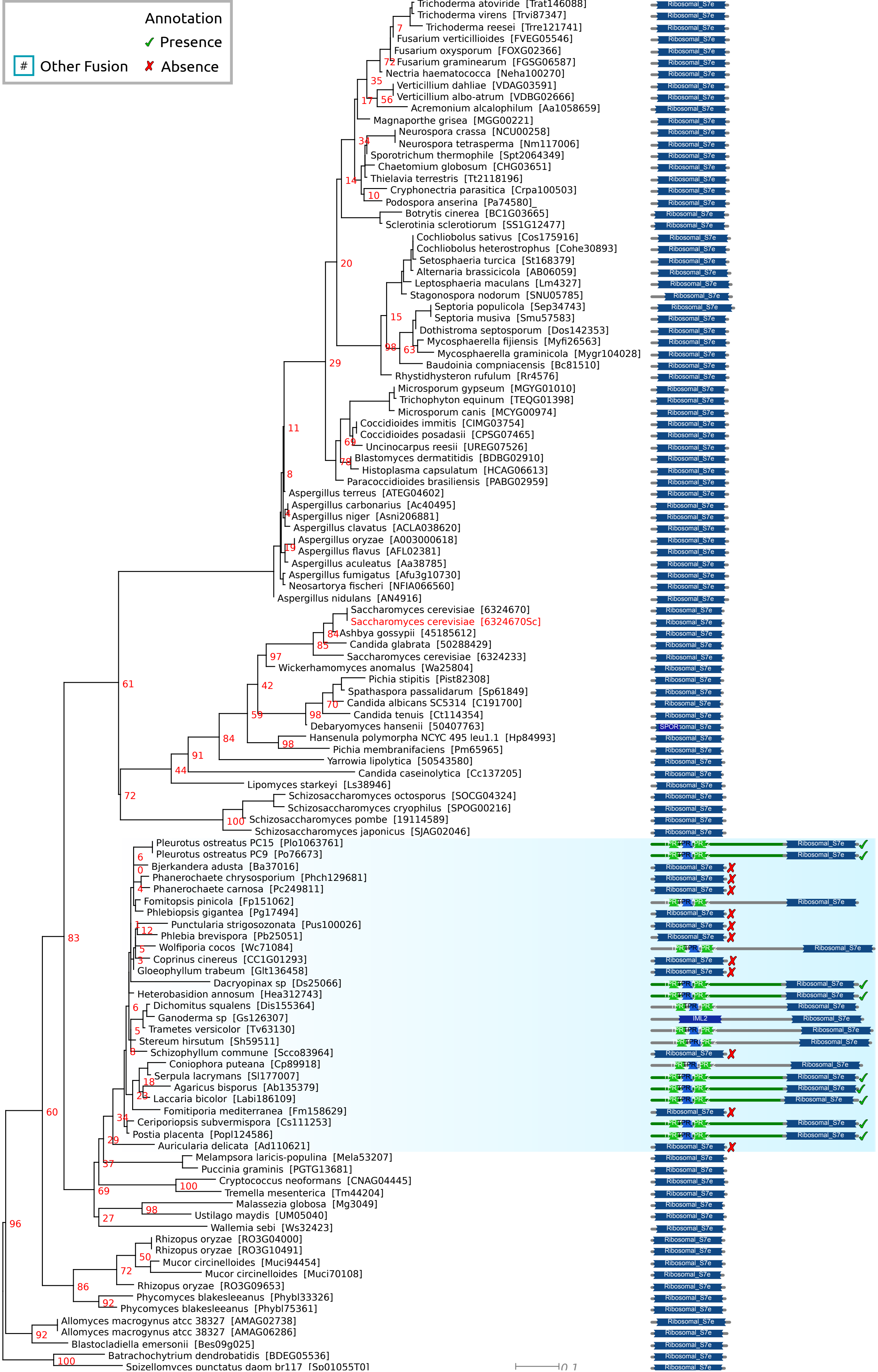
IML2
Ribosomal_S7e
BTAD
LRS4
DUF45
CMV_1a
APG6
Calcipressin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Other Fusion
✗ Absence
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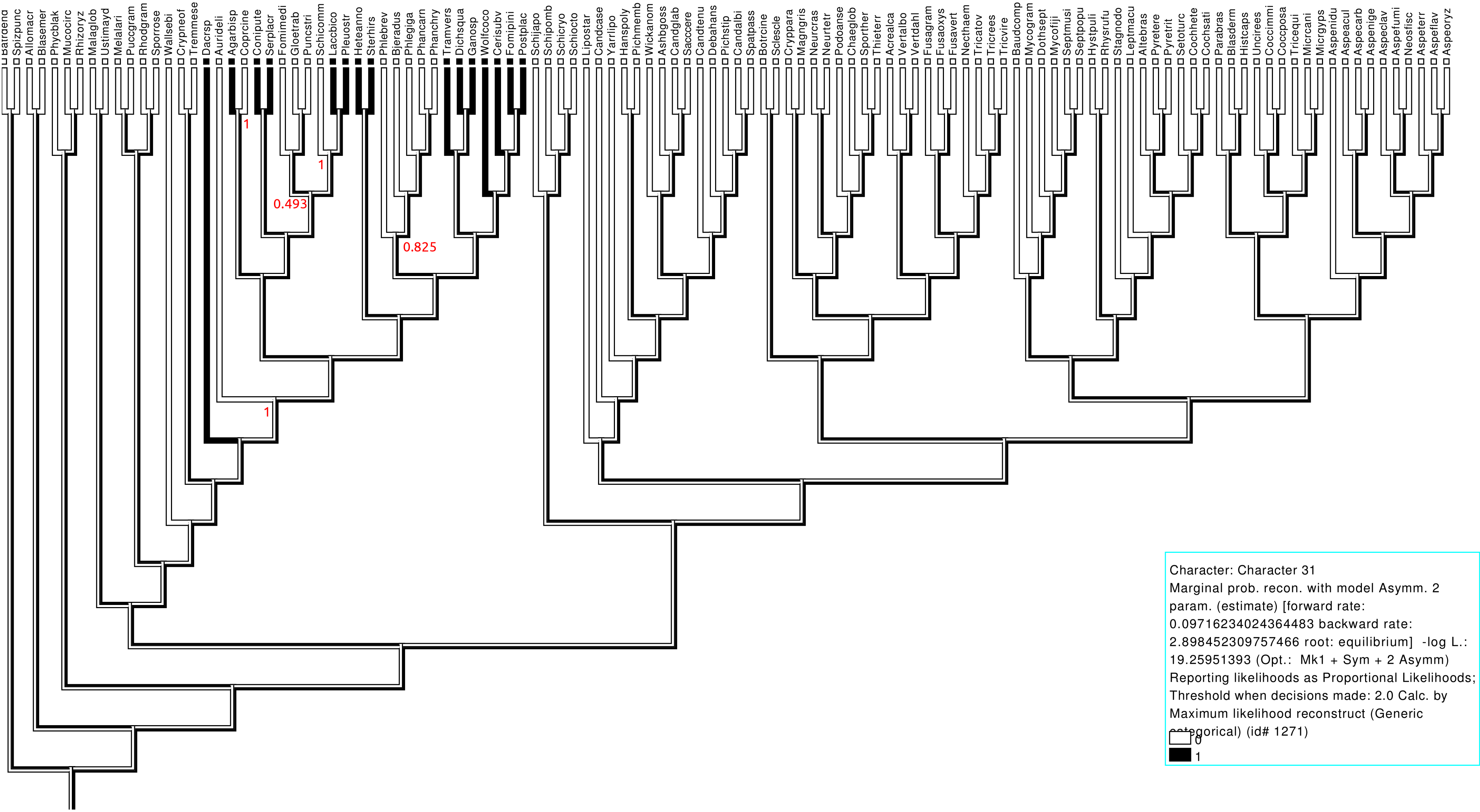
Fusarium verticillioides [FVEG05546]
Fusarium oxysporum [FOXG02366]
72
Fusarium graminearum [FGSG06587]
Nectria haematococca [Neha100270]
35
Verticillium dahliae [VDAG03591]
17
56
Verticillium albo-atrum [VDBG02666]
Acremonium alcalophilum [Aa1058659]
Magnaporthe grisea [MGG00221]
Neurospora crassa [NCU00258]
34
Neurospora tetrasperma [Nm117006]
Sporotrichum thermophile [Spt2064349]
Chaetomium globosum [CHG03651]
14
Thielavia terrestris [Tt2118196]
Cryphonectria parasitica [Crpa100503]
10
Podospora anserina [Pa74580]_
Botrytis cinerea [BC1G03665]
Sclerotinia sclerotiorum [SS1G12477]
Cochliobolus sativus [Cos175916]
Cochliobolus heterostrophus [Cohe30893]
20
Setosphaeria turcica [St168379]
Alternaria brassicicola [AB06059]
Leptosphaeria maculans [Lm4327]
Stagonospora nodorum [SNU05785]
Septoria populicola [Sep34743]
15
Septoria musiva [Smu57583]
Dothistroma septosporum [Dos142353]
98
Mycosphaerella fijiensis [Myfi26563]
63
Mycosphaerella graminicola [Mygr104028]
29
Baudoinia compniacensis [Bc81510]
Rhystidhysteron rufulum [Rr4576]
Microsporum gypseum [MGYG01010]
Trichophyton equinum [TEQG01398]
Microsporum canis [MCYG00974]
11
Coccidioides immitis [CIMG03754]
Coccidioides posadasii [CPSG07465]
69
Uncinocarpus reesii [UREG07526]
Blastomyces dermatitidis [BDBG02910]
78
Histoplasma capsulatum [HCAG06613]
8
Paracoccidioides brasiliensis [PABG02959]
Aspergillus terreus [ATEG04602]
Aspergillus carbonarius [Ac40495]
4
Aspergillus niger [Asni206881]
Aspergillus clavatus [ACLA038620]
Aspergillus oryzae [A003000618]
19
Aspergillus flavus [AFL02381]
Aspergillus aculeatus [Aa38785]
Aspergillus fumigatus [Afu3g10730]
Neosartorya fischeri [NFIA066560]
Aspergillus nidulans [AN4916]
Saccharomyces cerevisiae [6324670]
Saccharomyces cerevisiae [6324670Sc]
84
Ashbya gossypii [45185612]
85
Candida glabrata [50288429]
97
Saccharomyces cerevisiae [6324233]
Wickerhamomyces anomalus [Wa25804]
61
42
Pichia stipitis [Pist82308]
Spathaspora passalidarum [Sp61849]
70
Candida albicans SC5314 [C191700]
59
98
Candida tenuis [Ct114354]
Debaryomyces hansenii [50407763]
84
Hansenula polymorpha NCYC 495 leu1.1 [Hp84993]
98
Pichia membranifaciens [Pm65965]
91
Yarrowia lipolytica [50543580]
44
Candida caseinolytica [Cc137205]
Lipomyces starkeyi [Ls38946]
72
Schizosaccharomyces octosporus [SOCG04324]
Schizosaccharomyces cryophilus [SPOG00216]
100
Schizosaccharomyces pombe [19114589]
Schizosaccharomyces japonicus [SJAG02046]
Pleurotus ostreatus PC15 [Plo1063761]
6
Pleurotus ostreatus PC9 [Po76673]
0
Bjerkandera adusta [Ba37016]
Phanerochaete chrysosporium [Phch129681]
4
Phanerochaete carnosa [Pc249811]
Fomitopsis pinicola [Fp151062]
Phlebiopsis gigantea [Pg17494]
1
Punctularia strigosozonata [Pus100026]
12
Phlebia brevispora [Pb25051]
83
5
Wolfiporia cocos [Wc71084]
3
Coprinus cinereus [CC1G01293]
Gloeophyllum trabeum [Glt136458]
Dacryopinax sp [Ds25066]
Heterobasidion annosum [Hea312743]
6
Dichomitus squalens [Dis155364]
Ganoderma sp [Gs126307]
5
Trametes versicolor [Tv63130]
Stereum hirsutum [Sh59511]
8
Schizophyllum commune [Scco83964]
Coniophora puteana [Cp89918]
18
Serpula lacrymans [Sl177007]
Agaricus bisporus [Ab135379]
23
Laccaria bicolor [Labi186109]
60
Fomitiporia mediterranea [Fm158629]
34
Ceriporiopsis subvermispora [Cs111253]
29
Postia placenta [Popl124586]
Auricularia delicata [Ad110621]
Melampsora laricis-populina [Mela53207]
37
Puccinia graminis [PGTG13681]
100
Cryptococcus neoformans [CNAG04445]
69
Tremella mesenterica [Tm44204]
98
Malassezia globosa [Mg3049]
27
Ustilago maydis [UM05040]
96
Wallemia sebi [Ws32423]
Rhizopus oryzae [RO3G04000]
Rhizopus oryzae [RO3G10491]
50
Mucor circinelloides [Muci94454]
72
Mucor circinelloides [Muci70108]
86
Rhizopus oryzae [RO3G09653]
92
Phycomyces blakesleeanus [Phybl33326]
Phycomyces blakesleeanus [Phybl75361]
Allomyces macrogynus atcc 38327 [AMAG02738]
92
Allomyces macrogynus atcc 38327 [AMAG06286]
Blastocladiella emersonii [Bes09g025]
100
Batrachochytrium dendrobatidis [BDEG05536]
Spizellomyces punctatus daom br117 [Sp01055T0]
Ribosomal_S7e
TPR
SPOR
IML2
0.1



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Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.09716234024364483 backward rate:
2.898452309757466 root: equilibrium] -log L.:
19.25951393 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)

☐ 0

■ 1

Putative Fusion 32

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|2624654Sc unnamed protein product
MASETFEFQAEITQLMSLIINTVYSNKEIFLRELISNASDALDKIRYKSLSDPKQLETEPDLFIRITPKPEQKVLEIRDS
GIGMTKAELINNLGTIAKSGTKAFMEALSAGADVSMIGQFGVGFYSLFLVADRVQVISKSNDDEQYIWESNAGGSFTVTL
DEVNERIGRGTILRLFLKDDQLEYLEEKRIKEVIKRHSEFVAYPIQLVVTKEVEKEVPIP
>lcl|42543758Sc unnamed protein product
GKTKPLWTRNPSDITQEEYNAFYKSISNDWEDPLYVKHFSVEGQLEFRAILFIPKRAPFDLFESKKKKNNIKLYVRRVFI
TDEAEDLIPEWLSFVKGVVDSEDLPLNLSREMLQQNKIMKVIRKNIVKKLIEAFNEIAEDSEQFEKFYSAFSKNIKLGVH
EDTQNRAALAKLLRYNSTKSVDELTSLTDYVTRMPEHQKNIYYITGESLKAVEKSPFLDALKAKNFEVLFLTDPIDEYAF
TQLKEFEGKTLVDITKDFEL
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

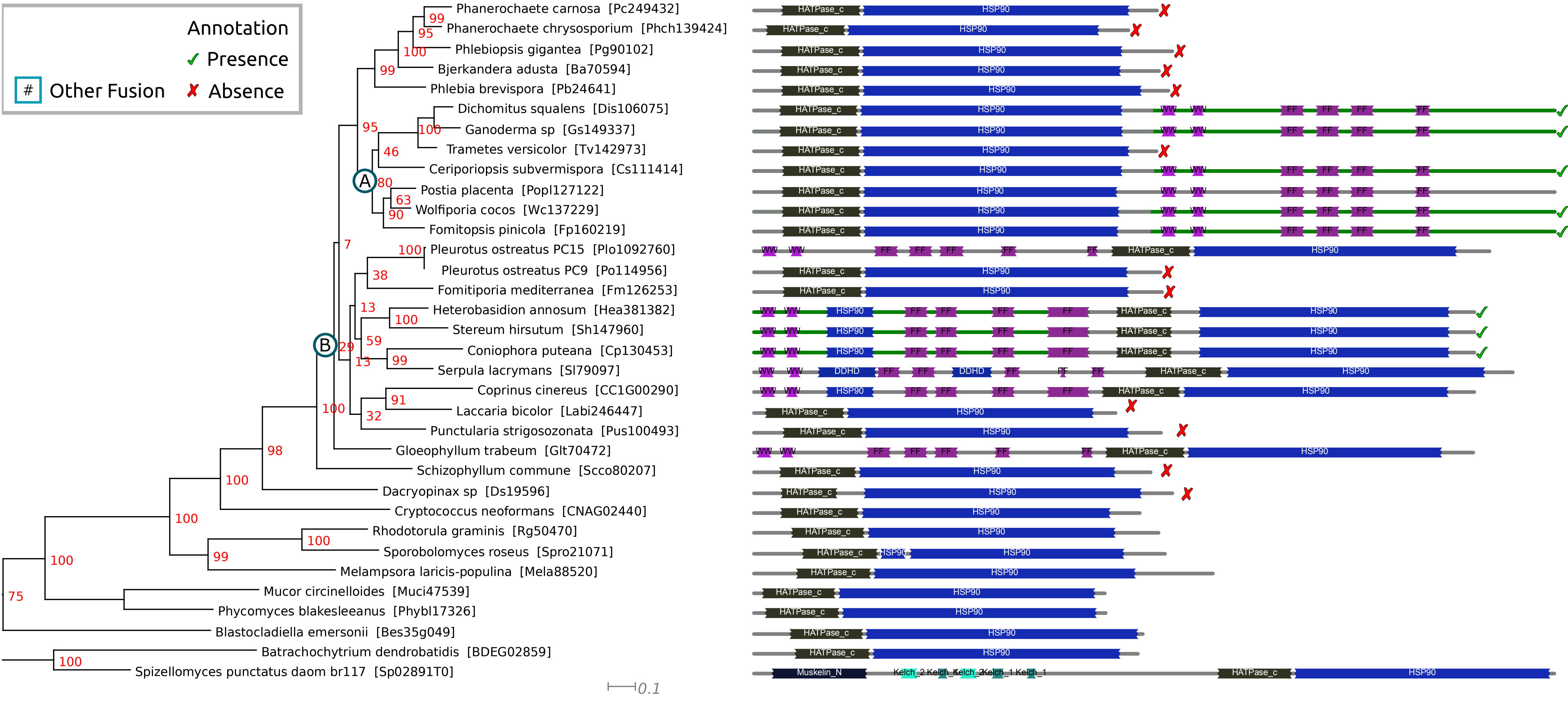
Styling and annotation was made possible by Dendroscope and Inkscape.

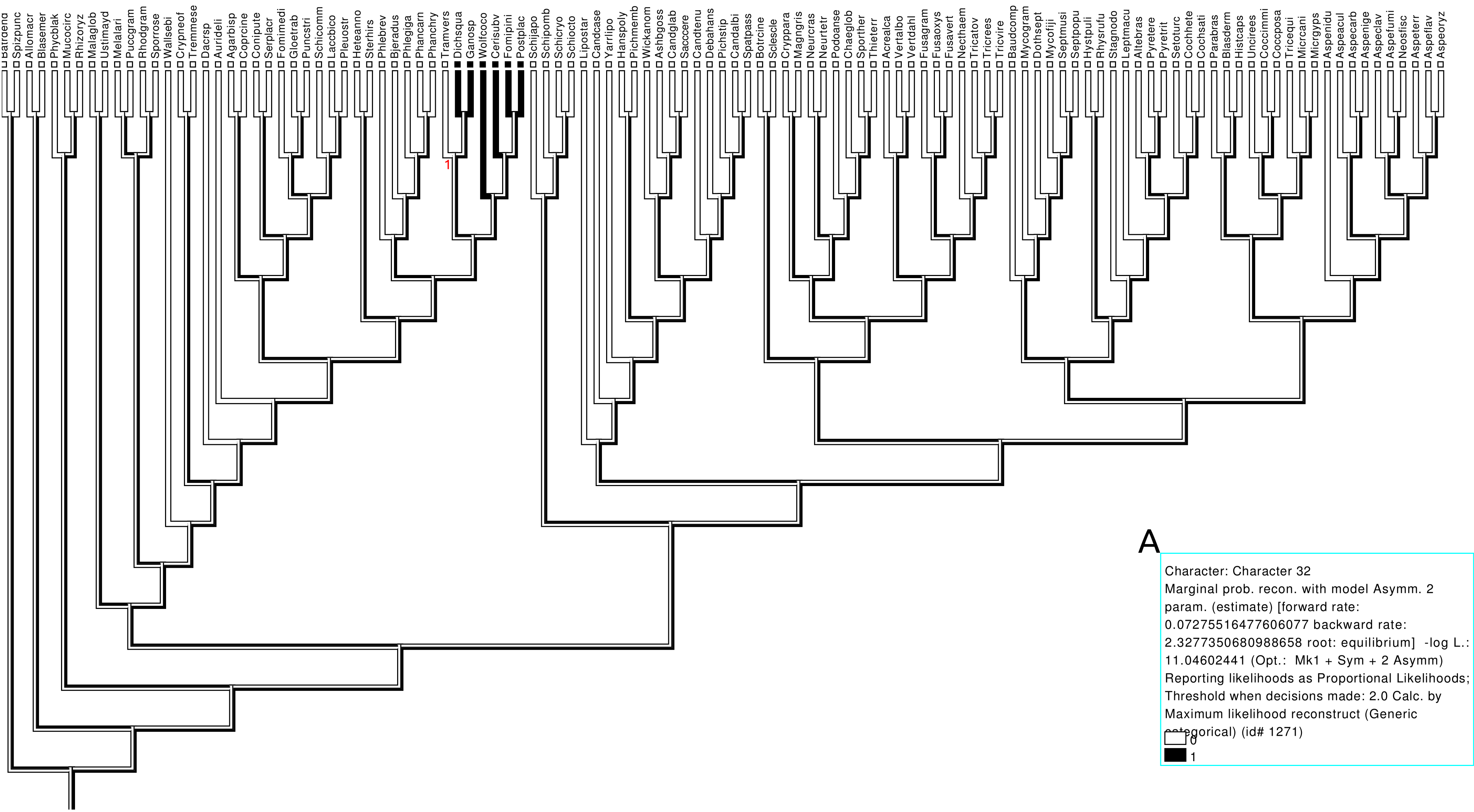
2.1 Important Notes

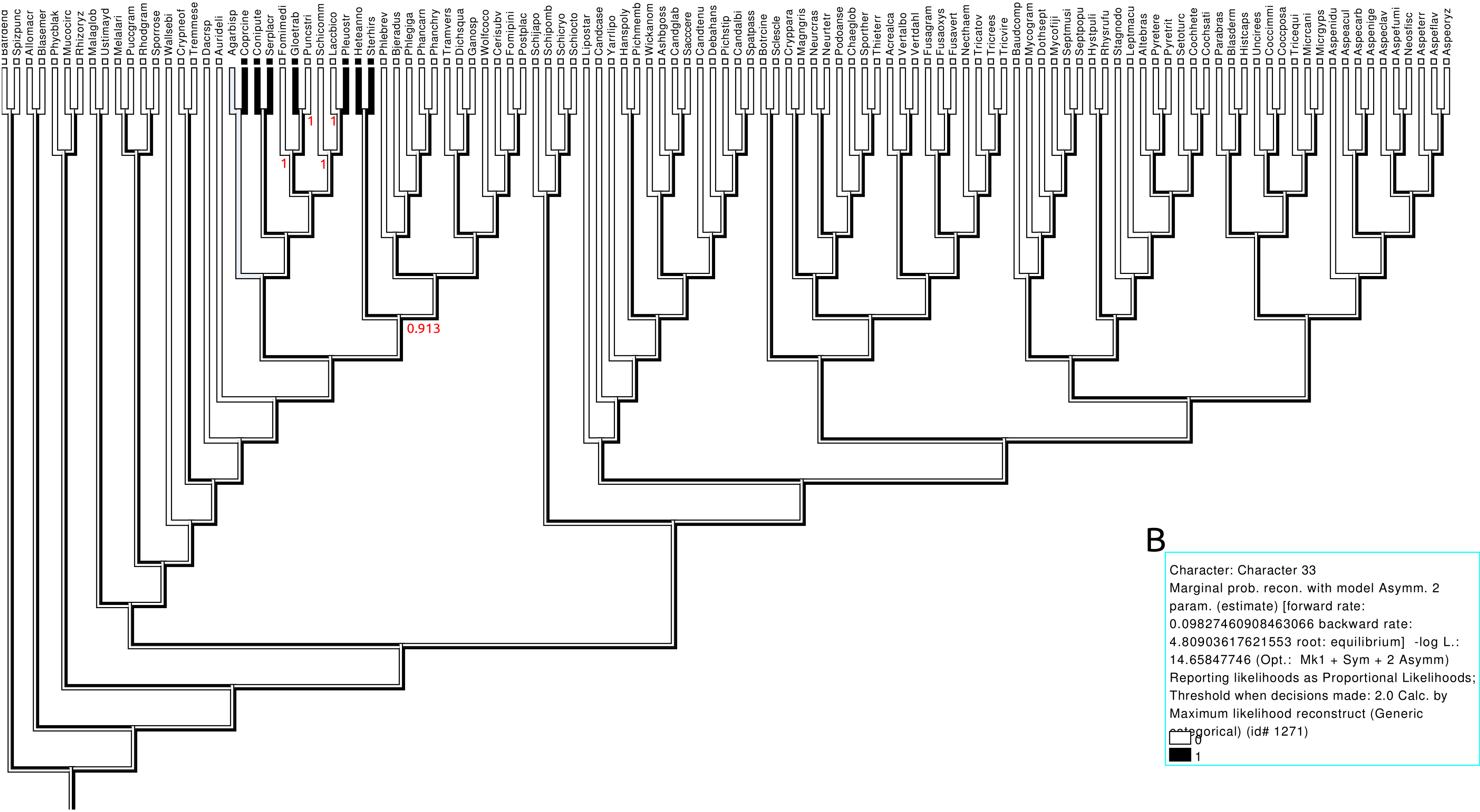
The original prediction made by fdFBLAST, on closer inspection (from the first round of phylogenies), indicated that there was not a gene fusion present between the above two domains but there was potentially a gene fusion with a third other domain. There is only one phylogeny here as the third domain consists of a series of repeats and so an alignment would not be possible as the resulting phylogeny would then be unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Phanerochaete carnosa [Pc249432]
Phanerochaete chrysosporium [Phch139424]
Phlebiopsis gigantea [Pg90102]
Bjerkandera adusta [Ba70594]
Phlebia brevispora [Pb24641]
Dichomitus squalens [Dis106075]
Ganoderma sp [Gs149337]
Trametes versicolor [Tv142973]
Ceriporiopsis subvermispora [Cs111414]
Postia placenta [Popl127122]
Wolfiporia cocos [Wc137229]
Fomitopsis pinicola [Fp160219]
Pleurotus ostreatus PC15 [Plo1092760]
Pleurotus ostreatus PC9 [Po114956]
Fomitiporia mediterranea [Fm126253]
Heterobasidion annosum [Hea381382]
Stereum hirsutum [Sh147960]
Coniophora puteana [Cp130453]
Serpula lacrymans [Sl79097]
Coprinus cinereus [CC1G00290]
Laccaria bicolor [Labi246447]
Punctularia strigosozonata [Pus100493]
Gloeophyllum trabeum [Glt70472]
Schizophyllum commune [Scco80207]
Dacryopinax sp [Ds19596]
Cryptococcus neoformans [CNAG02440]
Rhodotorula graminis [Rg50470]
Sporobolomyces roseus [Spro21071]
Melampsora laricis-populina [Mela88520]
Mucor circinelloides [Muci47539]
Phycomyces blakesleeanus [Phybl17326]
Blastocladiella emersonii [Bes35g049]
Batrachochytrium dendrobatidis [BDEG02859]
Spizellomyces punctatus daom br117 [Sp02891T0]
99
95
100
99
100
46
95
80
63
90
A
7
100
38
13
100
59
99
13
29
B
91
32
100
98
100
100
99
100
100
75
100
0.1
HATPase_c
HSP90
WW
FF
DDHD
Muskelin_N
Kelch_2
Kelch_1

A
Character: Character 32
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.07275516477606077 backward rate: 2.3277350680988658 root: equilibrium] -log L.: 11.04602441 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1
1
Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
1
1
1
0.913
B
Character: Character 33
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.09827460908463066 backward rate: 4.80903617621553 root: equilibrium] -log L.: 14.65847746 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 33

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>lcl|Mc157300 unnamed protein product
MKLSLSIFLCVAACSHPLAVVSVAAQSSPFYYQDYETSFHSEHAKQGSMVQQGRTGVAAMHAVLLNERSILIIDKAEENE
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CKGTEFFIEKDVNDLQI
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

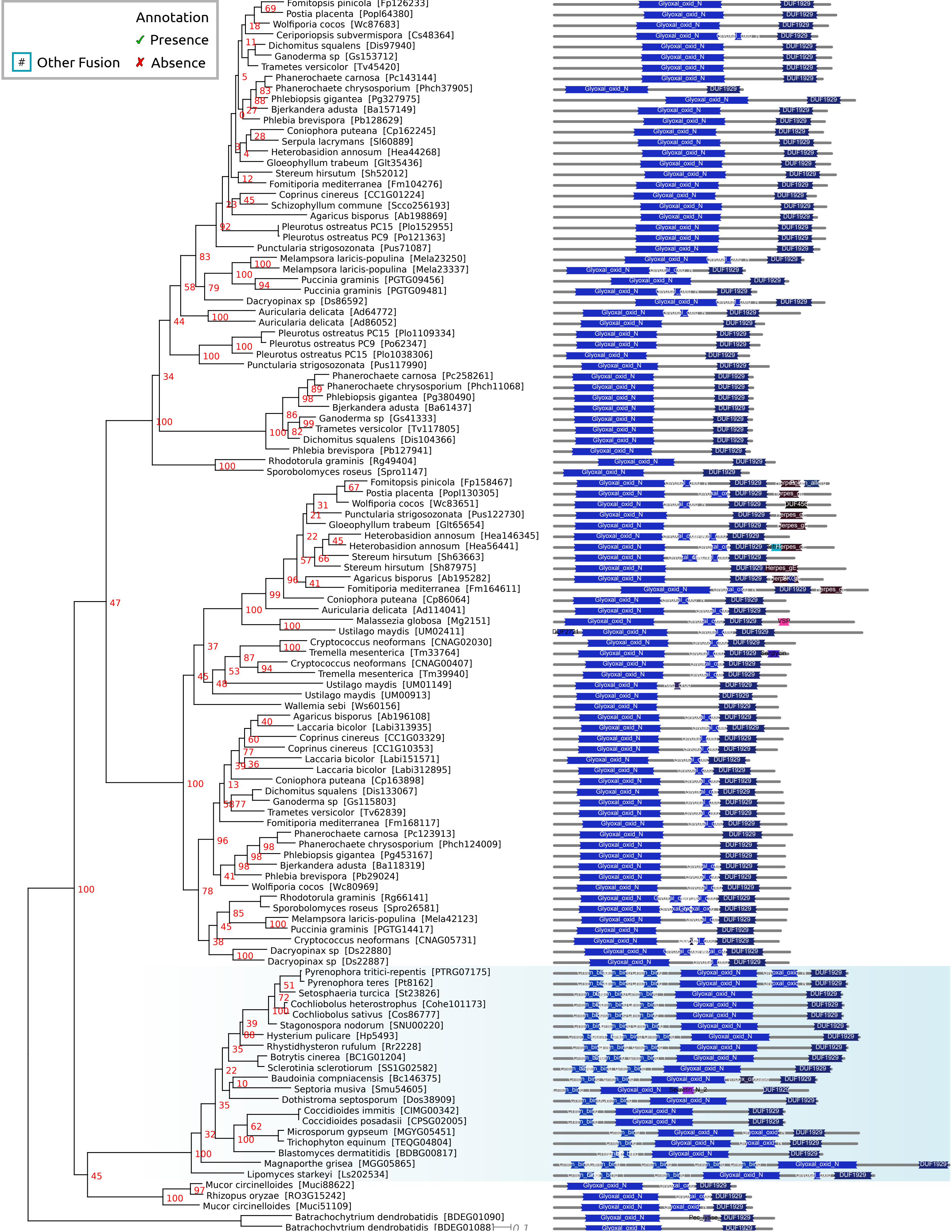
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

The original prediction made by fdFBLAST, on closer inspection (from the first round of phylogenies), indicated that there was not a gene fusion present between the above two domains but there was potentially a gene fusion with a third other domain. There is only one phylogeny included here as the first domain *Chitin_bind* consists of a series of small noisy repeats and so an alignment would not be possible as the resulting phylogeny would appear to be unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Other Fusion
✗ Absence
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Ganoderma sp [Gs153712]
Trametes versicolor [Tv45420]
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Bjerkandera adusta [Ba157149]
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Coniophora puteana [Cp162245]
Serpula lacrymans [Sl60889]
Heterobasidion annosum [Hea44268]
Gloeophyllum trabeum [Glt35436]
Stereum hirsutum [Sh52012]
Fomitiporia mediterranea [Fm104276]
Coprinus cinereus [CC1G01224]
Schizophyllum commune [Scco256193]
Agaricus bisporus [Ab198869]
Pleurotus ostreatus PC15 [Plo152955]
Pleurotus ostreatus PC9 [Po121363]
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Melampsora laricis-populina [Mela23250]
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Puccinia graminis [PGTG09456]
Puccinia graminis [PGTG09481]
Dacryopinax sp [Ds86592]
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Pleurotus ostreatus PC15 [Plo1109334]
Pleurotus ostreatus PC9 [Po62347]
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Dichomitus squalens [Dis104366]
Phlebia brevispora [Pb127941]
Rhodotorula graminis [Rg49404]
Sporobolomyces roseus [Spro1147]
Fomitopsis pinicola [Fp158467]
Postia placenta [Popl130305]
Wolfiporia cocos [Wc83651]
Punctularia strigosozonata [Pus122730]
Gloeophyllum trabeum [Glt65654]
Heterobasidion annosum [Hea146345]
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Stereum hirsutum [Sh63663]
Stereum hirsutum [Sh87975]
Agaricus bisporus [Ab195282]
Fomitiporia mediterranea [Fm164611]
Coniophora puteana [Cp86064]
Auricularia delicata [Ad114041]
Malassezia globosa [Mg2151]
Ustilago maydis [UM02411]
Cryptococcus neoformans [CNAG02030]
Tremella mesenterica [Tm33764]
Cryptococcus neoformans [CNAG00407]
Tremella mesenterica [Tm39940]
Ustilago maydis [UM01149]
Ustilago maydis [UM00913]
Wallemia sebi [Ws60156]
Agaricus bisporus [Ab196108]
Laccaria bicolor [Labi313935]
Coprinus cinereus [CC1G03329]
Coprinus cinereus [CC1G10353]
Laccaria bicolor [Labi151571]
Laccaria bicolor [Labi312895]
Coniophora puteana [Cp163898]
Dichomitus squalens [Dis133067]
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Bjerkandera adusta [Ba118319]
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Wolfiporia cocos [Wc80969]
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Dacryopinax sp [Ds22887]
Pyrenophora tritici-repentis [PTRG07175]
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Cochliobolus sativus [Cos86777]
Stagonospora nodorum [SNU00220]
Hysterium pulicare [Hp5493]
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Botrytis cinerea [BC1G01204]
Sclerotinia sclerotiorum [SS1G02582]
Baudoinia compniacensis [Bc146375]
Septoria musiva [Smu54605]
Dothistroma septosporum [Dos38909]
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Coccidioides posadasii [CPSG02005]
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Trichophyton equinum [TEQG04804]
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Lipomyces starkeyi [Ls202534]
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Rhizopus oryzae [RO3G15242]
Mucor circinelloides [Muci51109]
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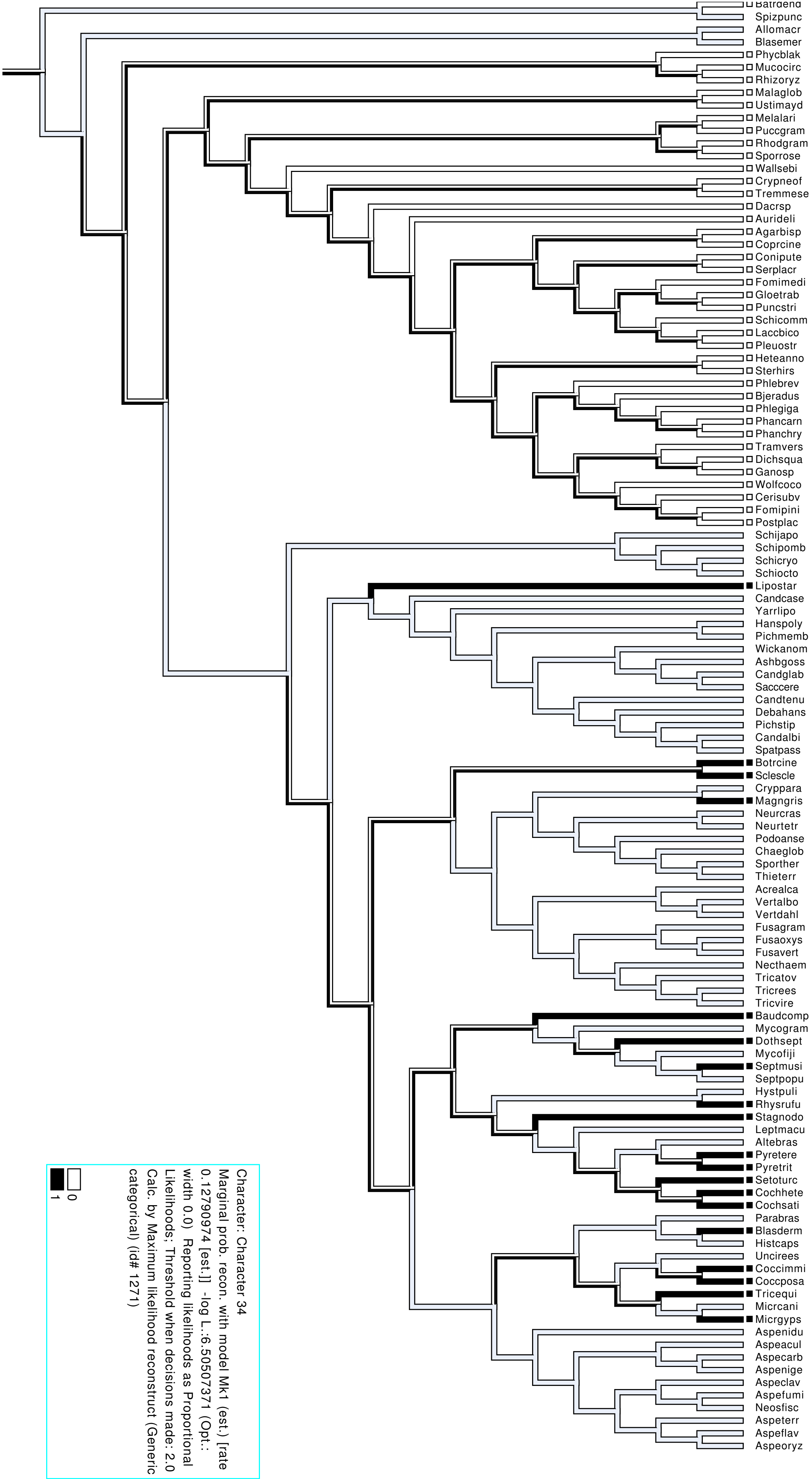
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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
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Aspeterr
Aspeflav
Aspeoryz
Character: Character 34
Marginal prob. recon. with model Mk1 (est.) [rate
0.12790974 [est.]] -log L.:6.50507371 (Opt.:
width 0.0) Reporting likelihoods as Proportional
Likelihoods; Threshold when decisions made: 2.0
Calc. by Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 34

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>NP_013239_F34_dom1
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QVDIEDRNEARDDEVSVDSTAHSSLTTTMTNLSSSSGGRLKRILTPTSLGKIHSLVDKGK
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LKSKANSGVPPPVDEEKAIEGPSRKGPGMLKKRTLTPAPPRGVQDSLDLEDEPSSEEDLG
DSYNMDDSEDYDDNAYESETEFERQRRLNALGEMTAPADQDDEELPPLPVEAQTGNDGPG
TAEGKKKQKSAAVKSALSKTLGLNK
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

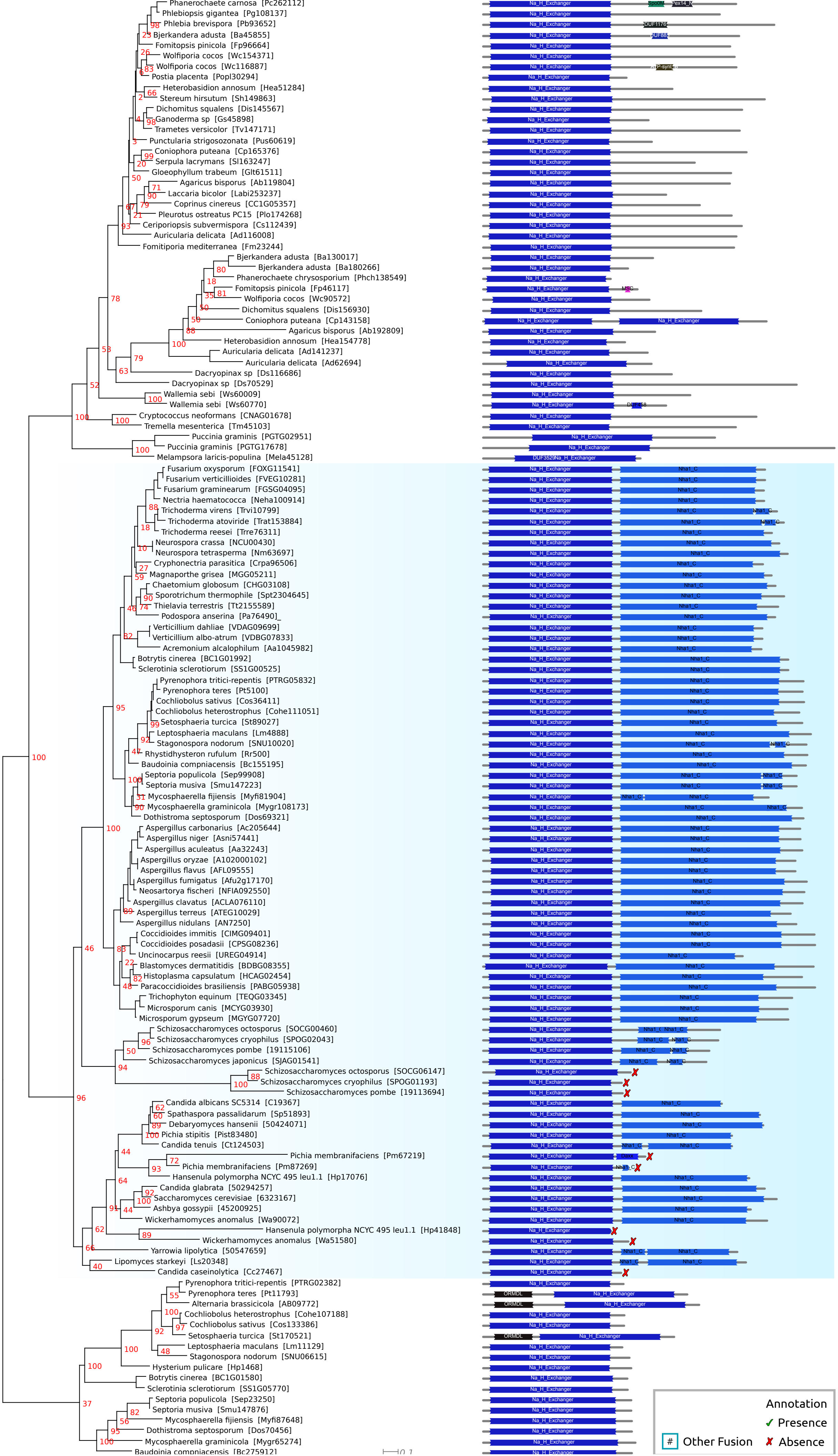
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

Sequences similar to Nha1_C domain are only present in ascomycete genomes so we did not conduct a phylogeny as this data would be uninformative for polarising ancestry of this gene fusion.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Phlebiopsis gigantea [Pg108137]
Phlebia brevispora [Pb93652]
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Fomitopsis pinicola [Fp96664]
Wolfiporia cocos [Wc154371]
Wolfiporia cocos [Wc116887]
Postia placenta [Popl30294]
Heterobasidion annosum [Hea51284]
Stereum hirsutum [Sh149863]
Dichomitus squalens [Dis145567]
Ganoderma sp [Gs45898]
Trametes versicolor [Tv147171]
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Serpula lacrymans [Sl163247]
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Agaricus bisporus [Ab119804]
Laccaria bicolor [Labi253237]
Coprinus cinereus [CC1G05357]
Pleurotus ostreatus PC15 [Plo174268]
Ceriporiopsis subvermispora [Cs112439]
Auricularia delicata [Ad116008]
Fomitiporia mediterranea [Fm23244]
Bjerkandera adusta [Ba130017]
Bjerkandera adusta [Ba180266]
Phanerochaete chrysosporium [Phch138549]
Fomitopsis pinicola [Fp46117]
Wolfiporia cocos [Wc90572]
Dichomitus squalens [Dis156930]
Coniophora puteana [Cp143158]
Agaricus bisporus [Ab192809]
Heterobasidion annosum [Hea154778]
Auricularia delicata [Ad141237]
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Dacryopinax sp [Ds116686]
Dacryopinax sp [Ds70529]
Wallemia sebi [Ws60009]
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Cryptococcus neoformans [CNAG01678]
Tremella mesenterica [Tm45103]
Puccinia graminis [PGTG02951]
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Acremonium alcalophilum [Aa1045982]
Botrytis cinerea [BC1G01992]
Sclerotinia sclerotiorum [SS1G00525]
Pyrenophora tritici-repentis [PTRG05832]
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Cochliobolus sativus [Cos36411]
Cochliobolus heterostrophus [Cohe111051]
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Leptosphaeria maculans [Lm4888]
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Septoria musiva [Smu147223]
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Debaryomyces hansenii [50424071]
Pichia stipitis [Pist83480]
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Pichia membranifaciens [Pm67219]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp17076]
Candida glabrata [50294257]
Saccharomyces cerevisiae [6323167]
Ashbya gossypii [45200925]
Wickerhamomyces anomalus [Wa90072]
Hansenula polymorpha NCYC 495 leu1.1 [Hp41848]
Wickerhamomyces anomalus [Wa51580]
Yarrowia lipolytica [50547659]
Lipomyces starkeyi [Ls20348]
Candida caseinolytica [Cc27467]
Pyrenophora tritici-repentis [PTRG02382]
Pyrenophora teres [Pt11793]
Alternaria brassicicola [AB09772]
Cochliobolus heterostrophus [Cohe107188]
Cochliobolus sativus [Cos133386]
Setosphaeria turcica [St170521]
Leptosphaeria maculans [Lm11129]
Stagonospora nodorum [SNU06615]
Hysterium pulicare [Hp1468]
Botrytis cinerea [BC1G01580]
Sclerotinia sclerotiorum [SS1G05770]
Septoria populicola [Sep23250]
Septoria musiva [Smu147876]
Mycosphaerella fijiensis [Myfi87648]
Dothistroma septosporum [Dos70456]
Mycosphaerella graminicola [Mygr65274]
Baudoinia compniacensis [Bc275912]
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ORMDL
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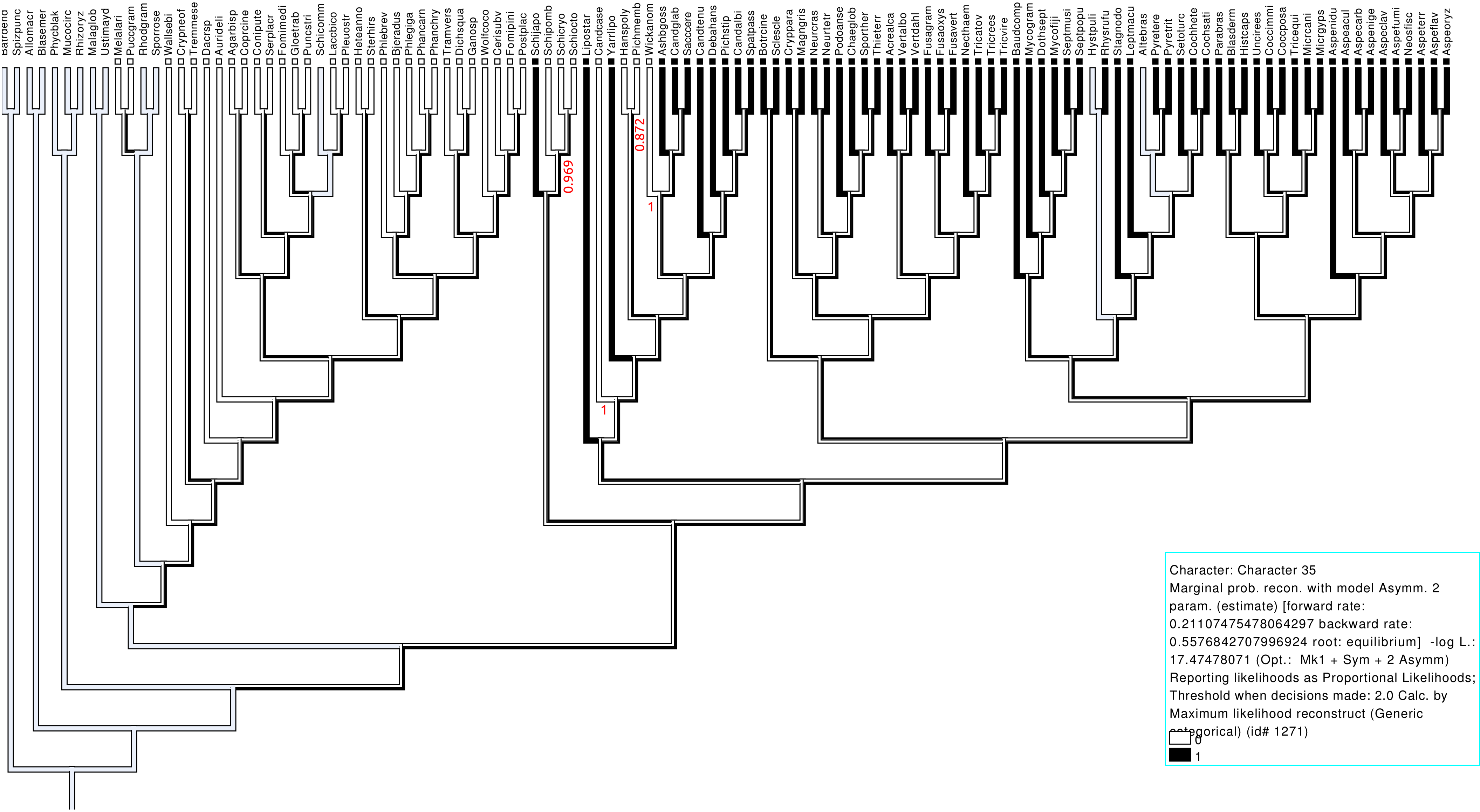
Annotation
✓ Presence
Other Fusion
✗ Absence



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Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
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☐ 0
■ 1

Putative Fusion 35

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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YWNEARILDKTTFETLTILPTIPGTVNNPMGGRTYPLEGTGVLLPQKAPYTAPLGILICGGSTEGVATAI
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LDGGIPAVGVYYVRIGGDPAELGNWPDKSSFSPPGL
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet
    -a gamma
```

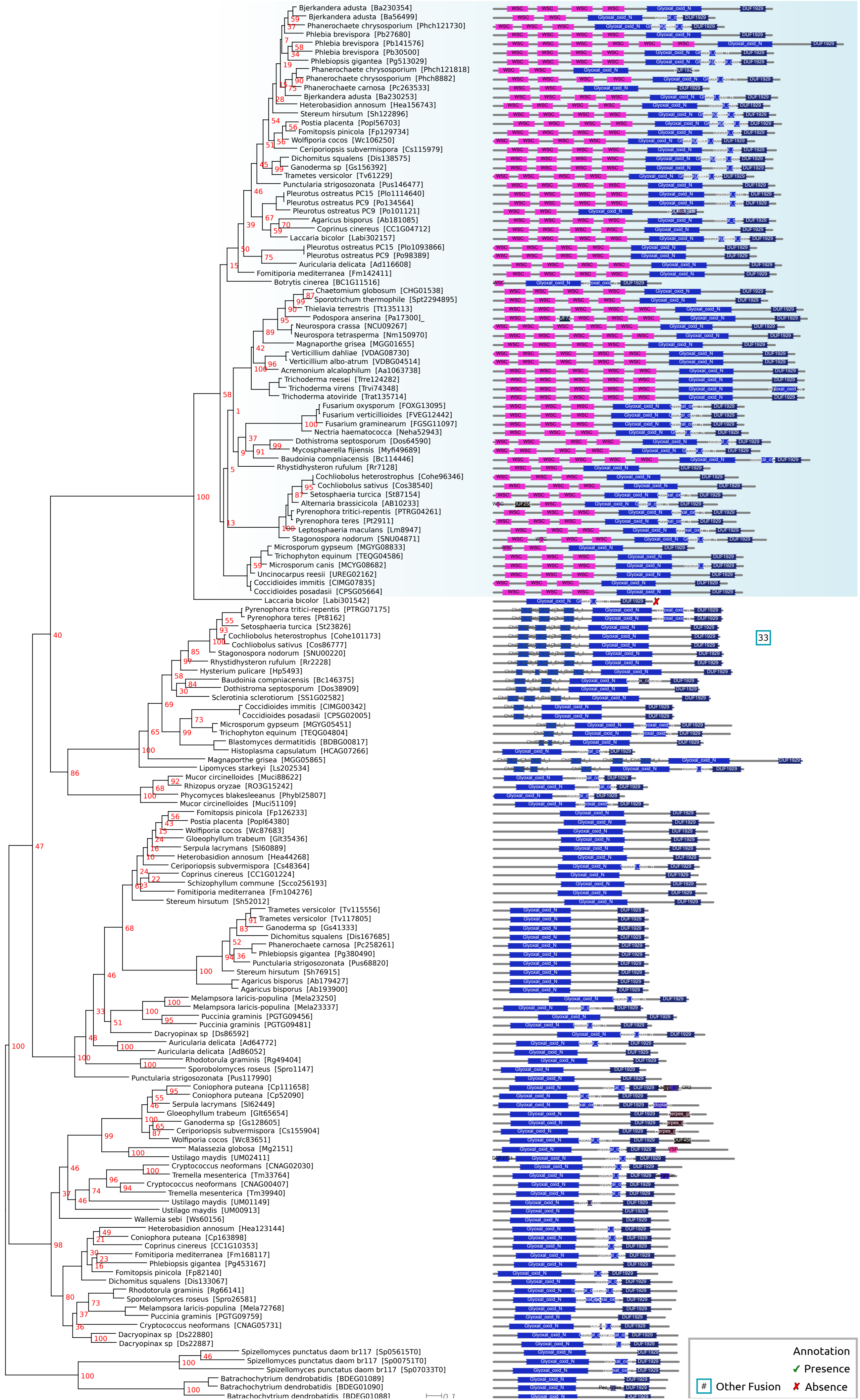
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

There is only one phylogeny here as one domain consists of a series of repeats and so an alignment would not be possible as the resulting phylogeny would then be unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Phlebia brevispora [Pb27680]
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Phlebiopsis gigantea [Pg513029]
Phanerochaete chrysosporium [Phch121818]
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Phanerochaete carnosa [Pc263533]
Bjerkandera adusta [Ba230253]
Heterobasidion annosum [Hea156743]
Stereum hirsutum [Sh122896]
Postia placenta [Popl56703]
Fomitopsis pinicola [Fp129734]
Wolfiporia cocos [Wc106250]
Ceriporiopsis subvermispora [Cs115979]
Dichomitus squalens [Dis138575]
Ganoderma sp [Gs156392]
Trametes versicolor [Tv61229]
Punctularia strigosozonata [Pus146477]
Pleurotus ostreatus PC15 [Plo1114640]
Pleurotus ostreatus PC9 [Po134564]
Pleurotus ostreatus PC9 [Po101121]
Agaricus bisporus [Ab181085]
Coprinus cinereus [CC1G04712]
Laccaria bicolor [Labi302157]
Pleurotus ostreatus PC15 [Plo1093866]
Pleurotus ostreatus PC9 [Po98389]
Auricularia delicata [Ad116608]
Fomitiporia mediterranea [Fm142411]
Botrytis cinerea [BC1G11516]
Chaetomium globosum [CHG01538]
Sporotrichum thermophile [Spt2294895]
Thielavia terrestris [Tt135113]
Podospora anserina [Pa17300]
Neurospora crassa [NCU09267]
Neurospora tetrasperma [Nm150970]
Magnaporthe grisea [MGG01655]
Verticillium dahliae [VDAG08730]
Verticillium albo-atrum [VDBG04514]
Acremonium alcalophilum [Aa1063738]
Trichoderma reesei [Trre124282]
Trichoderma virens [Trvi74348]
Trichoderma atoviride [Trat135714]
Fusarium oxysporum [FOXG13095]
Fusarium verticillioides [FVEG12442]
Fusarium graminearum [FGSG11097]
Nectria haematococca [Neha52943]
Dothistroma septosporum [Dos64590]
Mycosphaerella fijiensis [Myfi49689]
Baudoinia compniacensis [Bc114446]
Rhystidhysteron rufulum [Rr7128]
Cochliobolus heterostrophus [Cohe96346]
Cochliobolus sativus [Cos38540]
Setosphaeria turcica [St87154]
Alternaria brassicicola [AB10233]
Pyrenophora tritici-repentis [PTRG04261]
Pyrenophora teres [Pt2911]
Leptosphaeria maculans [Lm8947]
Stagonospora nodorum [SNU04871]
Microsporum gypseum [MGYG08833]
Trichophyton equinum [TEQG04586]
Microsporum canis [MCYG08682]
Uncinocarpus reesii [UREG02162]
Coccidioides immitis [CIMG07835]
Coccidioides posadasii [CPSG05664]
Laccaria bicolor [Labi301542]
Pyrenophora tritici-repentis [PTRG07175]
Pyrenophora teres [Pt8162]
Setosphaeria turcica [St23826]
Cochliobolus heterostrophus [Cohe101173]
Cochliobolus sativus [Cos86777]
Stagonospora nodorum [SNU00220]
Rhystidhysteron rufulum [Rr2228]
Hysterium pulicare [Hp5493]
Baudoinia compniacensis [Bc146375]
Dothistroma septosporum [Dos38909]
Sclerotinia sclerotiorum [SS1G02582]
Coccidioides immitis [CIMG00342]
Coccidioides posadasii [CPSG02005]
Microsporum gypseum [MGYG05451]
Trichophyton equinum [TEQG04804]
Blastomyces dermatitidis [BDBG00817]
Histoplasma capsulatum [HCAG07266]
Magnaporthe grisea [MGG05865]
Lipomyces starkeyi [Ls202534]
Mucor circinelloides [Muci88622]
Rhizopus oryzae [RO3G15242]
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Fomitopsis pinicola [Fp126233]
Postia placenta [Popl64380]
Wolfiporia cocos [Wc87683]
Gloeophyllum trabeum [Glt35436]
Serpula lacrymans [Sl60889]
Heterobasidion annosum [Hea44268]
Ceriporiopsis subvermispora [Cs48364]
Coprinus cinereus [CC1G01224]
Schizophyllum commune [Scco256193]
Fomitiporia mediterranea [Fm104276]
Stereum hirsutum [Sh52012]
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Ganoderma sp [Gs41333]
Dichomitus squalens [Dis167685]
Phanerochaete carnosa [Pc258261]
Phlebiopsis gigantea [Pg380490]
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Stereum hirsutum [Sh76915]
Agaricus bisporus [Ab179427]
Agaricus bisporus [Ab193900]
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Puccinia graminis [PGTG09456]
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Dacryopinax sp [Ds86592]
Auricularia delicata [Ad64772]
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Rhodotorula graminis [Rg49404]
Sporobolomyces roseus [Spro1147]
Punctularia strigosozonata [Pus117990]
Coniophora puteana [Cp111658]
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Serpula lacrymans [Sl62449]
Gloeophyllum trabeum [Glt65654]
Ganoderma sp [Gs128605]
Ceriporiopsis subvermispora [Cs155904]
Wolfiporia cocos [Wc83651]
Malassezia globosa [Mg2151]
Ustilago maydis [UM02411]
Cryptococcus neoformans [CNAG02030]
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Tremella mesenterica [Tm39940]
Ustilago maydis [UM01149]
Ustilago maydis [UM00913]
Wallemia sebi [Ws60156]
Heterobasidion annosum [Hea123144]
Coniophora puteana [Cp163898]
Coprinus cinereus [CC1G10353]
Fomitiporia mediterranea [Fm168117]
Phlebiopsis gigantea [Pg453167]
Fomitopsis pinicola [Fp82140]
Dichomitus squalens [Dis133067]
Rhodotorula graminis [Rg66141]
Sporobolomyces roseus [Spro26581]
Melampsora laricis-populina [Mela72768]
Puccinia graminis [PGTG09759]
Cryptococcus neoformans [CNAG05731]
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Dacryopinax sp [Ds22887]
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Spizellomyces punctatus daom br117 [Sp00751T0]
Spizellomyces punctatus daom br117 [Sp07033T0]
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Batrachochytrium dendrobatidis [BDEG01090]
Batrachochytrium dendrobatidis [BDEG01088]
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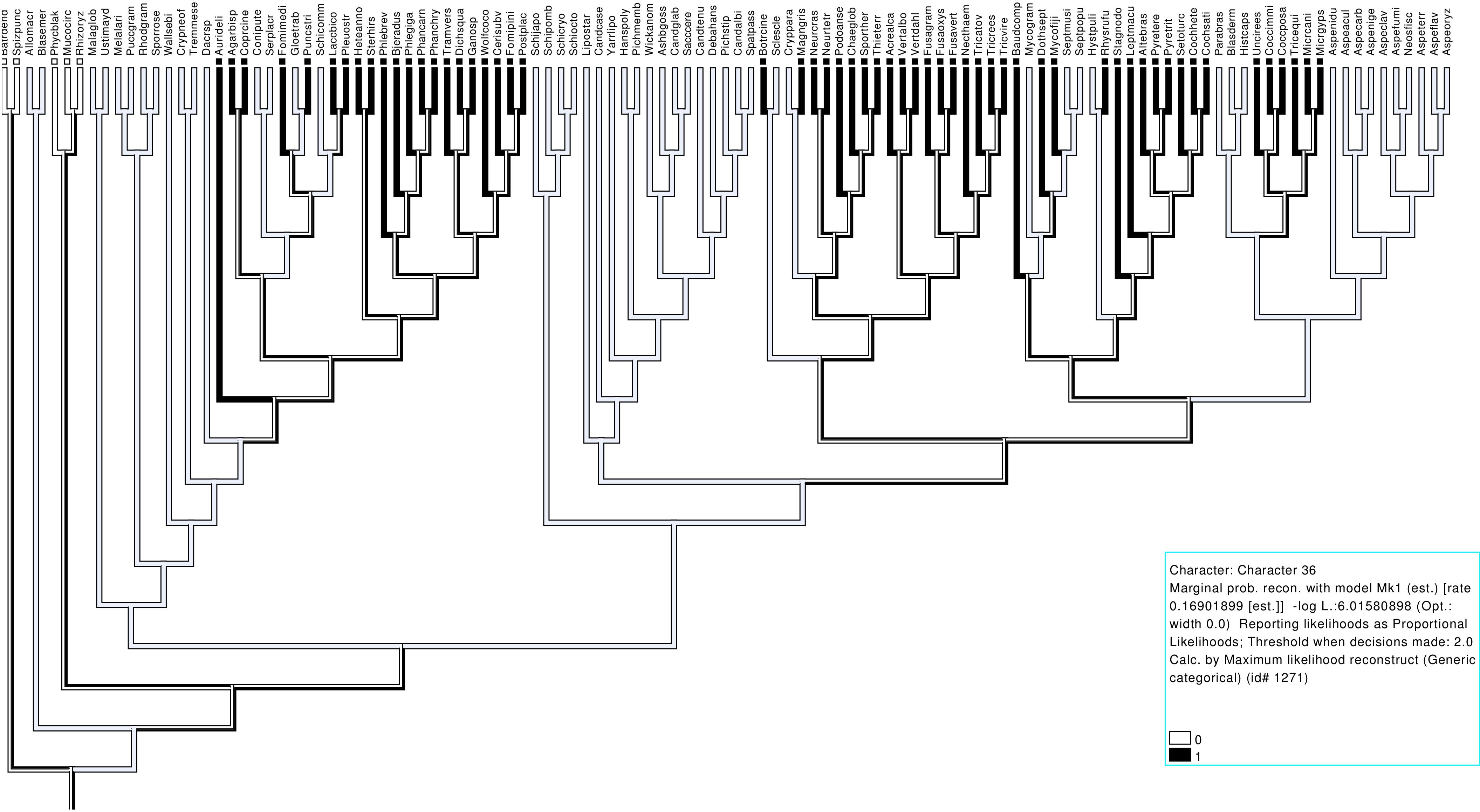
✓ Presence
Other Fusion
✗ Absence



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Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

Putative Fusion 36

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>gi|242209591|ref|XP_002470642.1| predicted protein [Postia placenta Mad-698-R]
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KEQIEKLREVVETPLLSPERFVNLGIDPPKGVLLFGPPGTGKTLCARAVANRTDATFIRVIGSELVQKYV
GEGARMVRELFEMARSKKACIIFFDEVDAIGGARFDDGAGGDNEVQRTMLELINQLDGFDPRGNIKVLMA
TNRPDTLDPALLRPGRLDRRVEFSLPDVEGRASILRIHARSMSCERDIRFDLIARLCPNTTGAELRSVAT
EAGMFAIRARRKVATERDFLDAVEKVVRQGTKFSSTDYEDGGISAAELSRLMEEHAEQPPRPLTLSTLLS
LADPVTPESVLTSVRYVTNEIPRRMAMRARSLEALPYIVGMNPFIARTLEAYRKSFRFLTTYPPVQTLED
NQRLTAELDGLVQSHANDIPTMAKGFQECARYLTPEQISTFLDEAIRNRIAVRLIAEQHIAISRALEEGG
DLKDHHGVVHLSCSPQDMIRMCGSWVSDLCEATLGAHPEIIIDGEVDATFAYVPVHLEYILTEILKNAFR
ATVERHARQPSSIRTSPVPPVRITISPPPLTPIPRPRFLSMRVRDQGGGVSPAHLAQIFSYSFTTAGRAT
TSPGGGVGWDDQETGGGPYAAQHVGGSAAIGGIDSMGGAGGLFAEMTGRGVQVGMGTIAGLGYGLPMSRL
YTRYFGGSLDLMSLDGWGCDVFLKLRCLDDAGDVEI
```

2 Annotated Phylograms

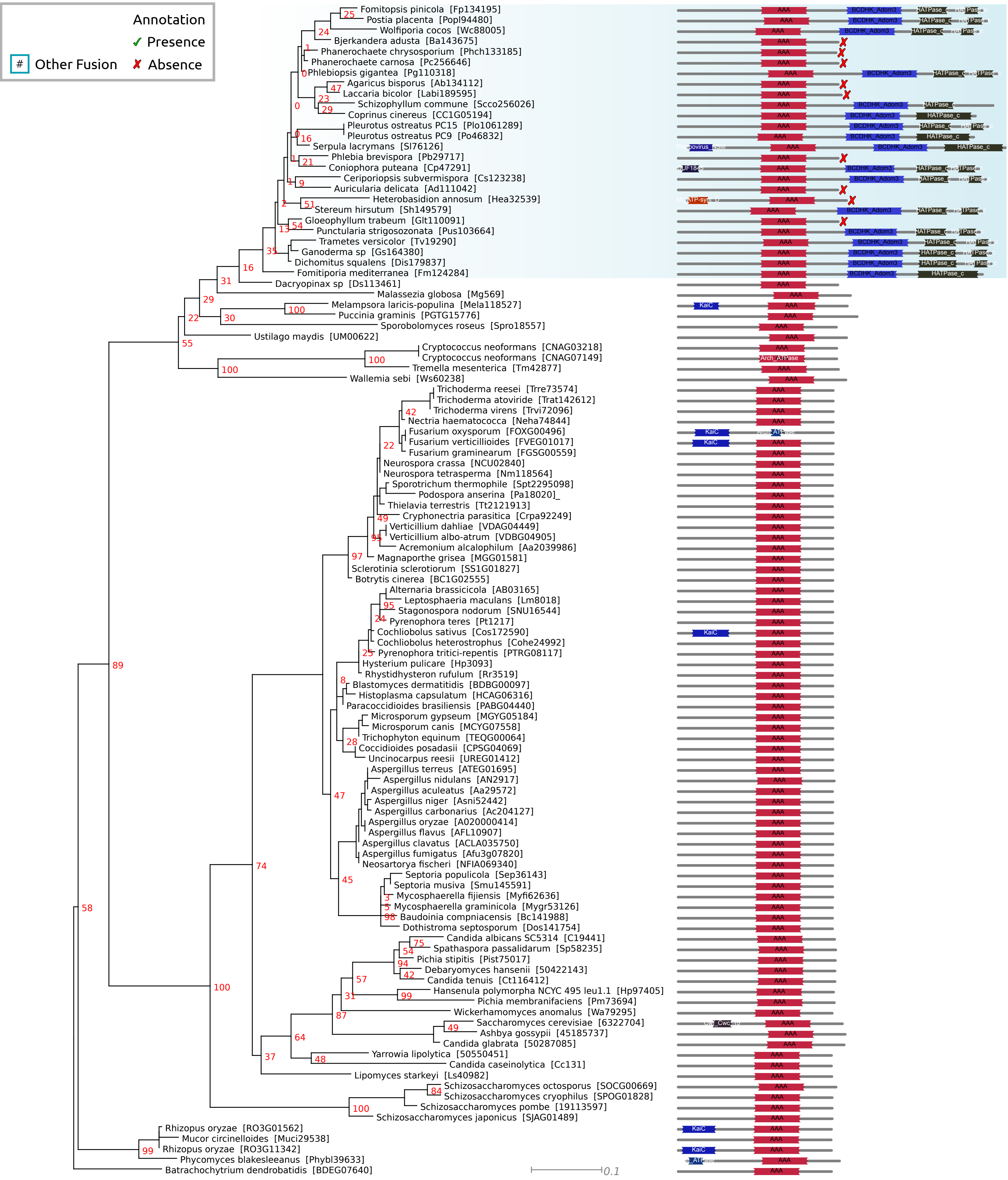
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
Other Fusion
✓ Presence
✗ Absence
Fomitopsis pinicola [Fp134195]
Postia placenta [Popl94480]
Wolfiporia cocos [Wc88005]
Bjerkandera adusta [Ba143675]
Phanerochaete chrysosporium [Phch133185]
Phanerochaete carnosa [Pc256646]
Phlebiopsis gigantea [Pg110318]
Agaricus bisporus [Ab134112]
Laccaria bicolor [Labi189595]
Schizophyllum commune [Scco256026]
Coprinus cinereus [CC1G05194]
Pleurotus ostreatus PC15 [Plo1061289]
Pleurotus ostreatus PC9 [Po46832]
Serpula lacrymans [Sl76126]
Phlebia brevispora [Pb29717]
Coniophora puteana [Cp47291]
Ceriporiopsis subvermispora [Cs123238]
Auricularia delicata [Ad111042]
Heterobasidion annosum [Hea32539]
Stereum hirsutum [Sh149579]
Gloeophyllum trabeum [Glt110091]
Punctularia strigosozonata [Pus103664]
Trametes versicolor [Tv19290]
Ganoderma sp [Gs164380]
Dichomitus squalens [Dis179837]
Fomitiporia mediterranea [Fm124284]
Dacryopinax sp [Ds113461]
Malassezia globosa [Mg569]
Melampsora laricis-populina [Mela118527]
Puccinia graminis [PGTG15776]
Sporobolomyces roseus [Spro18557]
Ustilago maydis [UM00622]
Cryptococcus neoformans [CNAG03218]
Cryptococcus neoformans [CNAG07149]
Tremella mesenterica [Tm42877]
Wallemia sebi [Ws60238]
Trichoderma reesei [Tre73574]
Trichoderma atoviride [Trat142612]
Trichoderma virens [Trvi72096]
Nectria haematococca [Neha74844]
Fusarium oxysporum [FOXG00496]
Fusarium verticillioides [FVEG01017]
Fusarium graminearum [FGSG00559]
Neurospora crassa [NCU02840]
Neurospora tetrasperma [Nm118564]
Sporotrichum thermophile [Spt2295098]
Podospora anserina [Pa18020]_
Thielavia terrestris [Tt2121913]
Cryphonectria parasitica [Crpa92249]
Verticillium dahliae [VDAG04449]
Verticillium albo-atrum [VDBG04905]
Acremonium alcalophilum [Aa2039986]
Magnaporthe grisea [MGG01581]
Sclerotinia sclerotiorum [SS1G01827]
Botrytis cinerea [BC1G02555]
Alternaria brassicicola [AB03165]
Leptosphaeria maculans [Lm8018]
Stagonospora nodorum [SNU16544]
Pyrenophora teres [Pt1217]
Cochliobolus sativus [Cos172590]
Cochliobolus heterostrophus [Cohe24992]
Pyrenophora tritici-repentis [PTRG08117]
Hysterium pulicare [Hp3093]
Rhystidhysteron rufulum [Rr3519]
Blastomyces dermatitidis [BDBG00097]
Histoplasma capsulatum [HCAG06316]
Paracoccidioides brasiliensis [PABG04440]
Microsporum gypseum [MGYG05184]
Microsporum canis [MCYG07558]
Trichophyton equinum [TEQG00064]
Coccidioides posadasii [CPSG04069]
Uncinocarpus reesii [UREG01412]
Aspergillus terreus [ATEG01695]
Aspergillus nidulans [AN2917]
Aspergillus aculeatus [Aa29572]
Aspergillus niger [Asni52442]
Aspergillus carbonarius [Ac204127]
Aspergillus oryzae [A020000414]
Aspergillus flavus [AFL10907]
Aspergillus clavatus [ACLA035750]
Aspergillus fumigatus [Afu3g07820]
Neosartorya fischeri [NFIA069340]
Septoria populicola [Sep36143]
Septoria musiva [Smu145591]
Mycosphaerella fijiensis [Myfi62636]
Mycosphaerella graminicola [Mygr53126]
Baudoinia compniacensis [Bc141988]
Dothistroma septosporum [Dos141754]
Candida albicans SC5314 [C19441]
Spathaspora passalidarum [Sp58235]
Pichia stipitis [Pist75017]
Debaryomyces hansenii [50422143]
Candida tenuis [Ct116412]
Hansenula polymorpha NCYC 495 leu1.1 [Hp97405]
Pichia membranifaciens [Pm73694]
Wickerhamomyces anomalus [Wa79295]
Saccharomyces cerevisiae [6322704]
Ashbya gossypii [45185737]
Candida glabrata [50287085]
Yarrowia lipolytica [50550451]
Candida caseinolytica [Cc131]
Lipomyces starkeyi [Ls40982]
Schizosaccharomyces octosporus [SOCG00669]
Schizosaccharomyces cryophilus [SPOG01828]
Schizosaccharomyces pombe [19113597]
Schizosaccharomyces japonicus [SJAG01489]
Rhizopus oryzae [RO3G01562]
Mucor circinelloides [Muci29538]
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Phycomyces blakesleeanus [Phybl39633]
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0.1
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KaiC
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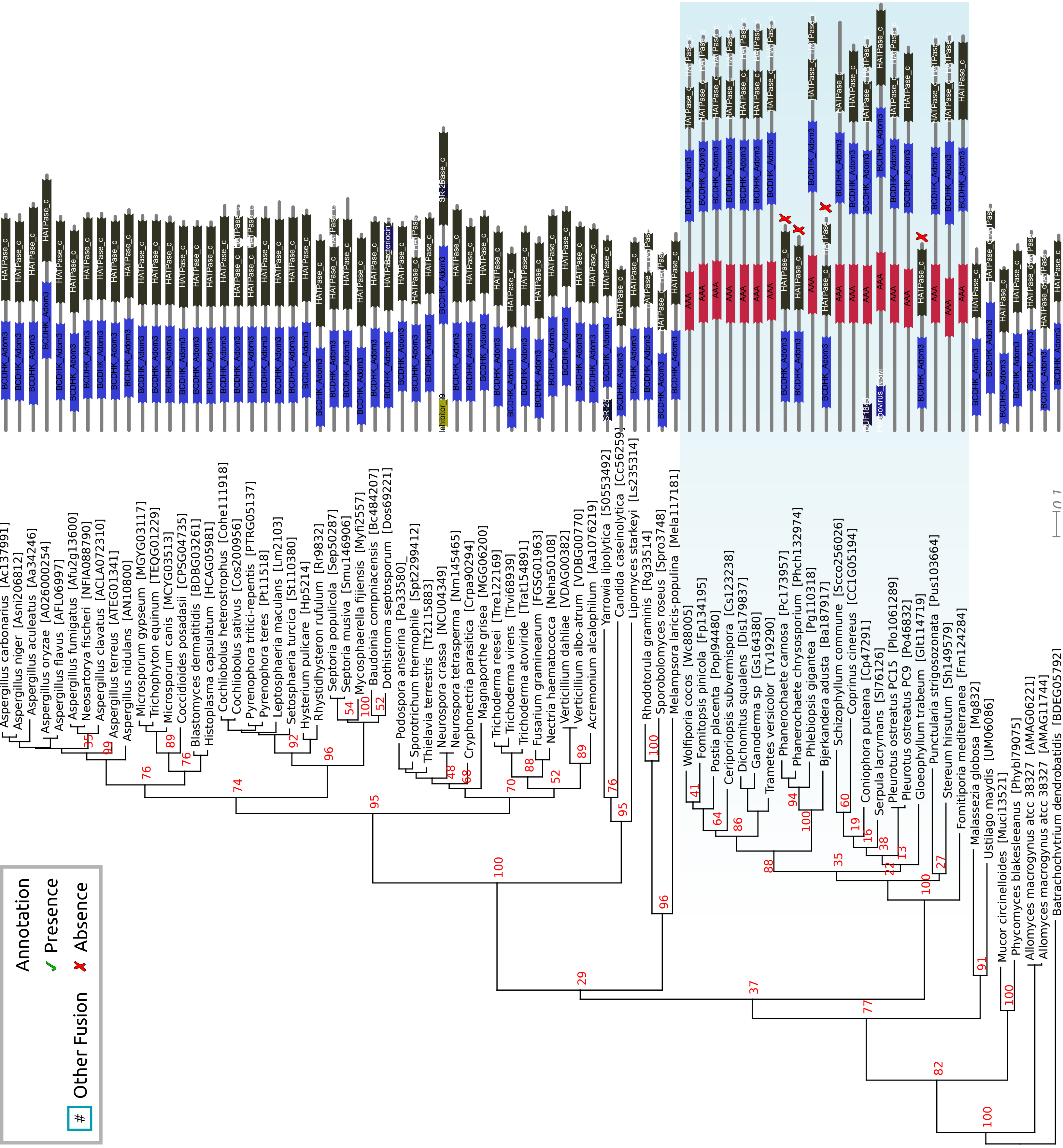

Annotation
✓ Presence
✗ Absence
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Aspergillus oryzae [A026000254]
Aspergillus flavus [AFL06997]
Aspergillus fumigatus [Afu2g13600]
Neosartorya fischeri [NFIA088790]
Aspergillus clavatus [ACLA072310]
Aspergillus terreus [ATEG01341]
Aspergillus nidulans [AN10800]
Microsporum gypseum [MGYG03117]
Trichophyton equinum [TEQG01229]
Microsporum canis [MCYG03513]
Coccidioides posadasii [CPSG04735]
Blastomyces dermatitidis [BDBG03261]
Histoplasma capsulatum [HCAG05981]
Cochliobolus heterostrophus [Cohe111918]
Cochliobolus sativus [Cos200956]
Pyrenophora tritici-repentis [PTRG05137]
Pyrenophora teres [Pt11518]
Leptosphaeria maculans [Lm2103]
Setosphaeria turcica [St110380]
Hysterium pulicare [Hp5214]
Rhytidhysteron rufulum [Rr9832]
Septoria populicola [Sep50287]
Septoria musiva [Smu146906]
Mycosphaerella fijiensis [Myfi2557]
Baudoinia compniacensis [Bc484207]
Dothistroma septosporum [Dos69221]
Podospora anserina [Pa33580]
Sporotrichum thermophile [Spt2299412]
Thielavia terrestris [Tt2115883]
Neurospora crassa [NCU04349]
Neurospora tetrasperma [Nm145465]
Cryphonectria parasitica [Crpa90294]
Magnaporthe grisea [MGG06200]
Trichoderma reesei [Tre122169]
Trichoderma virens [Trvi68939]
Trichoderma atoviride [Trat154891]
Fusarium graminearum [FGSG01963]
Nectria haematococca [Neha50108]
Verticillium dahliae [VDAG00382]
Verticillium albo-atrum [VDBG00770]
Acremonium alcalophilum [Aa1076219]
Yarrowia lipolytica [50553492]
Candida caseinolytica [Cc562559]
Lipomyces starkeyi [Ls235314]
Rhodotorula graminis [Rg33514]
Sporobolomyces roseus [Spro3748]
Melampsora laricis-populina [Mela117181]
Wolfiporia cocos [Wc88005]
Fomitopsis pinicola [Fp134195]
Postia placenta [Popl94480]
Ceriporiopsis subvermispora [Cs123238]
Dichomitus squalens [Dis179837]
Ganoderma sp [Gs164380]
Trametes versicolor [Tv19290]
Phanerochaete carnosa [Pc173957]
Phanerochaete chrysosporium [Phch132974]
Phlebiopsis gigantea [Pg110318]
Bjerkandera adusta [Ba187917]
Schizophyllum commune [Scco256026]
Coprinus cinereus [CC1G05194]
Coniophora puteana [Cp47291]
Serpula lacrymans [Sl76126]
Pleurotus ostreatus PC15 [Plo1061289]
Pleurotus ostreatus PC9 [Po46832]
Gloeophyllum trabeum [Glt114719]
Punctularia strigosozonata [Pus103664]
Stereum hirsutum [Sh149579]
Fomitiporia mediterranea [Fm124284]
Malassezia globosa [Mg832]
Ustilago maydis [UM06086]
Mucor circinelloides [Muci13521]
Phycomyces blakesleeanus [Phybl79075]
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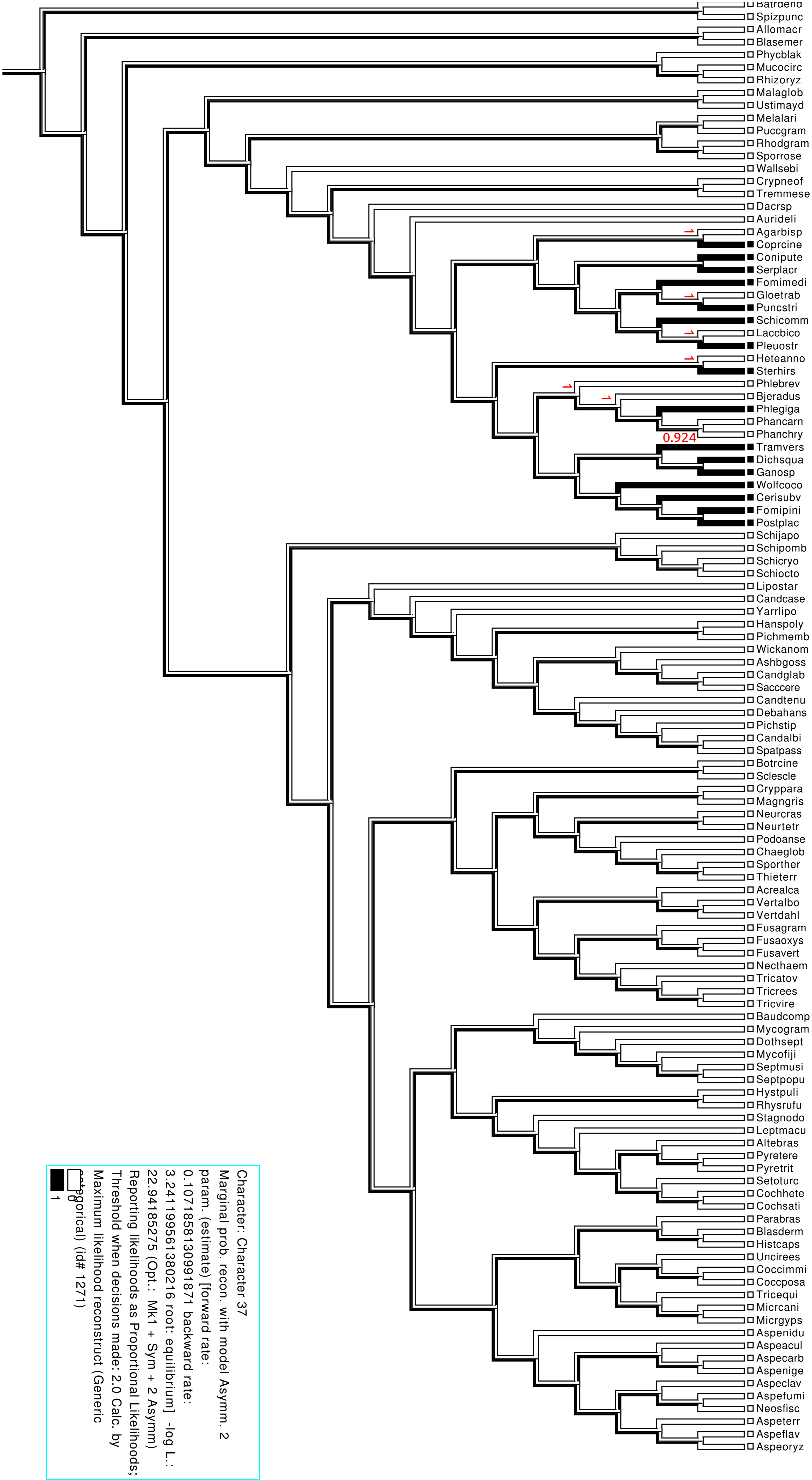
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Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
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Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
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Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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22.94185275 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 37

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>gi|116208054|ref|XP_001229836.1| hypothetical protein CHGG_03320 [Chaetomium globosu
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WALRGLADTLAMEVNLYPETPVKVHVVFPATITSPGLERENKTKPAITTELEKDEPPETPDTVARRAIAG
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PARIPCKNCHKGHGPWTSCVVVDGQMCGSCANCWFNASGARCSFHETRNPQPVPQHPTILPAATTGMTND
PTYRFAAASHPLLQPHGPALGGVSHPGGLLINNPVLQEMVNRAMVEVRQANKATRQLIQIEITAKQLALQ
IVECEEMVNNQEQSGSGQQAMGDDSGA
```

2 Annotated Phylograms

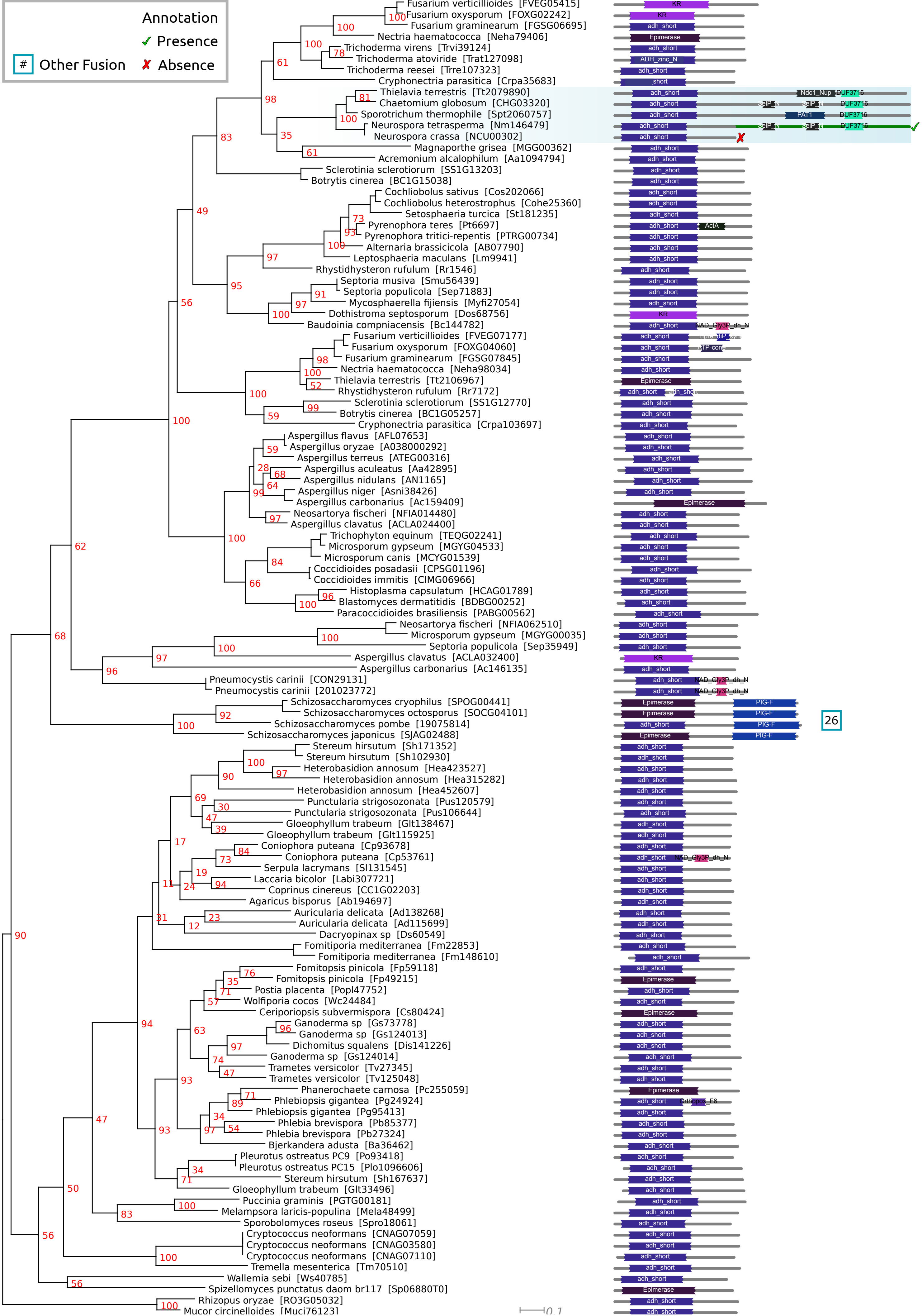
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Fusarium verticillioides [FVEG05415]
Fusarium oxysporum [FOXG02242]
Fusarium graminearum [FGSG06695]
Nectria haematococca [Neha79406]
Trichoderma virens [Trvi39124]
Trichoderma atoviride [Trat127098]
Trichoderma reesei [Trre107323]
Cryphonectria parasitica [Crpa35683]
Thielavia terrestris [Tt2079890]
Chaetomium globosum [CHG03320]
Sporotrichum thermophile [Spt2060757]
Neurospora tetrasperma [Nm146479]
Neurospora crassa [NCU00302]
Magnaporthe grisea [MGG00362]
Acremonium alcalophilum [Aa1094794]
Sclerotinia sclerotiorum [SS1G13203]
Botrytis cinerea [BC1G15038]
Cochliobolus sativus [Cos202066]
Cochliobolus heterostrophus [Cohe25360]
Setosphaeria turcica [St181235]
Pyrenophora teres [Pt6697]
Pyrenophora tritici-repentis [PTRG00734]
Alternaria brassicicola [AB07790]
Leptosphaeria maculans [Lm9941]
Rhystidhysteron rufulum [Rr1546]
Septoria musiva [Smu56439]
Septoria populicola [Sep71883]
Mycosphaerella fijiensis [Myfi27054]
Dothistroma septosporum [Dos68756]
Baudoinia compniacensis [Bc144782]
Fusarium verticillioides [FVEG07177]
Fusarium oxysporum [FOXG04060]
Fusarium graminearum [FGSG07845]
Nectria haematococca [Neha98034]
Thielavia terrestris [Tt2106967]
Rhystidhysteron rufulum [Rr7172]
Sclerotinia sclerotiorum [SS1G12770]
Botrytis cinerea [BC1G05257]
Cryphonectria parasitica [Crpa103697]
Aspergillus flavus [AFL07653]
Aspergillus oryzae [A038000292]
Aspergillus terreus [ATEG00316]
Aspergillus aculeatus [Aa42895]
Aspergillus nidulans [AN1165]
Aspergillus niger [Asni38426]
Aspergillus carbonarius [Ac159409]
Neosartorya fischeri [NFIA014480]
Aspergillus clavatus [ACLA024400]
Trichophyton equinum [TEQG02241]
Microsporum gypseum [MGYG04533]
Microsporum canis [MCYG01539]
Coccidioides posadasii [CPSG01196]
Coccidioides immitis [CIMG06966]
Histoplasma capsulatum [HCAG01789]
Blastomyces dermatitidis [BDBG00252]
Paracoccidioides brasiliensis [PABG00562]
Neosartorya fischeri [NFIA062510]
Microsporum gypseum [MGYG00035]
Septoria populicola [Sep35949]
Aspergillus clavatus [ACLA032400]
Aspergillus carbonarius [Ac146135]
Pneumocystis carinii [CON29131]
Pneumocystis carinii [201023772]
Schizosaccharomyces cryophilus [SPOG00441]
Schizosaccharomyces octosporus [SOCG04101]
Schizosaccharomyces pombe [19075814]
Schizosaccharomyces japonicus [SJAG02488]
Stereum hirsutum [Sh171352]
Stereum hirsutum [Sh102930]
Heterobasidion annosum [Hea423527]
Heterobasidion annosum [Hea315282]
Heterobasidion annosum [Hea452607]
Punctularia strigosozonata [Pus120579]
Punctularia strigosozonata [Pus106644]
Gloeophyllum trabeum [Glt138467]
Gloeophyllum trabeum [Glt115925]
Coniophora puteana [Cp93678]
Coniophora puteana [Cp53761]
Serpula lacrymans [Sl131545]
Laccaria bicolor [Labi307721]
Coprinus cinereus [CC1G02203]
Agaricus bisporus [Ab194697]
Auricularia delicata [Ad138268]
Auricularia delicata [Ad115699]
Dacryopinax sp [Ds60549]
Fomitiporia mediterranea [Fm22853]
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Fomitopsis pinicola [Fp59118]
Fomitopsis pinicola [Fp49215]
Postia placenta [Popl47752]
Wolfiporia cocos [Wc24484]
Ceriporiopsis subvermispora [Cs80424]
Ganoderma sp [Gs73778]
Ganoderma sp [Gs124013]
Dichomitus squalens [Dis141226]
Ganoderma sp [Gs124014]
Trametes versicolor [Tv27345]
Trametes versicolor [Tv125048]
Phanerochaete carnosa [Pc255059]
Phlebiopsis gigantea [Pg24924]
Phlebiopsis gigantea [Pg95413]
Phlebia brevispora [Pb85377]
Phlebia brevispora [Pb27324]
Bjerkandera adusta [Ba36462]
Pleurotus ostreatus PC9 [Po93418]
Pleurotus ostreatus PC15 [Plo1096606]
Stereum hirsutum [Sh167637]
Gloeophyllum trabeum [Glt33496]
Puccinia graminis [PGTG00181]
Melampsora laricis-populina [Mela48499]
Sporobolomyces roseus [Spro18061]
Cryptococcus neoformans [CNAG07059]
Cryptococcus neoformans [CNAG03580]
Cryptococcus neoformans [CNAG07110]
Tremella mesenterica [Tm70510]
Wallemia sebi [Ws40785]
Spizellomyces punctatus daom br117 [Sp06880T0]
Rhizopus oryzae [RO3G05032]
Mucor circinelloides [Muci76123]
26
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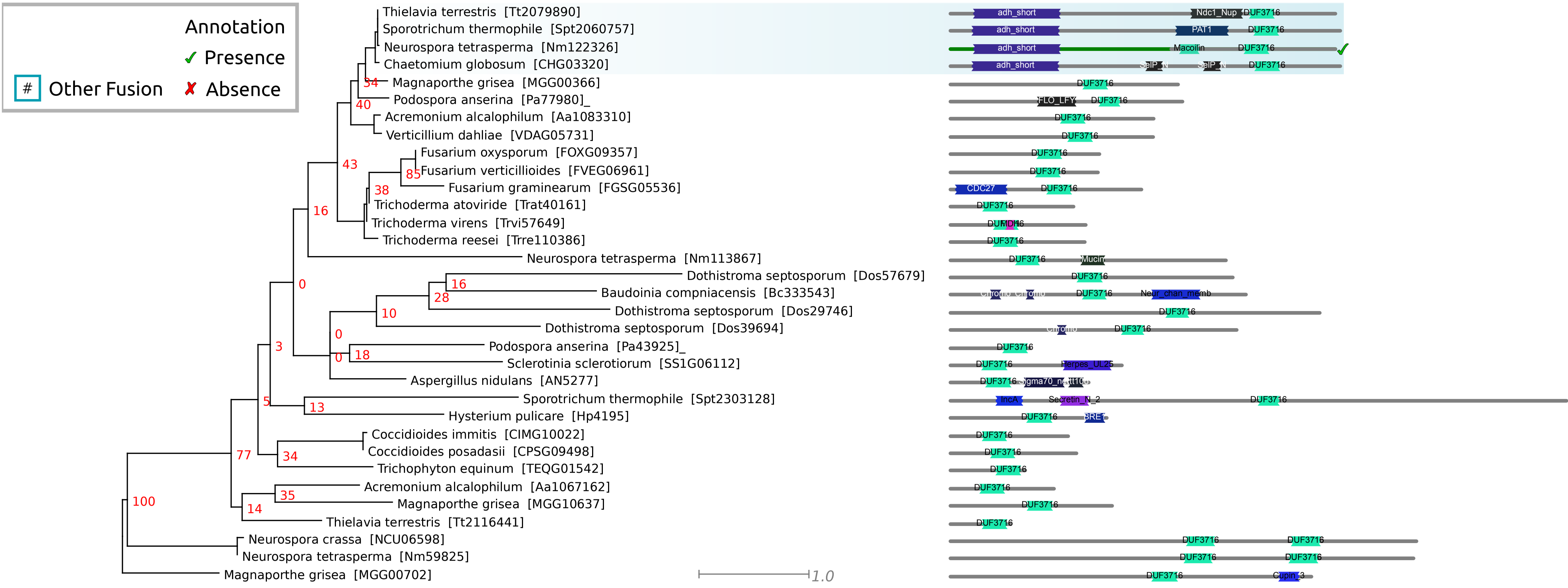
Annotation
✓ Presence
Other Fusion
✗ Absence
Thielavia terrestris [Tt2079890]
Sporotrichum thermophile [Spt2060757]
Neurospora tetrasperma [Nm122326]
Chaetomium globosum [CHG03320]
Magnaporthe grisea [MGG00366]
Podospora anserina [Pa77980]_
Acremonium alcalophilum [Aa1083310]
Verticillium dahliae [VDAG05731]
Fusarium oxysporum [FOXG09357]
Fusarium verticillioides [FVEG06961]
Fusarium graminearum [FGSG05536]
Trichoderma atoviride [Trat40161]
Trichoderma virens [Trvi57649]
Trichoderma reesei [Tre110386]
Neurospora tetrasperma [Nm113867]
Dothistroma septosporum [Dos57679]
Baudoinia compniacensis [Bc333543]
Dothistroma septosporum [Dos29746]
Dothistroma septosporum [Dos39694]
Podospora anserina [Pa43925]_
Sclerotinia sclerotiorum [SS1G06112]
Aspergillus nidulans [AN5277]
Sporotrichum thermophile [Spt2303128]
Hysterium pulicare [Hp4195]
Coccidioides immitis [CIMG10022]
Coccidioides posadasii [CPSG09498]
Trichophyton equinum [TEQG01542]
Acremonium alcalophilum [Aa1067162]
Magnaporthe grisea [MGG10637]
Thielavia terrestris [Tt2116441]
Neurospora crassa [NCU06598]
Neurospora tetrasperma [Nm59825]
Magnaporthe grisea [MGG00702]
54
40
43
85
38
16
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16
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10
0
18
0
3
5
13
34
77
35
14
100
1.0
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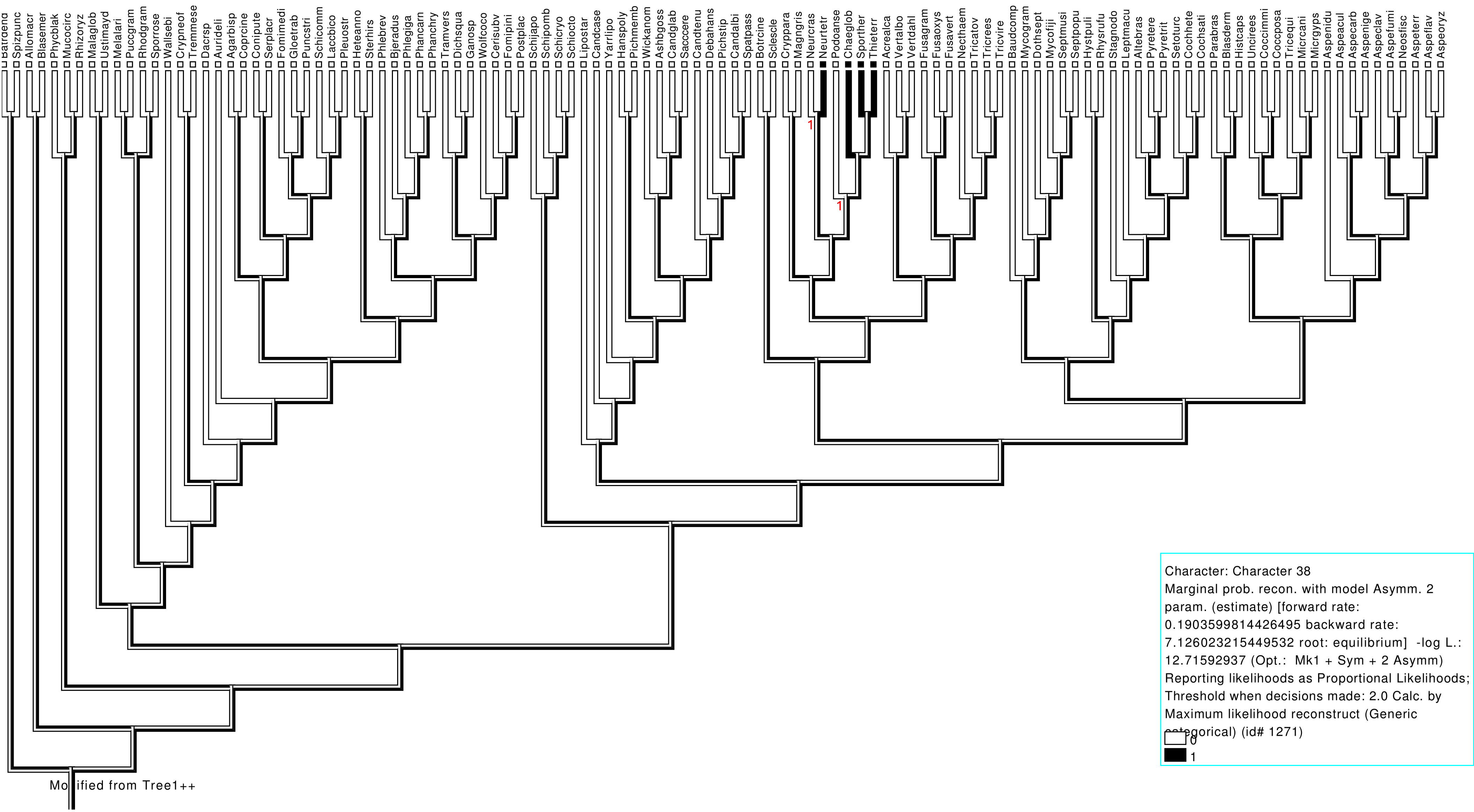
Ndc1_Nup
DUF3716
PAT1
Macoilin
SelP_N
FLO_LFY
CDC27
DUF3716
Mucin
Chromo
Neur_chan_memb
Herpes_UL25
Sigma70_ner
IncA
Secretin_N_2
BRE1
Cupin_3
✓


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
1
Modified from Tree1++
Character: Character 38
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.1903599814426495 backward rate:
7.126023215449532 root: equilibrium] -log L.:
12.71592937 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 38

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>Plo1073489_dom1
MISHFLRHPFQALCELLTNPRYFGAVAALVVVGDAVLTQLIVRFIPYTEIDWETYMAQIA
VIMKGETDYSRISGPTGPLVYPAGHVYIHQLLYKITDAGRNMALSQQIYAGLYVSSLILT
CCIYRKAGAPNWLLLALPLSKRLHSIYVLRLFNDCWSVTAALAAVLAYQFEMDDLAVLLY
STALSIKMSILLYLPGLLVLLYKRRGLLTTFRQMITILSFQAVIARTFIKADLSAYLNGA
FDLSRVFLFKWTVNWRILGEGLFLDRRWAVGLLVGHVSVLVAFGYRWCRPDGGPLPTILR
GISRPSTPAGLVPVSPDYVATVLFTSNLIGIFFARSLHYQFYSWYAQQLPFLVFKTRYAM
PVKLTILVAVEFAWNVYPSTNVSSSILLLAHSLLLAGIWRHNYTFPAIAPKDYLECRTLL
>Plo1073489_dom2
DDQILLIDNFLTAAECKQYIQFIDNLPLELTPPKKRGEAERVNYRFSIPSVDFAERLHSL
FQPYVLSLPTPSTWRTSESRHSPVGCNSNIRLYKYNPGQHFGAHYDDSVRDPATGLKSEW
TILMYLSGIEDGVEGGETIFYLEQKGKAREPIAAPLTRGTALLHRHGSECLLHEGSPVRK
GTKYILRSDLMFKY
```

2 Annotated Phylograms

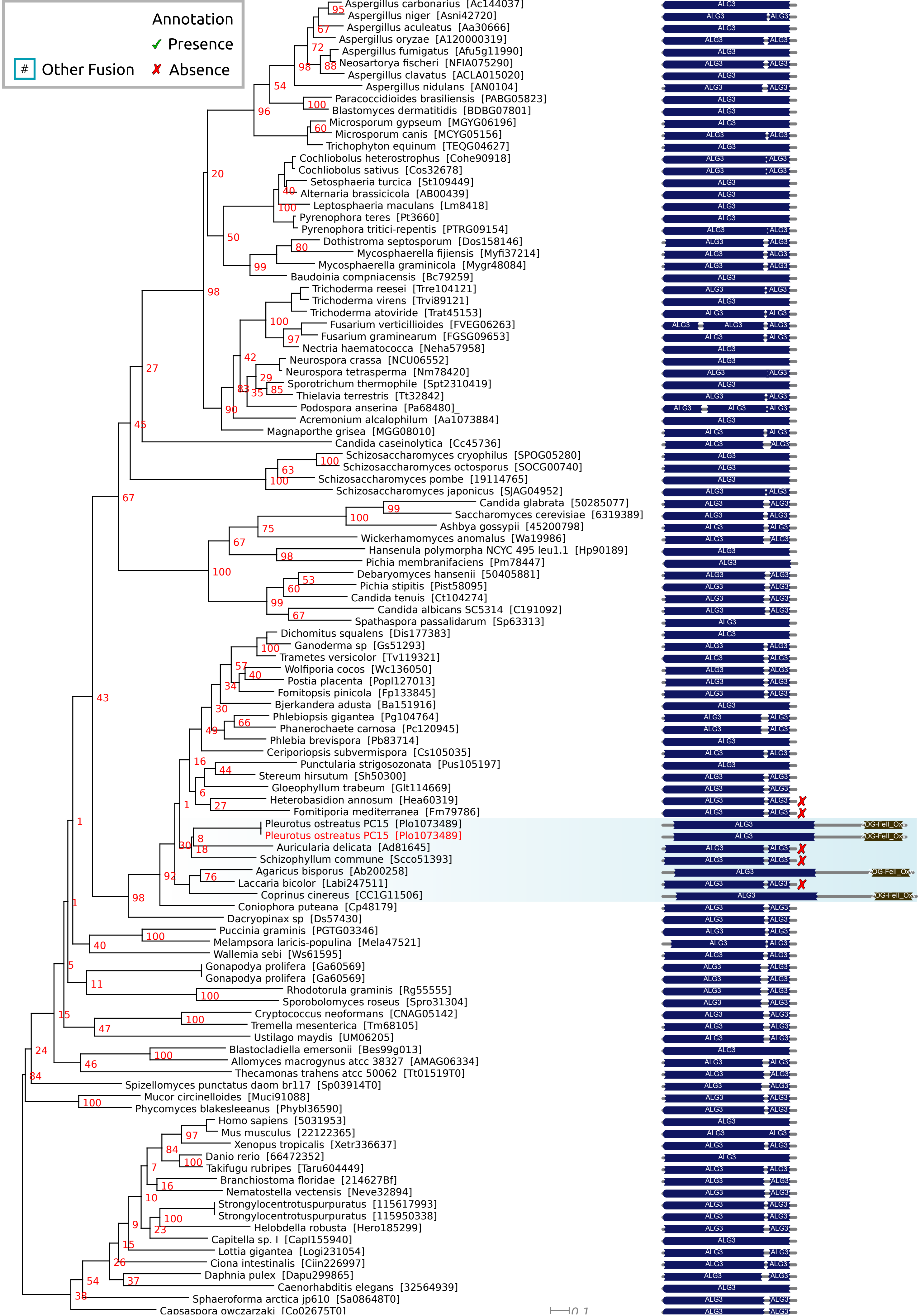
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Aspergillus carbonarius [Ac144037]
Aspergillus niger [Asni42720]
Aspergillus aculeatus [Aa30666]
Aspergillus oryzae [A120000319]
Aspergillus fumigatus [Afu5g11990]
Neosartorya fischeri [NFIA075290]
Aspergillus clavatus [ACLA015020]
Aspergillus nidulans [AN0104]
Paracoccidioides brasiliensis [PABG05823]
Blastomyces dermatitidis [BDBG07801]
Microsporum gypseum [MGYG06196]
Microsporum canis [MCYG05156]
Trichophyton equinum [TEQG04627]
Cochliobolus heterostrophus [Cohe90918]
Cochliobolus sativus [Cos32678]
Setosphaeria turcica [St109449]
Alternaria brassicicola [AB00439]
Leptosphaeria maculans [Lm8418]
Pyrenophora teres [Pt3660]
Pyrenophora tritici-repentis [PTRG09154]
Dothistroma septosporum [Dos158146]
Mycosphaerella fijiensis [Myfi37214]
Mycosphaerella graminicola [Mygr48084]
Baudoinia compniacensis [Bc79259]
Trichoderma reesei [Trre104121]
Trichoderma virens [Trvi89121]
Trichoderma atoviride [Trat45153]
Fusarium verticillioides [FVEG06263]
Fusarium graminearum [FGSG09653]
Nectria haematococca [Neha57958]
Neurospora crassa [NCU06552]
Neurospora tetrasperma [Nm78420]
Sporotrichum thermophile [Spt2310419]
Thielavia terrestris [Tt32842]
Podospora anserina [Pa68480]_
Acremonium alcalophilum [Aa1073884]
Magnaporthe grisea [MGG08010]
Candida caseinolytica [Cc45736]
Schizosaccharomyces cryophilus [SPOG05280]
Schizosaccharomyces octosporus [SOCG00740]
Schizosaccharomyces pombe [19114765]
Schizosaccharomyces japonicus [SJAG04952]
Candida glabrata [50285077]
Saccharomyces cerevisiae [6319389]
Ashbya gossypii [45200798]
Wickerhamomyces anomalus [Wa19986]
Hansenula polymorpha NCYC 495 leu1.1 [Hp90189]
Pichia membranifaciens [Pm78447]
Debaryomyces hansenii [50405881]
Pichia stipitis [Pist58095]
Candida tenuis [Ct104274]
Candida albicans SC5314 [C191092]
Spathaspora passalidarum [Sp63313]
Dichomitus squalens [Dis177383]
Ganoderma sp [Gs51293]
Trametes versicolor [Tv119321]
Wolfiporia cocos [Wc136050]
Postia placenta [Popl127013]
Fomitopsis pinicola [Fp133845]
Bjerkandera adusta [Ba151916]
Phlebiopsis gigantea [Pg104764]
Phanerochaete carnosa [Pc120945]
Phlebia brevispora [Pb83714]
Ceriporiopsis subvermispora [Cs105035]
Punctularia strigosozonata [Pus105197]
Stereum hirsutum [Sh50300]
Gloeophyllum trabeum [Glt114669]
Heterobasidion annosum [Hea60319]
Fomitiporia mediterranea [Fm79786]
Pleurotus ostreatus PC15 [Plo1073489]
Pleurotus ostreatus PC15 [Plo1073489]
Auricularia delicata [Ad81645]
Schizophyllum commune [Scco51393]
Agaricus bisporus [Ab200258]
Laccaria bicolor [Labi247511]
Coprinus cinereus [CC1G11506]
Coniophora puteana [Cp48179]
Dacryopinax sp [Ds57430]
Puccinia graminis [PGTG03346]
Melampsora laricis-populina [Mela47521]
Wallemia sebi [Ws61595]
Gonapodya prolifera [Ga60569]
Gonapodya prolifera [Ga60569]
Rhodotorula graminis [Rg55555]
Sporobolomyces roseus [Spro31304]
Cryptococcus neoformans [CNAG05142]
Tremella mesenterica [Tm68105]
Ustilago maydis [UM06205]
Blastocladiella emersonii [Bes99g013]
Allomyces macrogynus atcc 38327 [AMAG06334]
Thecamonas trahens atcc 50062 [Tt01519T0]
Spizellomyces punctatus daom br117 [Sp03914T0]
Mucor circinelloides [Muci91088]
Phycomyces blakesleeanus [Phybl36590]
Homo sapiens [5031953]
Mus musculus [22122365]
Xenopus tropicalis [Xetr336637]
Danio rerio [66472352]
Takifugu rubripes [Taru604449]
Branchiostoma floridae [214627Bf]
Nematostella vectensis [Neve32894]
Strongylocentrotuspurpuratus [115617993]
Strongylocentrotuspurpuratus [115950338]
Helobdella robusta [Hero185299]
Capitella sp. I [Capl155940]
Lottia gigantea [Logi231054]
Ciona intestinalis [Ciin226997]
Daphnia pulex [Dapu299865]
Caenorhabditis elegans [32564939]
Sphaeroforma arctica jp610 [Sa08648T0]
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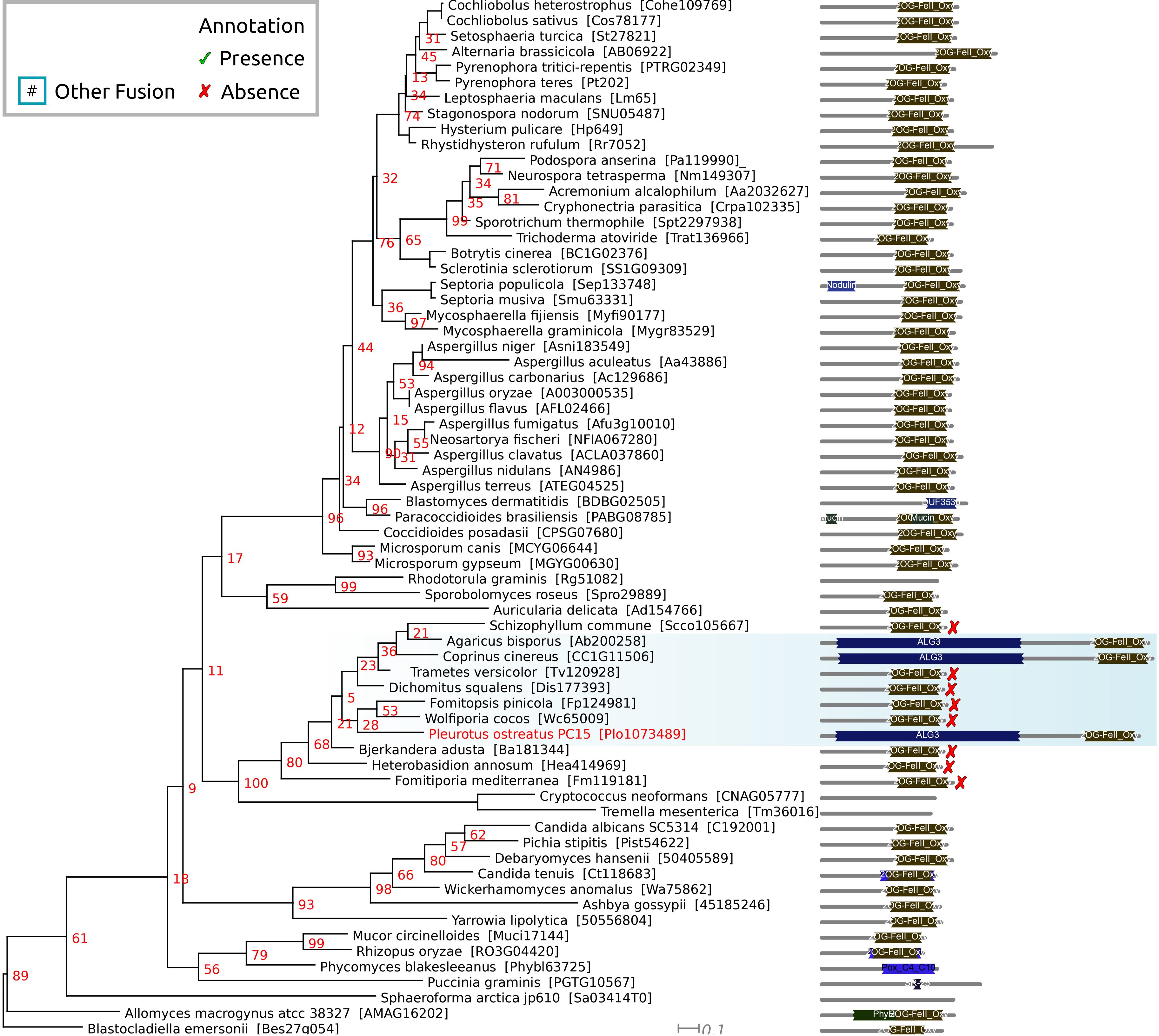

Annotation
✓ Presence
Other Fusion
✗ Absence
Cochliobolus heterostrophus [Cohe109769]
Cochliobolus sativus [Cos78177]
Setosphaeria turcica [St27821]
Alternaria brassicicola [AB06922]
Pyrenophora tritici-repentis [PTRG02349]
Pyrenophora teres [Pt202]
Leptosphaeria maculans [Lm65]
Stagonospora nodorum [SNU05487]
Hysterium pulicare [Hp649]
Rhystidhysteron rufulum [Rr7052]
Podospora anserina [Pa119990]_
Neurospora tetrasperma [Nm149307]
Acremonium alcalophilum [Aa2032627]
Cryphonectria parasitica [Crpa102335]
Sporotrichum thermophile [Spt2297938]
Trichoderma atoviride [Trat136966]
Botrytis cinerea [BC1G02376]
Sclerotinia sclerotiorum [SS1G09309]
Septoria populicola [Sep133748]
Septoria musiva [Smu63331]
Mycosphaerella fijiensis [Myfi90177]
Mycosphaerella graminicola [Mygr83529]
Aspergillus niger [Asni183549]
Aspergillus aculeatus [Aa43886]
Aspergillus carbonarius [Ac129686]
Aspergillus oryzae [A003000535]
Aspergillus flavus [AFL02466]
Aspergillus fumigatus [Afu3g10010]
Neosartorya fischeri [NFIA067280]
Aspergillus clavatus [ACLA037860]
Aspergillus nidulans [AN4986]
Aspergillus terreus [ATEG04525]
Blastomyces dermatitidis [BDBG02505]
Paracoccidioides brasiliensis [PABG08785]
Coccidioides posadasii [CPSG07680]
Microsporum canis [MCYG06644]
Microsporum gypseum [MGYG00630]
Rhodotorula graminis [Rg51082]
Sporobolomyces roseus [Spro29889]
Auricularia delicata [Ad154766]
Schizophyllum commune [Scco105667]
Agaricus bisporus [Ab200258]
Coprinus cinereus [CC1G11506]
Trametes versicolor [Tv120928]
Dichomitus squalens [Dis177393]
Fomitopsis pinicola [Fp124981]
Wolfiporia cocos [Wc65009]
Pleurotus ostreatus PC15 [Plo1073489]
Bjerkandera adusta [Ba181344]
Heterobasidion annosum [Hea414969]
Fomitiporia mediterranea [Fm119181]
Cryptococcus neoformans [CNAG05777]
Tremella mesenterica [Tm36016]
Candida albicans SC5314 [C192001]
Pichia stipitis [Pist54622]
Debaryomyces hansenii [50405589]
Candida tenuis [Ct118683]
Wickerhamomyces anomalus [Wa75862]
Ashbya gossypii [45185246]
Yarrowia lipolytica [50556804]
Mucor circinelloides [Muci17144]
Rhizopus oryzae [RO3G04420]
Phycomyces blakesleeanus [Phybl63725]
Puccinia graminis [PGTG10567]
Sphaeroforma arctica jp610 [Sa03414T0]
Allomyces macrogynus atcc 38327 [AMAG16202]
Blastocladiella emersonii [Bes27g054]
31
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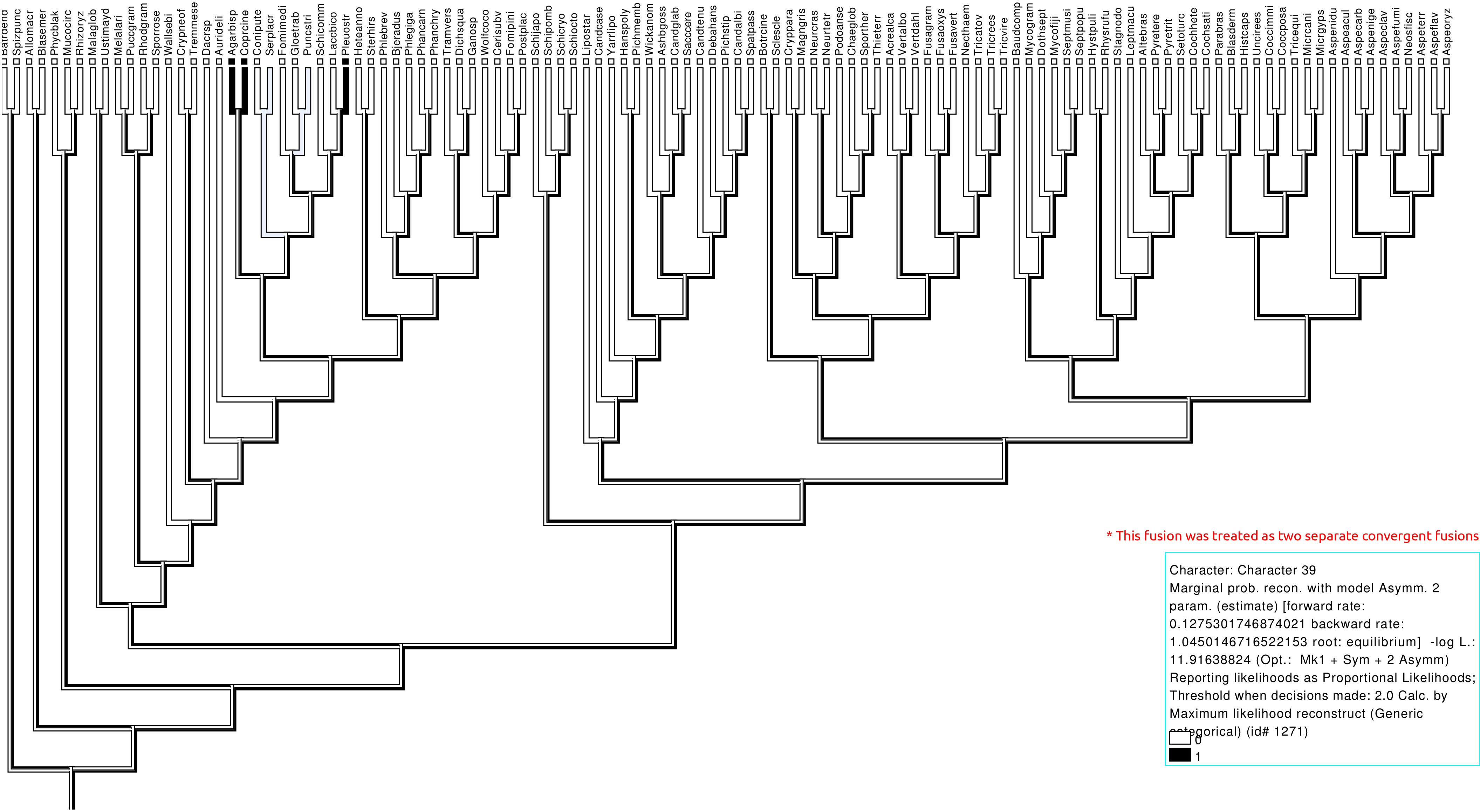
ALG3
Nodulin
DUF353
Mucin
Pox_C4_C10
PhyH
0.1



* This fusion was treated as two separate convergent fusions

Character: Character 39
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.1275301746874021 backward rate:
1.0450146716522153 root: equilibrium] -log L.:
11.91638824 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 39

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>XP_0030516041Neha_dom1
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APAISVEGCFSQDDEEVASWKGGRGKWETILGVQECGPSERFCWKLKTPTQKQYTHVRLN
MYPDGGIARFRLFGHAVPVFPDDKDVIFDLAAAQNGGLAVSCSDQHFGNKDNLLLPGRGK
DMGDGWETARSRAKGHTDFAIIKLGAPGYIERFGCEWTGHGDPVADAVAWREFVPPSKTG
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>XP_0030516041Neha_dom2
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KDAGLFHATAEFQAQLAELINEIFILIVRDAERRLDKVLDVAMLDHETIPGFEDITFQNE
WKIFKRKAQVKEEPIEKRFRPPSPKQRAKPAPRNVTSLLSSTLFVLDLYDIHSVISAQII
SQLLYWIGAELFNRIMSNRKYLARTKAMQIRMNISILEDWARTNNRQADHYEGSDMRSSG
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VGEKGLPKSAMKYLIAIQKEAALKRERRRSGMASPQRSGQDSSPVTPVKNRSNGNHLETP
GSPPEDEWSDDDDDAPEHLLLDPALMLPFTLPSVTDMLVTYGAGFGGVNRERERKYIPTV
PPEFLEKLEVSGGTRKGPMFGEADWENEEV
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

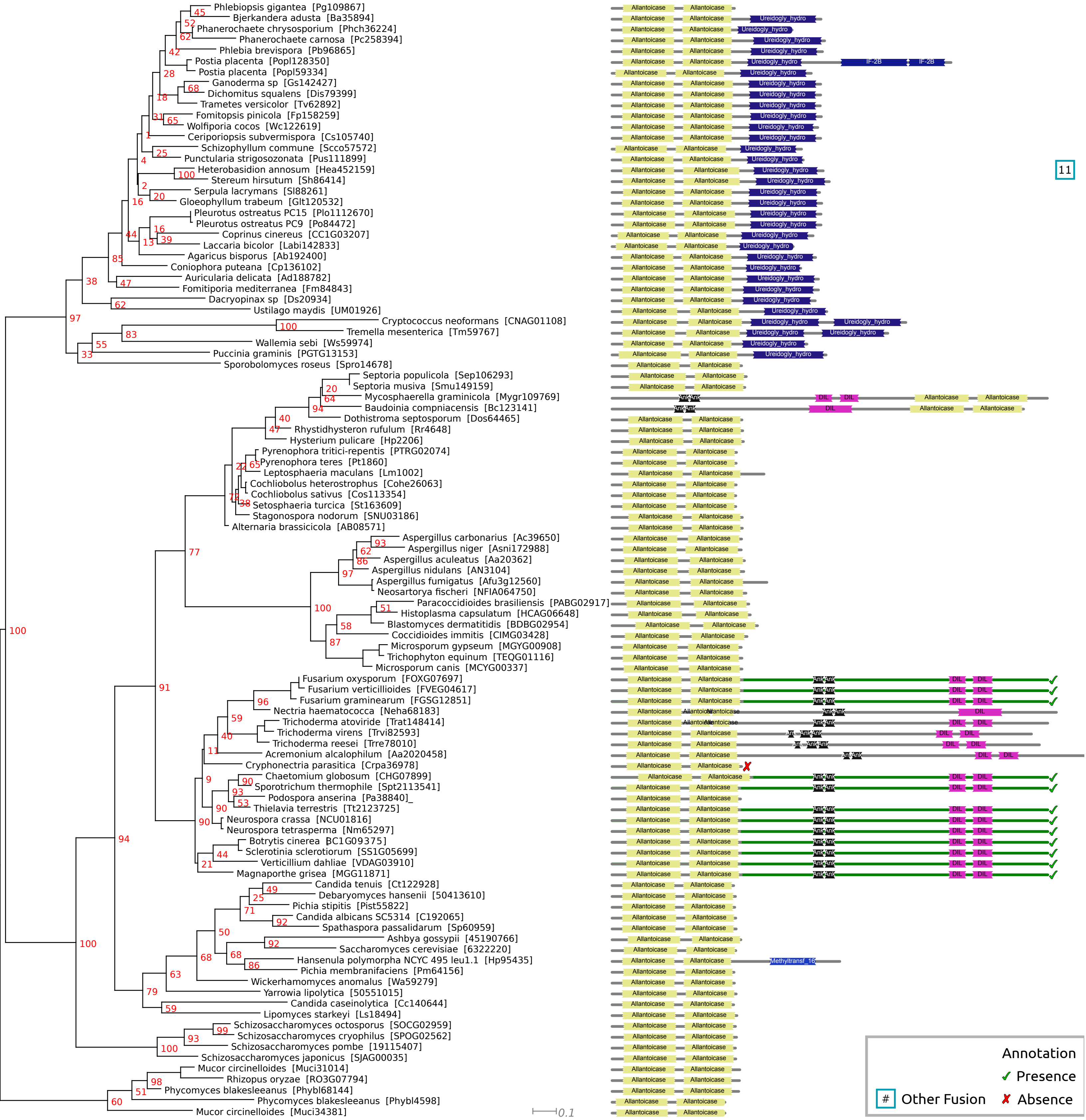
Styling and annotation was made possible by Dendroscope and Inkscape.

2.1 Important Notes

The original prediction made by fdFBLAST, on closer inspection (from the first round of phylogenies), indicated that there was not a gene fusion present between the above two domains but there was potentially a gene fusion with a third other domain. There is only one phylogeny here as the third domain consists of a series of repeats and so an alignment would not be possible as the resulting phylogeny would then be unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Heterobasidion annosum [Hea452159]
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Gloeophyllum trabeum [Glt120532]
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Coprinus cinereus [CC1G03207]
Laccaria bicolor [Labi142833]
Agaricus bisporus [Ab192400]
Coniophora puteana [Cp136102]
Auricularia delicata [Ad188782]
Fomitiporia mediterranea [Fm84843]
Dacryopinax sp [Ds20934]
Ustilago maydis [UM01926]
Cryptococcus neoformans [CNAG01108]
Tremella mesenterica [Tm59767]
Wallemia sebi [Ws59974]
Puccinia graminis [PGTG13153]
Sporobolomyces roseus [Spro14678]
Septoria populicola [Sep106293]
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Baudoinia compniacensis [Bc123141]
Dothistroma septosporum [Dos64465]
Rhystidhysteron rufulum [Rr4648]
Hysterium pulicare [Hp2206]
Pyrenophora tritici-repentis [PTRG02074]
Pyrenophora teres [Pt1860]
Leptosphaeria maculans [Lm1002]
Cochliobolus heterostrophus [Cohe26063]
Cochliobolus sativus [Cos113354]
Setosphaeria turcica [St163609]
Stagonospora nodorum [SNU03186]
Alternaria brassicicola [AB08571]
Aspergillus carbonarius [Ac39650]
Aspergillus niger [Asni172988]
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Aspergillus nidulans [AN3104]
Aspergillus fumigatus [Afu3g12560]
Neosartorya fischeri [NFIA064750]
Paracoccidioides brasiliensis [PABG02917]
Histoplasma capsulatum [HCAG06648]
Blastomyces dermatitidis [BDBG02954]
Coccidioides immitis [CIMG03428]
Microsporum gypseum [MGYG00908]
Trichophyton equinum [TEQG01116]
Microsporum canis [MCYG00337]
Fusarium oxysporum [FOXG07697]
Fusarium verticillioides [FVEG04617]
Fusarium graminearum [FGSG12851]
Nectria haematococca [Neha68183]
Trichoderma atoviride [Trat148414]
Trichoderma virens [Trvi82593]
Trichoderma reesei [Trre78010]
Acremonium alcalophilum [Aa2020458]
Cryphonectria parasitica [Crpa36978]
Chaetomium globosum [CHG07899]
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Verticillium dahliae [VDAG03910]
Magnaporthe grisea [MGG11871]
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Pichia stipitis [Pist55822]
Candida albicans SC5314 [C192065]
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Ashbya gossypii [45190766]
Saccharomyces cerevisiae [6322220]
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Wickerhamomyces anomalus [Wa59279]
Yarrowia lipolytica [50551015]
Candida caseinolytica [Cc140644]
Lipomyces starkeyi [Ls18494]
Schizosaccharomyces octosporus [SOCG02959]
Schizosaccharomyces cryophilus [SPOG02562]
Schizosaccharomyces pombe [19115407]
Schizosaccharomyces japonicus [SJAG00035]
Mucor circinelloides [Muci31014]
Rhizopus oryzae [RO3G07794]
Phycomyces blakesleeanus [Phybl68144]
Phycomyces blakesleeanus [Phybl4598]
Mucor circinelloides [Muci34381]
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IF-2B
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DIL
Methyltransf_16
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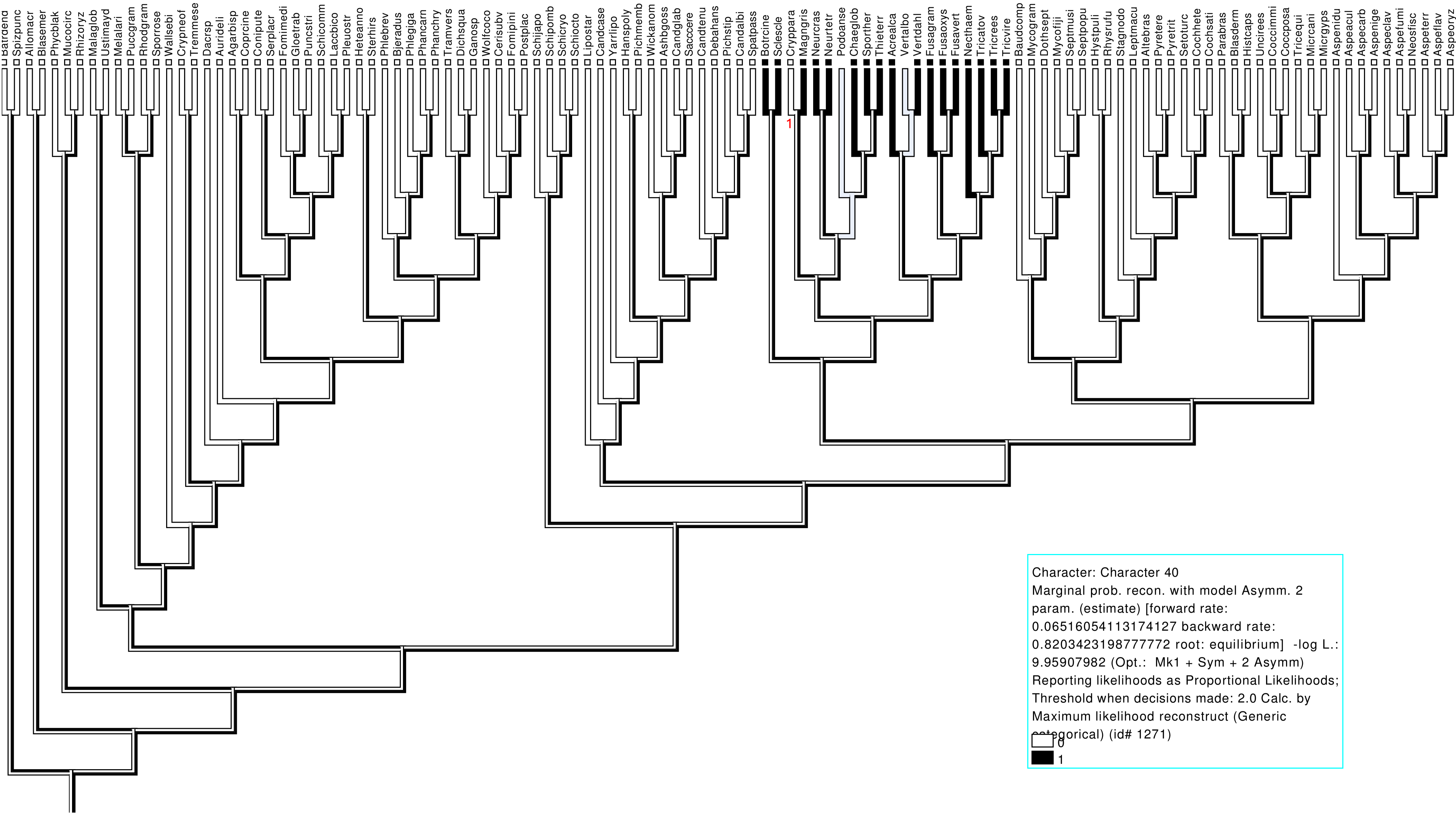
✓ Presence
Other Fusion
✗ Absence



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Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
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0.8203423198777772 root: equilibrium] -log L.:
9.95907982 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 40

September 26, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0012734091Ascl_dom1
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KDVQGLGLSSISNQIKDLGKRARENKLKPEEYQGGTFTISNMGMNPAVERFTAVINPPQA
GILAVGTTRKVAVPVETEEGTSVEWDDQIVVTGSFDHKVVDGAIGAEWIKELKKVVENPL
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>XP_0012734091Ascl_dom2
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TPENPYAQSSLPQSSPFANASSSRSGLSFGASPADFNRETHALREQSFFANTNTQLDEFL
DRGRAVLADLGQQREVLKGTQRRLYSVANTLGISGDTIRRVERRAKQDKWIFWGGVLTFF
LFCWAVLHFLR
```

2 Annotated Phylograms

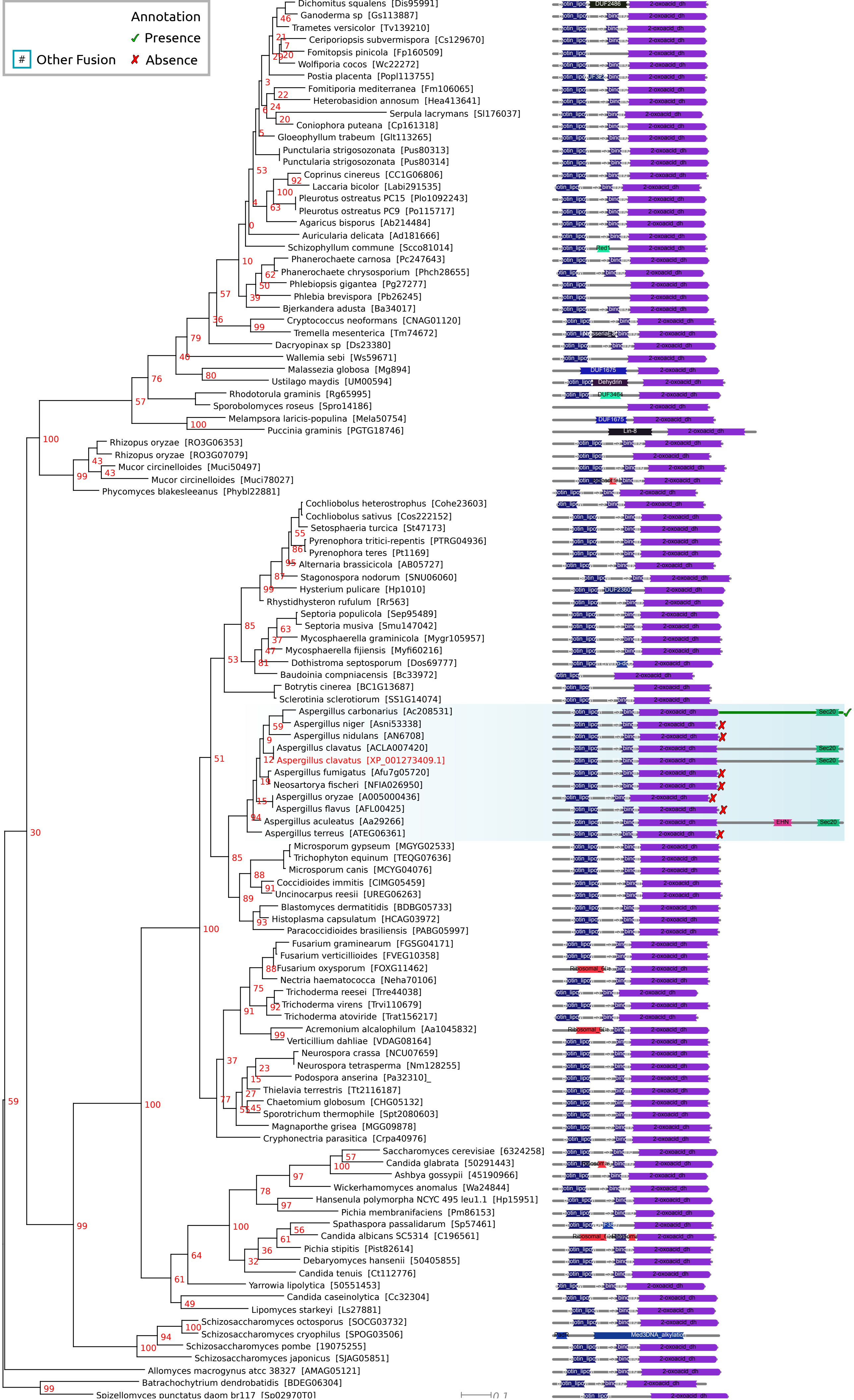
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet
    −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✓ Presence
Other Fusion
✗ Absence
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Ganoderma sp [Gs113887]
Trametes versicolor [Tv139210]
Ceriporiopsis subvermispora [Cs129670]
Fomitopsis pinicola [Fp160509]
Wolfiporia cocos [Wc22272]
Postia placenta [Popl113755]
Fomitiporia mediterranea [Fm106065]
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Serpula lacrymans [Sl176037]
Coniophora puteana [Cp161318]
Gloeophyllum trabeum [Glt113265]
Punctularia strigosozonata [Pus80313]
Punctularia strigosozonata [Pus80314]
Coprinus cinereus [CC1G06806]
Laccaria bicolor [Labi291535]
Pleurotus ostreatus PC15 [Plo1092243]
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Agaricus bisporus [Ab214484]
Auricularia delicata [Ad181666]
Schizophyllum commune [Scco81014]
Phanerochaete carnosa [Pc247643]
Phanerochaete chrysosporium [Phch28655]
Phlebiopsis gigantea [Pg27277]
Phlebia brevispora [Pb26245]
Bjerkandera adusta [Ba34017]
Cryptococcus neoformans [CNAG01120]
Tremella mesenterica [Tm74672]
Dacryopinax sp [Ds23380]
Wallemia sebi [Ws59671]
Malassezia globosa [Mg894]
Ustilago maydis [UM00594]
Rhodotorula graminis [Rg65995]
Sporobolomyces roseus [Spro14186]
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Pyrenophora tritici-repentis [PTRG04936]
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Alternaria brassicicola [AB05727]
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Hysterium pulicare [Hp1010]
Rhystidhysteron rufulum [Rr563]
Septoria populicola [Sep95489]
Septoria musiva [Smu147042]
Mycosphaerella graminicola [Mygr105957]
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Dothistroma septosporum [Dos69777]
Baudoinia compniacensis [Bc33972]
Botrytis cinerea [BC1G13687]
Sclerotinia sclerotiorum [SS1G14074]
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Aspergillus niger [Asni53338]
Aspergillus nidulans [AN6708]
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Neosartorya fischeri [NFIA026950]
Aspergillus oryzae [A005000436]
Aspergillus flavus [AFL00425]
Aspergillus aculeatus [Aa29266]
Aspergillus terreus [ATEG06361]
Microsporum gypseum [MGYG02533]
Trichophyton equinum [TEQG07636]
Microsporum canis [MCYG04076]
Coccidioides immitis [CIMG05459]
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Histoplasma capsulatum [HCAG03972]
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Verticillium dahliae [VDAG08164]
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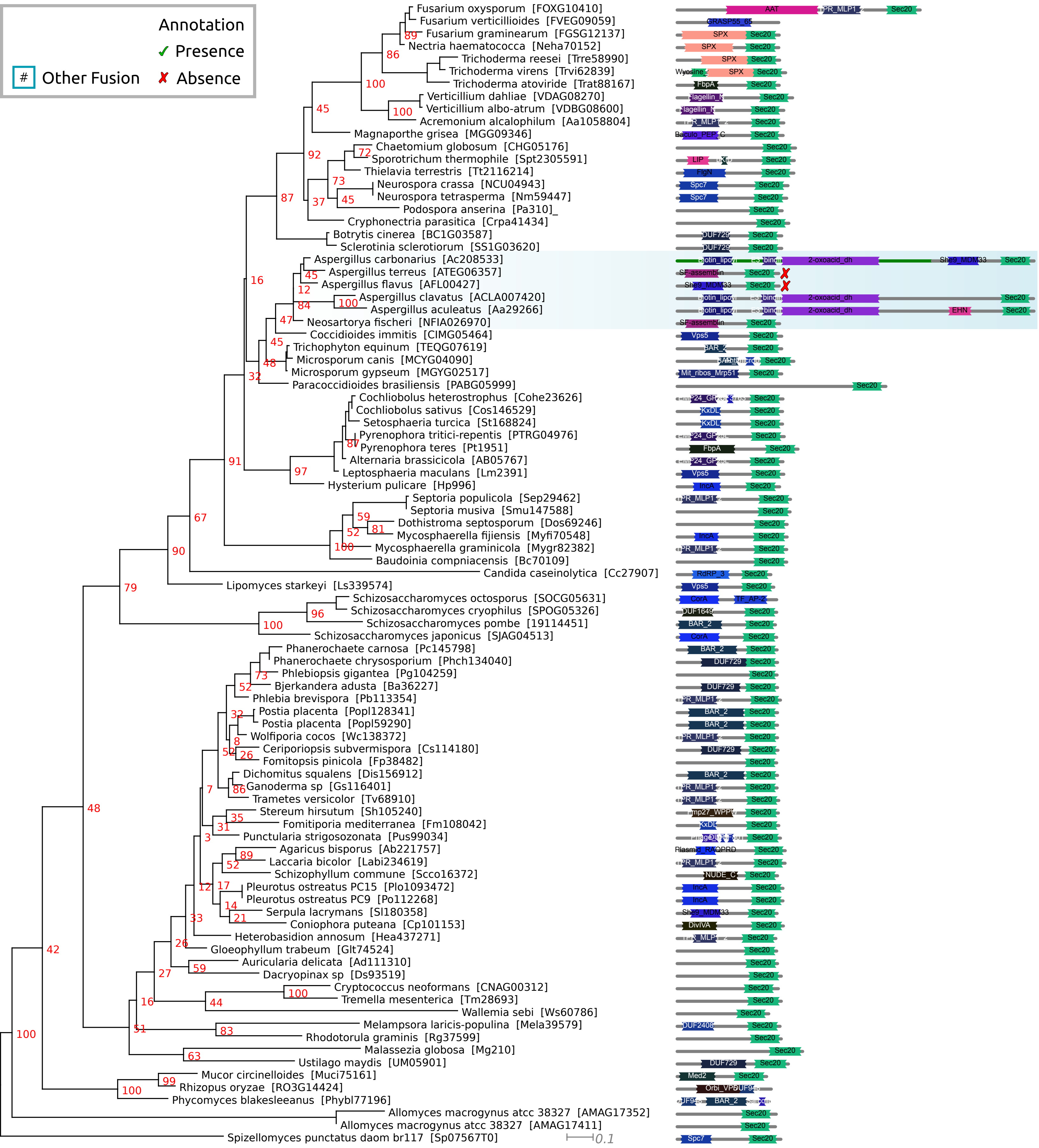
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✗ Absence
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Baudoinia compniacensis [Bc70109]
Candida caseinolytica [Cc27907]
Lipomyces starkeyi [Ls339574]
Schizosaccharomyces octosporus [SOCG05631]
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Phanerochaete carnosa [Pc145798]
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Pleurotus ostreatus PC15 [Plo1093472]
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Serpula lacrymans [Sl180358]
Coniophora puteana [Cp101153]
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Dacryopinax sp [Ds93519]
Cryptococcus neoformans [CNAG00312]
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Mucor circinelloides [Muci75161]
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Spizellomyces punctatus daom br117 [Sp07567T0]
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SPX
Sec20
FbpA
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Baculo_PEP_C
LIP
FlgN
Spc7
DUF729
Biotin_lipoyl
2-oxoacid_dh
She9_MDM33
SE-assemblin
EHN
Vps5
BAR_2
Mit_ribos_Mrp51
KxDL
IncA
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CorA
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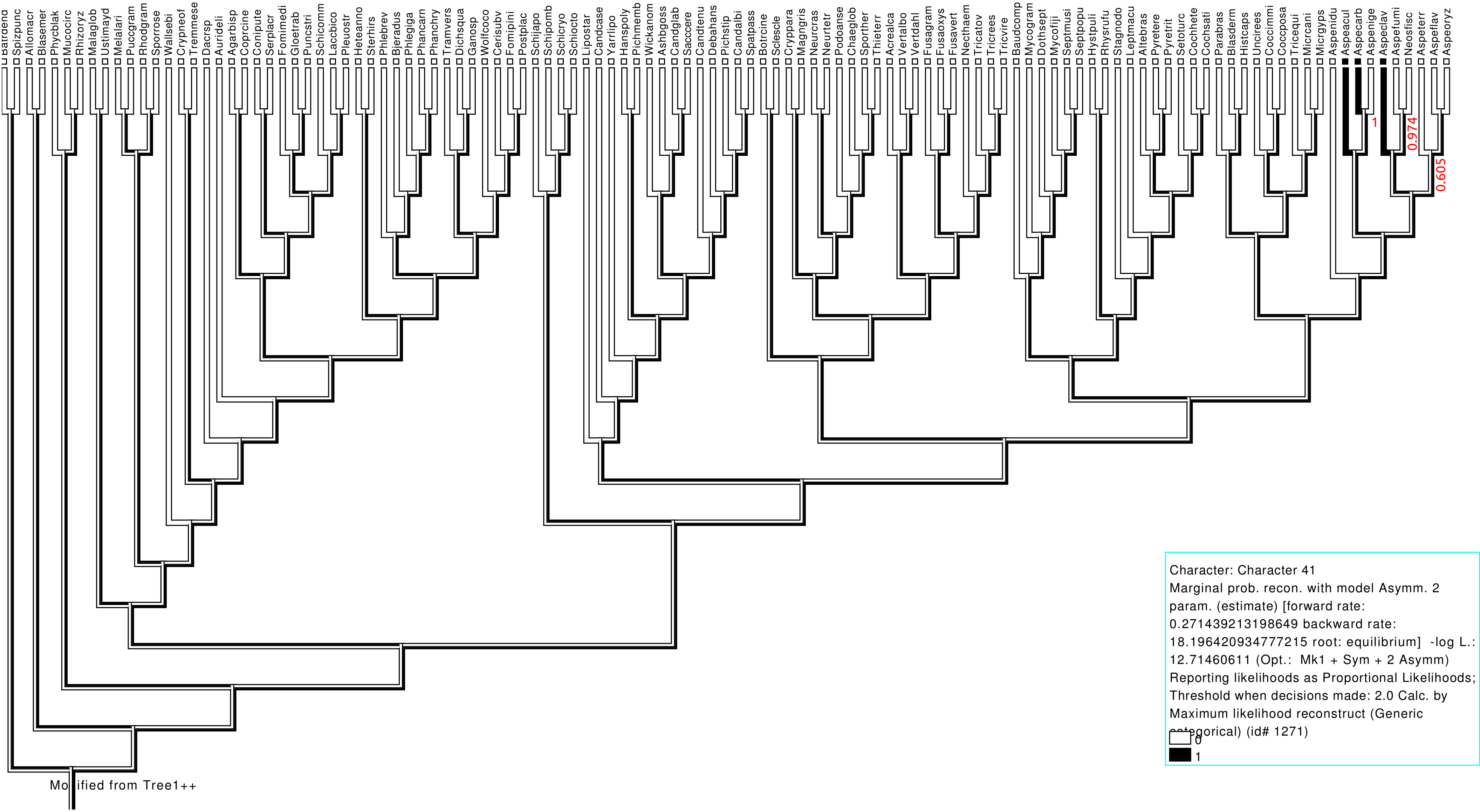
DUF948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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
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Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
1
0.974
0.605
Modified from Tree1++
Character: Character 41
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.271439213198649 backward rate:
18.196420934777215 root: equilibrium] -log L.:
12.71460611 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 41

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>EGZ73980_F41
MSASPTACQDLARSVLENISGINRALNVTPDDVNGVDSDPKINETHDGHNDKATTEAGNE
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RRYFREKAANNESVEDVVELRDASVDVFGYTQHYLYTGHVYPDTPPDYEVLIGIWKLGHS
LGIDGLCDATIDAMIEYRRITNSIPATALLVQVWDETPEGSSIRKLLLSWAADYMRASED
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ARPAKRARYSDAGHTNGAKATPNGRKGPGRPSTTGPKTGQKRKYNVANGEVELTTSKKLA
FCDDLLTRMLSGPGFWTRLVGPFRDPVNPESDGVPDYFDKVAKPMDLQTMRAKMDRNEYA
DENEFLADMNQIFNNCYTYWAKKDPMWQACERLQKTFEDKYSQMSKWIAKMEGQEGSN
```

2 Annotated Phylograms

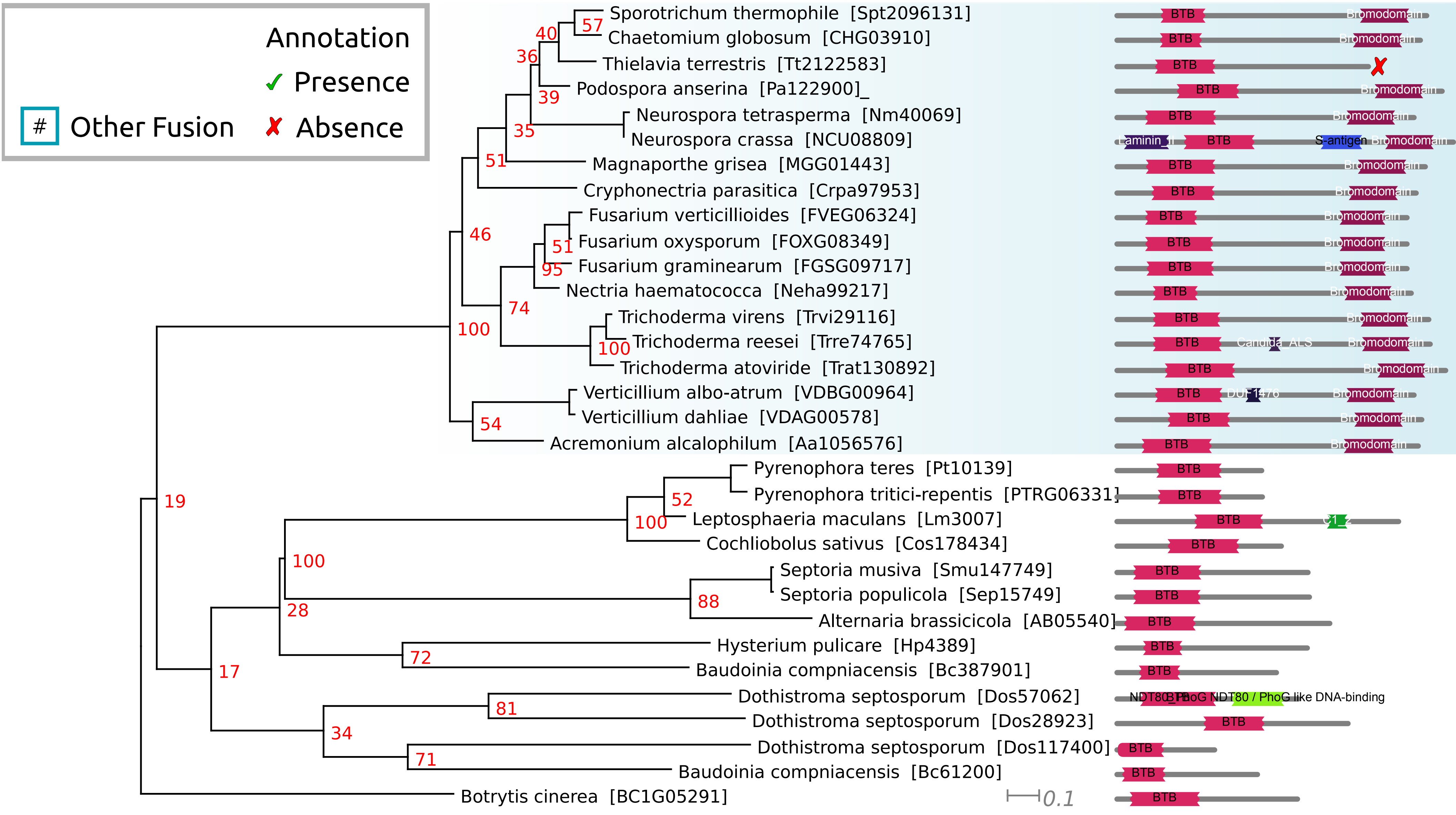
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Sporotrichum thermophile [Spt2096131]
Chaetomium globosum [CHG03910]
Thielavia terrestris [Tt2122583]
Podospora anserina [Pa122900]_
Neurospora tetrasperma [Nm40069]
Neurospora crassa [NCU08809]
Magnaporthe grisea [MGG01443]
Cryphonectria parasitica [Crpa97953]
Fusarium verticillioides [FVEG06324]
Fusarium oxysporum [FOXG08349]
Fusarium graminearum [FGSG09717]
Nectria haematococca [Neha99217]
Trichoderma virens [Trvi29116]
Trichoderma reesei [Trre74765]
Trichoderma atoviride [Trat130892]
Verticillium albo-atrum [VDBG00964]
Verticillium dahliae [VDAG00578]
Acremonium alcalophilum [Aa1056576]
Pyrenophora teres [Pt10139]
Pyrenophora tritici-repentis [PTRG06331]
Leptosphaeria maculans [Lm3007]
Cochliobolus sativus [Cos178434]
Septoria musiva [Smu147749]
Septoria populicola [Sep15749]
Alternaria brassicicola [AB05540]
Hysterium pulicare [Hp4389]
Baudoinia compniacensis [Bc387901]
Dothistroma septosporum [Dos57062]
Dothistroma septosporum [Dos28923]
Dothistroma septosporum [Dos117400]
Baudoinia compniacensis [Bc61200]
Botrytis cinerea [BC1G05291]
57
40
36
39
35
51
46
51
95
74
100
100
54
19
52
100
100
88
28
72
17
81
34
71
0.1
BTB
Bromodomain
Laminin_II
S-antigen
Candida_ALS
DUF1476
C1_2
NDT80_PhoG
NDT80 / PhoG like DNA-binding


Annotation
✓ Presence
Other Fusion
✗ Absence
Coccidioides immitis [CIMG00589]
Uncinocarpus reesii [UREG00602]
Aspergillus nidulans [AN3621]
Aspergillus oryzae [A009000327]
Aspergillus terreus [ATEG03149]
Aspergillus aculeatus [Aa62136]
Aspergillus niger [Asni171513]
Neosartorya fischeri [NFIA103660]
Aspergillus fumigatus [Afu4g12650]
Aspergillus carbonarius [Ac212399]
Aspergillus clavatus [ACLA051640]
Trichophyton equinum [TEQG02072]
Microsporum canis [MCYG01135]
Microsporum gypseum [MGYG01686]
Histoplasma capsulatum [HCAG06079]
Paracoccidioides brasiliensis [PABG03615]
Blastomyces dermatitidis [BDBG02277]
Setosphaeria turcica [St162079]
Cochliobolus heterostrophus [Cohe110450]
Cochliobolus sativus [Cos184866]
Stagonospora nodorum [SNU11530]
Pyrenophora tritici-repentis [PTRG04584]
Pyrenophora teres [Pt4522]
Alternaria brassicicola [AB03040]
Hysterium pulicare [Hp4478]
Rhystidhysteron rufulum [Rr1658]
Leptosphaeria maculans [Lm3678]
Microsporum gypseum [MGYG08341]
Trichophyton equinum [TEQG07481]
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Histoplasma capsulatum [HCAG02224]
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Pyrenophora tritici-repentis [PTRG08292]
Pyrenophora teres [Pt7417]
Sclerotinia sclerotiorum [SS1G02197]
Podospora anserina [Pa122850]
Botrytis cinerea [BC1G13074]
Sclerotinia sclerotiorum [SS1G05801]
Fusarium oxysporum [FOXG01180]
Fusarium verticillioides [FVEG00336]
Nectria haematococca [Neha105852]
Fusarium graminearum [FGSG00280]
Trichoderma virens [Trvi72469]
Trichoderma atoviride [Trat47901]
Trichoderma reesei [Trre64680]
Verticillium dahliae [VDAG01089]
Verticillium albo-atrum [VDBG03861]
Magnaporthe grisea [MGG03677]
Cryphonectria parasitica [Crpa43552]
Acremonium alcalophilum [Aa2027453]
Fusarium oxysporum [FOXG14847]
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Chaetomium globosum [CHG01905]
Sporotrichum thermophile [Spt61659]
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Neurospora crassa [NCU10847]
Neurospora tetrasperma [Nm142084]
Septoria populicola [Sep101130]
Septoria musiva [Smu148087]
Dothistroma septosporum [Dos52021]
Baudoinia compniacensis [Bc31218]
Mycosphaerella graminicola [Mygr40511]
Mycosphaerella fijiensis [Myfi39249]
Phanerochaete carnosa [Pc258454]
Phanerochaete chrysosporium [Phch124134]
Phlebiopsis gigantea [Pg108643]
Bjerkandera adusta [Ba106306]
Fomitiporia mediterranea [Fm85131]
Stereum hirsutum [Sh66795]
Phlebia brevispora [Pb125653]
Postia placenta [Popl110988]
Postia placenta [Popl47487]
Fomitopsis pinicola [Fp126344]
Wolfiporia cocos [Wc103864]
Ceriporiopsis subvermispora [Cs50046]
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Auricularia delicata [Ad55704]
Pleurotus ostreatus PC9 [Po36365]
Dichomitus squalens [Dis132942]
Trametes versicolor [Tv113075]
Laccaria bicolor [Labi319636]
Schizophyllum commune [Scco69536]
Malassezia globosa [Mg1715]
Debaryomyces hansenii [50427895]
Pichia stipitis [Pist40548]
Spathaspora passalidarum [Sp133455]
Candida albicans SC5314 [C19705]
Lipomyces starkeyi [Ls39734]
Yarrowia lipolytica [50551997]
Pneumocystis carinii [201011312]
Pneumocystis carinii [CON3311]
Candida caseinolytica [Cc64384]
Wickerhamomyces anomalus [Wa76317]
Schizosaccharomyces octosporus [SOCG00602]
Schizosaccharomyces cryophilus [SPOG01904]
Schizosaccharomyces japonicus [SJAG02773]
Schizosaccharomyces pombe [19115719]
Candida glabrata [50287799]
Saccharomyces cerevisiae [6321691]
Ashbya gossypii [45190900]
Hansenula polymorpha NCYC 495 leu1.1 [Hp84267]
Pichia membranifaciens [Pm28947]
Rhodotorula graminis [Rg24126]
Sporobolomyces roseus [Spro9185]
Puccinia graminis [PGTG05281]
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Cryptococcus neoformans [CNAG00375]
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Dacryopinax sp [Ds76862]
Encephalitozoon cuniculi [19069394]
Alternaria brassicicola [AB07122]
Pyrenophora teres [Pt552]
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Cochliobolus heterostrophus [Cohe99029]
Cochliobolus sativus [Cos166346]
Setosphaeria turcica [St158273]
Leptosphaeria maculans [Lm9575]
Stagonospora nodorum [SNU15588]
Rhystidhysteron rufulum [Rr519]
Botrytis cinerea [BC1G10754]
Sclerotinia sclerotiorum [SS1G14328]
Neosartorya fischeri [NFIA105530]
Aspergillus fumigatus [Afu4g10540]
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Aspergillus nidulans [AN1984]
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Blastomyces dermatitidis [BDBG03533]
Histoplasma capsulatum [HCAG01690]
Coccidioides posadasii [CPSG03280]
Coccidioides immitis [CIMG01460]
Uncinocarpus reesii [UREG05135]
Candida caseinolytica [Cc30960]
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Ashbya gossypii [45190674]
Candida glabrata [50285717]
Wickerhamomyces anomalus [Wa25639]
Hansenula polymorpha NCYC 495 leu1.1 [Hp15865]
Pichia membranifaciens [Pm102084]
Debaryomyces hansenii [50413693]
Candida tenuis [Ct98388]
Candida albicans SC5314 [C19978]
Pichia stipitis [Pist73625]
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Rhizopus oryzae [RO3G08999]
Mucor circinelloides [Muci83780]
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Schizosaccharomyces cryophilus [SPOG00429]
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Daphnia pulex [Dapu302185]
Helobdella robusta [Hero64016]
Branchiostoma floridae [128954Bf]
Ciona intestinalis [Ciin271883]
Trichoplax adhaerens [Trad20501]
Lottia gigantea [Logi52465]
Mus musculus [71067345]
Gallus gallus [71897271]
Takifugu rubripes [Taru743199]
Danio rerio [198282011]
Homo sapiens [46399198]
Homo sapiens [46399200]
Mus musculus [120431736]
Homo sapiens [11067749]
Mus musculus [31981064]
Danio rerio [47086635]
Gallus gallus [118099425]
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Sporotrichum thermophile [Spt2096131]
Podospora anserina [Pa122900]
Chaetomium globosum [CHG03910]
Neurospora crassa [NCU08809]
Neurospora tetrasperma [Nm40069]
Cryphonectria parasitica [Crpa97953]
Magnaporthe grisea [MGG01443]
Trichoderma virens [Trvi29116]
Trichoderma reesei [Trre74765]
Trichoderma atoviride [Trat130892]
Nectria haematococca [Neha99217]
Fusarium oxysporum [FOXG08349]
Fusarium verticillioides [FVEG06324]
Fusarium graminearum [FGSG09717]
Verticillium dahliae [VDAG00578]
Verticillium albo-atrum [VDBG00964]
Acremonium alcalophilum [Aa1056576]
Helobdella robusta [Hero192840]
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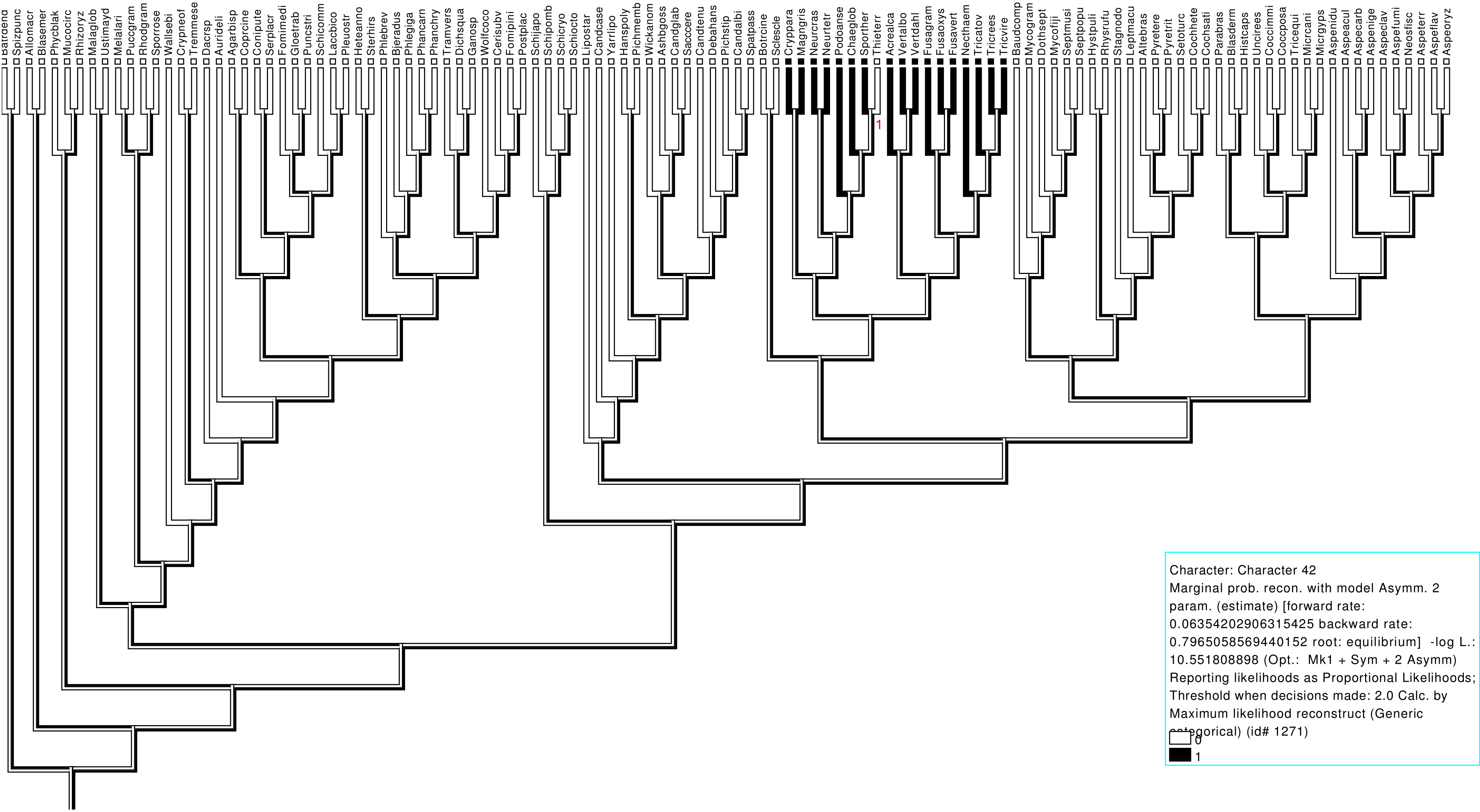
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Allomacr
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Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
1
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 42
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.06354202906315425 backward rate:
0.7965058569440152 root: equilibrium] -log L.:
10.551808898 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 42

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>XP_0033012721Pyte_dom1
MAGRLSDMSASPRTGKRNRGILPPANQPTRLDCKLATPDTVRRESYNCNMSEERRPRSRF
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ATATNPPLYLRITSTSKEGLDKAIEMIEEMMKEDLPNLVDERRFRRREPENFERDEFGRR
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DRGDRGDRERNNSYGYGGGGGGGGGSGYGGGAGGYGGQGGYGGHNGYAAQDTLMSPAAAT
PTADANAQAYDANATQAAWAAYYAQNPEADPYAAYGGYQAYMQQYAAYYAQSGYGQTQSP
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>XP_0033012721Pyte_dom2
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GGLGAIVIGVGGADAVDALVDAPWELKAPKILGVKLTGELSGWASPKDVILKLAGQLTVR
GGTGFIIEYFGPGVQTLSCTGMATICNMGAEVGATTSLFPFSPAHIPYLQATHRGPIAEA
AAKIAQSPMQQNLLRPDPEAVYDKVIEINLSELEPHINGPFTPDLSTPLSKFKSVVEENG
WPKTFGAGLIGSCTNSSYQDMTRSEEIVKQASAAGLKPRADFFITPGSEQIRATLERDDT
LSTFTEAGGTRTDEVKKGESNAILTSYNRNFPGRNDGNRATMNFLASPELITAMSYSGST
TFNPMTDSIPTPSGEPFKFAPPKGSDLPSAGFADGNPDFMPTPGVPDPSVEVVVSPTSSR
LALLDPFPAFPDSDFTGLRVLYKVKGQCTTDTISAAGPWLKYKGHLPNISENTLIGAVNA
QTDEVNVAYDVDGKTSSIPELAKRWRDQGVEWLVVAEHNYGEGSAREHAALQPRYLGGRI
ILAKSFARIHETNLKKQGIIPLTFANEADYDLFAACDEVATRGLLDVLRSGGKGEVELVL
KKKDGSEKVIKTKHTLSHDQCGFVLAGSALNLLARQGREIKEEVTRSAELTD
```

2 Annotated Phylograms

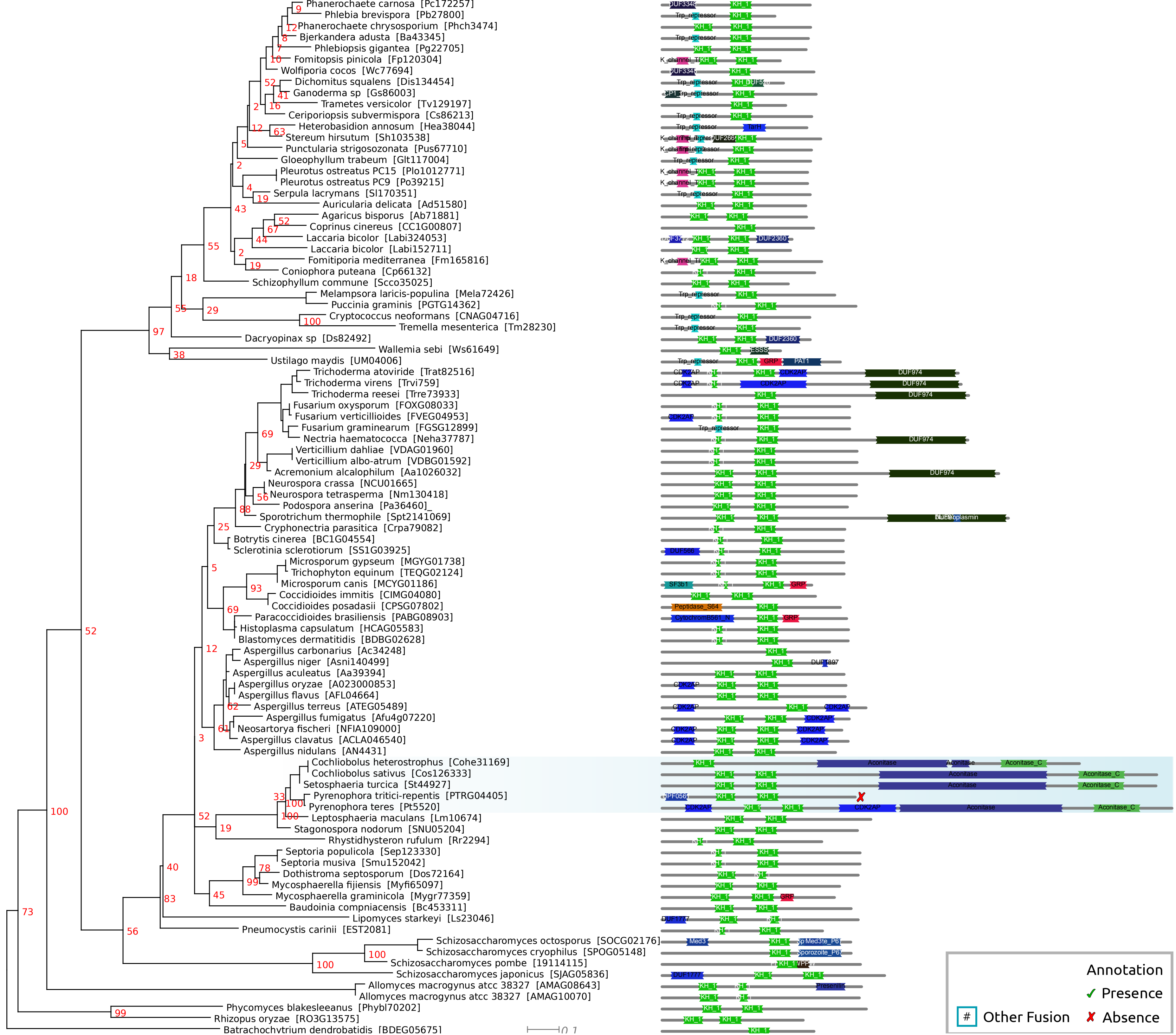
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Fomitopsis pinicola [Fp120304]
Wolfiporia cocos [Wc77694]
Dichomitus squalens [Dis134454]
Ganoderma sp [Gs86003]
Trametes versicolor [Tv129197]
Ceriporiopsis subvermispora [Cs86213]
Heterobasidion annosum [Hea38044]
Stereum hirsutum [Sh103538]
Punctularia strigosozonata [Pus67710]
Gloeophyllum trabeum [Glt117004]
Pleurotus ostreatus PC15 [Plo1012771]
Pleurotus ostreatus PC9 [Po39215]
Serpula lacrymans [Sl170351]
Auricularia delicata [Ad51580]
Agaricus bisporus [Ab71881]
Coprinus cinereus [CC1G00807]
Laccaria bicolor [Labi324053]
Laccaria bicolor [Labi152711]
Fomitiporia mediterranea [Fm165816]
Coniophora puteana [Cp66132]
Schizophyllum commune [Scco35025]
Melampsora laricis-populina [Mela72426]
Puccinia graminis [PGTG14362]
Cryptococcus neoformans [CNAG04716]
Tremella mesenterica [Tm28230]
Dacryopinax sp [Ds82492]
Wallemia sebi [Ws61649]
Ustilago maydis [UM04006]
Trichoderma atoviride [Trat82516]
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Trichoderma reesei [Tre73933]
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Fusarium verticillioides [FVEG04953]
Fusarium graminearum [FGSG12899]
Nectria haematococca [Neha37787]
Verticillium dahliae [VDAG01960]
Verticillium albo-atrum [VDBG01592]
Acremonium alcalophilum [Aa1026032]
Neurospora crassa [NCU01665]
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Podospora anserina [Pa36460]
Sporotrichum thermophile [Spt2141069]
Cryphonectria parasitica [Crpa79082]
Botrytis cinerea [BC1G04554]
Sclerotinia sclerotiorum [SS1G03925]
Microsporum gypseum [MGYG01738]
Trichophyton equinum [TEQG02124]
Microsporum canis [MCYG01186]
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Coccidioides posadasii [CPSG07802]
Paracoccidioides brasiliensis [PABG08903]
Histoplasma capsulatum [HCAG05583]
Blastomyces dermatitidis [BDBG02628]
Aspergillus carbonarius [Ac34248]
Aspergillus niger [Asni140499]
Aspergillus aculeatus [Aa39394]
Aspergillus oryzae [A023000853]
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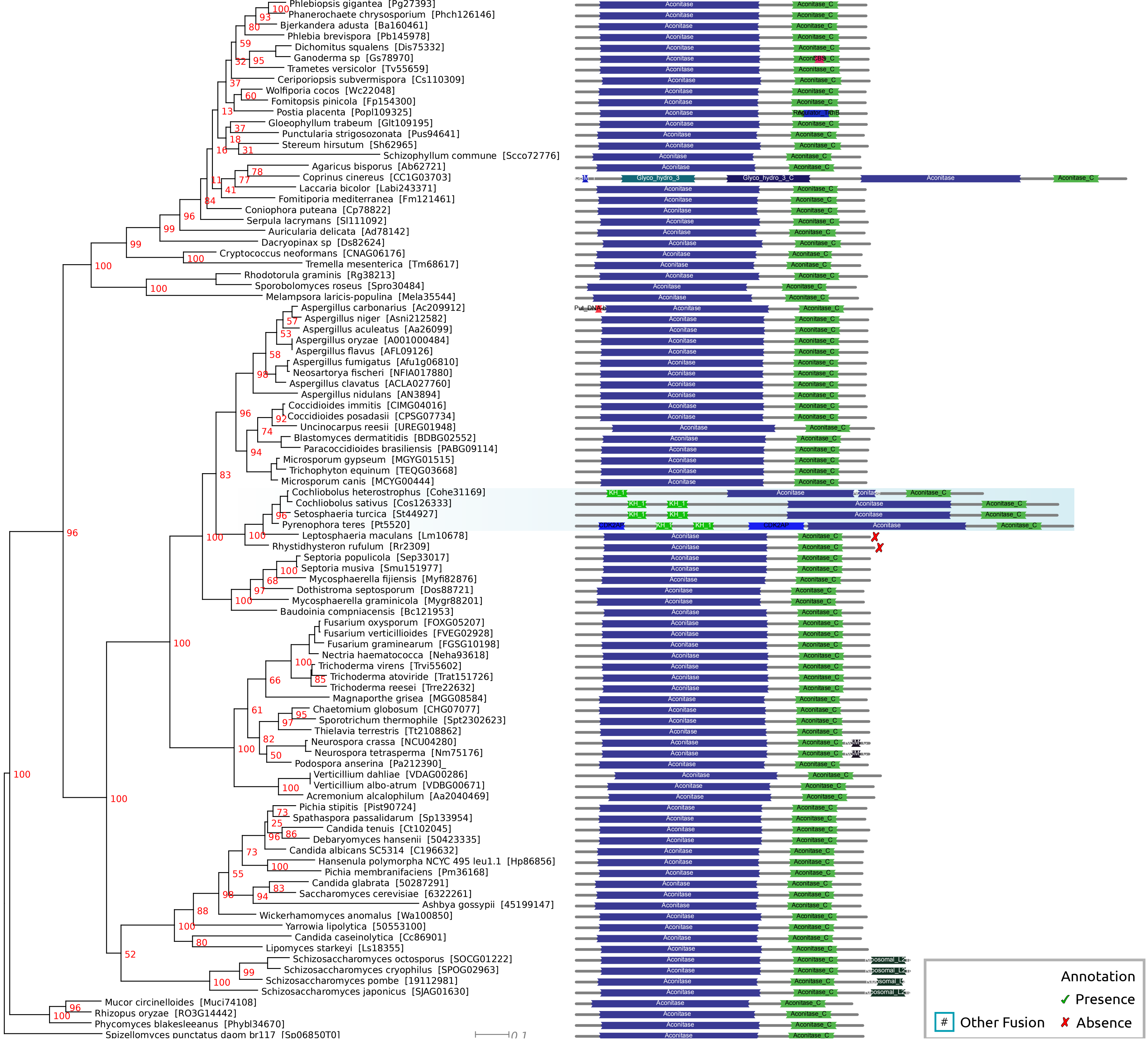
Aspergillus terreus [ATEG05489]
Aspergillus fumigatus [Afu4g07220]
Neosartorya fischeri [NFIA109000]
Aspergillus clavatus [ACLA046540]
Aspergillus nidulans [AN4431]
Cochliobolus heterostrophus [Cohe31169]
Cochliobolus sativus [Cos126333]
Setosphaeria turcica [St44927]
Pyrenophora tritici-repentis [PTRG04405]
Pyrenophora teres [Pt5520]
Leptosphaeria maculans [Lm10674]
Stagonospora nodorum [SNU05204]
Rhystidhysteron rufulum [Rr2294]
Septoria populicola [Sep123330]
Septoria musiva [Smu152042]
Dothistroma septosporum [Dos72164]
Mycosphaerella fijiensis [Myfi65097]
Mycosphaerella graminicola [Mygr77359]
Baudoinia compniacensis [Bc453311]
Lipomyces starkeyi [Ls23046]
Pneumocystis carinii [EST2081]
Schizosaccharomyces octosporus [SOCG02176]
Schizosaccharomyces cryophilus [SPOG05148]
Schizosaccharomyces pombe [19114115]
Schizosaccharomyces japonicus [SJAG05836]
Allomyces macrogynus atcc 38327 [AMAG08643]
Allomyces macrogynus atcc 38327 [AMAG10070]
Phycomyces blakesleeanus [Phybl70202]
Rhizopus oryzae [RO3G13575]
Batrachochytrium dendrobatidis [BDEG05675]
0.1
KH_1
Trp_repressor
K_channel_TID
DUF3348
DUF2360
ESSS
GRP
PAT1
CDK2AP
DUF974
Nucleoplasmin
DUF568
SF3b1
Peptidase_S64
CytochromB561_N
DUF1897
Aconitase
Aconitase_C
PF0565
DUF1777
Med3
Sp.Med3te_P6
Sporozoite_P67
VPS
Presenilin
TarH
Annotation
✓ Presence
Other Fusion
✗ Absence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Bjerkandera adusta [Ba160461]
Phlebia brevispora [Pb145978]
Dichomitus squalens [Dis75332]
Ganoderma sp [Gs78970]
Trametes versicolor [Tv55659]
Ceriporiopsis subvermispora [Cs110309]
Wolfiporia cocos [Wc22048]
Fomitopsis pinicola [Fp154300]
Postia placenta [Popl109325]
Gloeophyllum trabeum [Glt109195]
Punctularia strigosozonata [Pus94641]
Stereum hirsutum [Sh62965]
Schizophyllum commune [Scco72776]
Agaricus bisporus [Ab62721]
Coprinus cinereus [CC1G03703]
Laccaria bicolor [Labi243371]
Fomitiporia mediterranea [Fm121461]
Coniophora puteana [Cp78822]
Serpula lacrymans [Sl111092]
Auricularia delicata [Ad78142]
Dacryopinax sp [Ds82624]
Cryptococcus neoformans [CNAG06176]
Tremella mesenterica [Tm68617]
Rhodotorula graminis [Rg38213]
Sporobolomyces roseus [Spro30484]
Melampsora laricis-populina [Mela35544]
Aspergillus carbonarius [Ac209912]
Aspergillus niger [Asni212582]
Aspergillus aculeatus [Aa26099]
Aspergillus oryzae [A001000484]
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Neosartorya fischeri [NFIA017880]
Aspergillus clavatus [ACLA027760]
Aspergillus nidulans [AN3894]
Coccidioides immitis [CIMG04016]
Coccidioides posadasii [CPSG07734]
Uncinocarpus reesii [UREG01948]
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Microsporum gypseum [MGYG01515]
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Baudoinia compniacensis [Bc121953]
Fusarium oxysporum [FOXG05207]
Fusarium verticillioides [FVEG02928]
Fusarium graminearum [FGSG10198]
Nectria haematococca [Neha93618]
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Trichoderma atoviride [Trat151726]
Trichoderma reesei [Trre22632]
Magnaporthe grisea [MGG08584]
Chaetomium globosum [CHG07077]
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Thielavia terrestris [Tt2108862]
Neurospora crassa [NCU04280]
Neurospora tetrasperma [Nm75176]
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Spathaspora passalidarum [Sp133954]
Candida tenuis [Ct102045]
Debaryomyces hansenii [50423335]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp86856]
Pichia membranifaciens [Pm36168]
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Ashbya gossypii [45199147]
Wickerhamomyces anomalus [Wa100850]
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Lipomyces starkeyi [Ls18355]
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Schizosaccharomyces cryophilus [SPOG02963]
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Schizosaccharomyces japonicus [SJAG01630]
Mucor circinelloides [Muci74108]
Rhizopus oryzae [RO3G14442]
Phycomyces blakesleeanus [Phybl34670]
Spizellomyces punctatus daom br117 [Sp06850T0]
0.1
Aconitase
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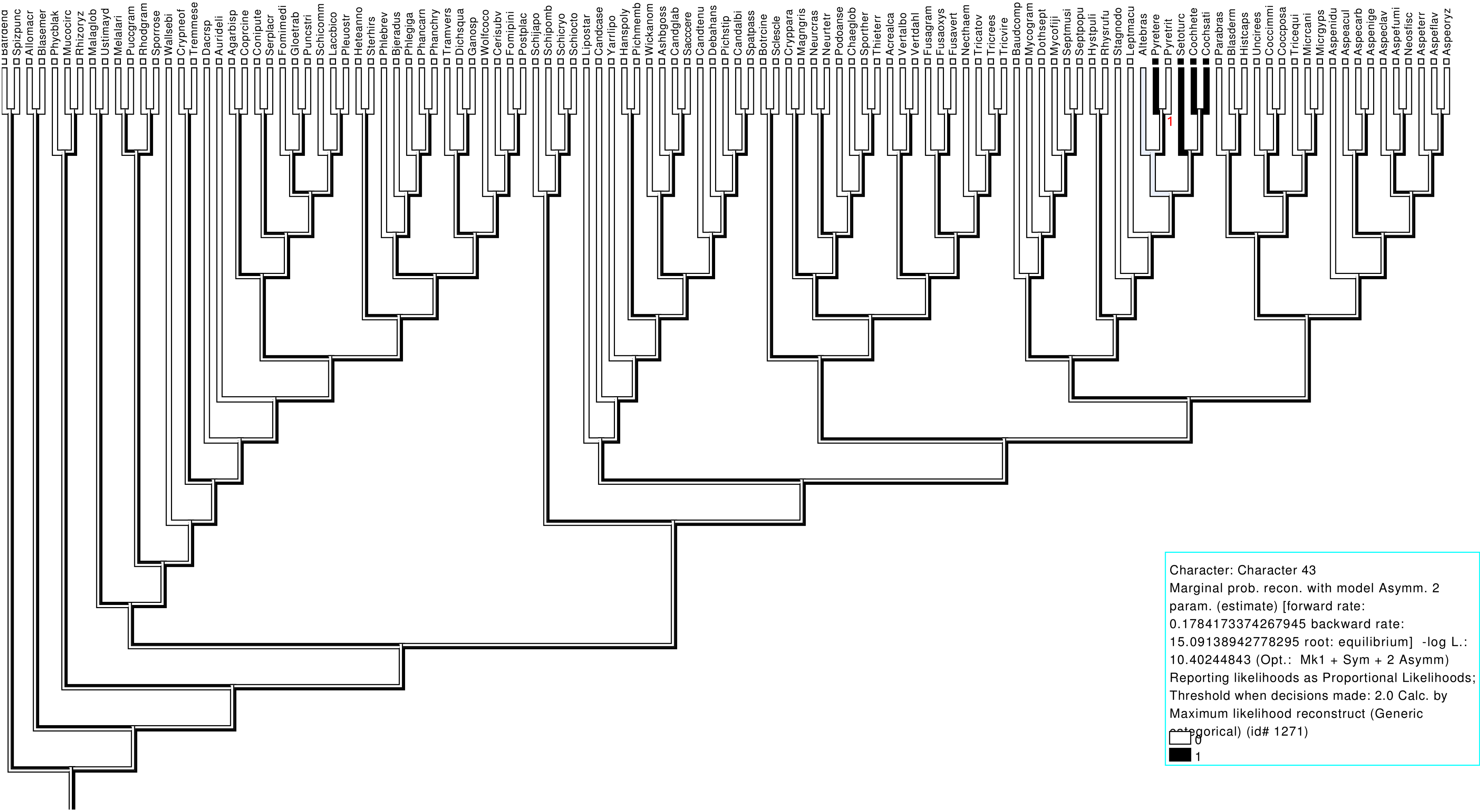
Glyco_hydro_3
Glyco_hydro_3_C
Regulator_TrmB
Put_DNA-b
KH_1
CDK2AP
Annotation
✓ Presence
Other Fusion
✗ Absence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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucggram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
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Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Character: Character 43
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.1784173374267945 backward rate: 15.09138942778295 root: equilibrium] -log L.: 10.40244843 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 43

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0033035321Pyte_dom1
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NGFALEPSVSPPQSQFSLSHQTRHSTMGSQLDTALRLRNITASDPSSHLIDPSLLKLLDS
FNATTGISRLASMPDHDPTSLTTVSLRGGEGDIPLPAPYPFNNRSDYGDYVAWKRHYYRL
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PVASSSATKSTLNTLFNNYVEAGAQDKDIVGVEGTMQYFVEVDVDAEGLDALVALEIVQA
PTIGEMSREGFVNGWSERGCDTVDKQKRYIKTLKREMPGSKDLFTRVYRHTFPIAKTAGQ
KAVALDVALVYWELLFSSPLSAVKWSSPNTPWLTWWTEFLTTSYKKSVNKDMWNETLKFA
>XP_0033035321Pyte_dom2
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HQSDRFMCVDPSWRKPKGIDNRVRRRFKGQAAMPKIGYGSNRKTRHMMPSGHKAFVVNNV
ADVDLLLMHNSTFAAEIAHAVSARKRIDIIARAKQIGVKVTNGKARVKTES
```

2 Annotated Phylograms

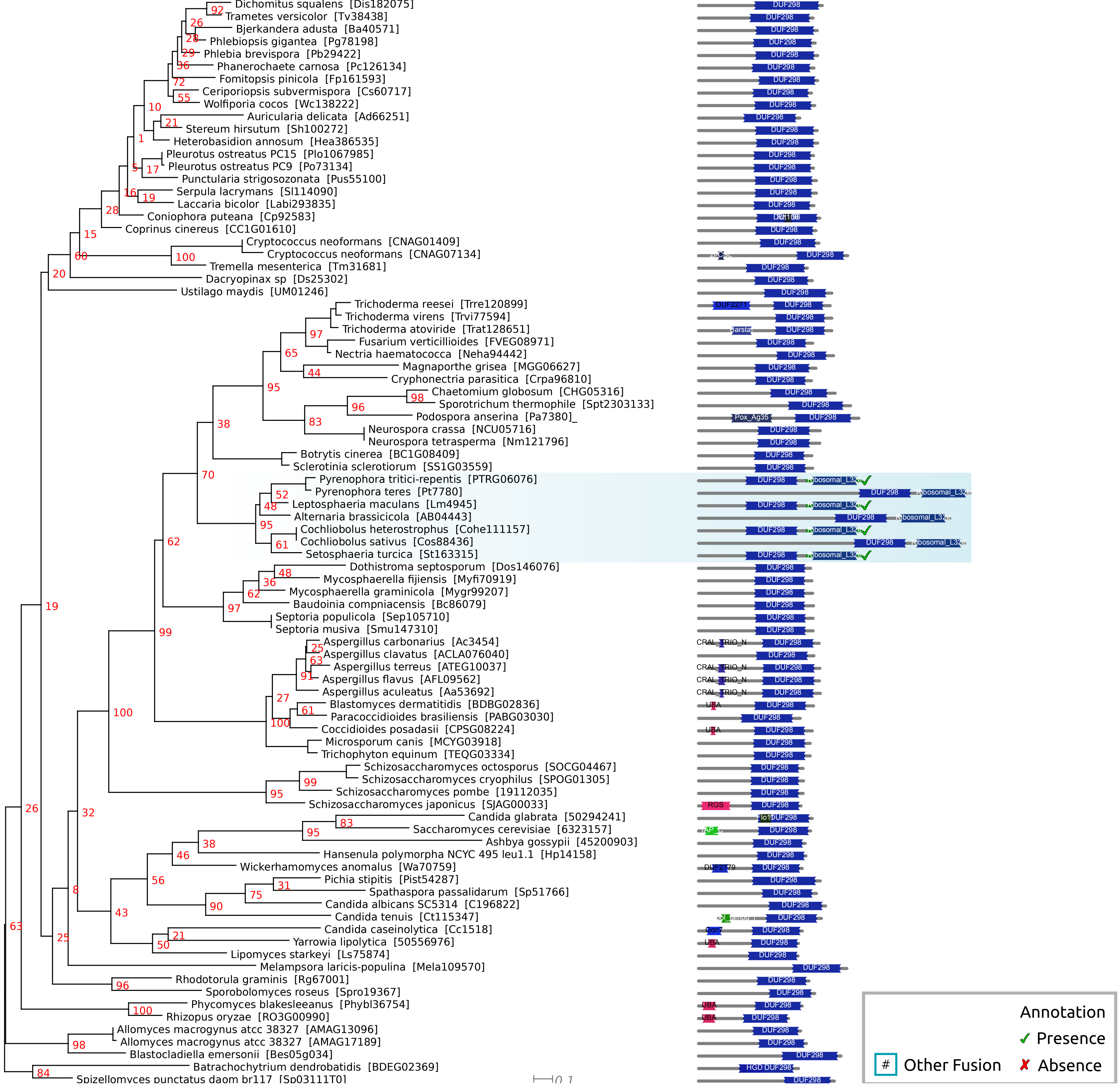
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Trametes versicolor [Tv38438]
Bjerkandera adusta [Ba40571]
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Phlebia brevispora [Pb29422]
Phanerochaete carnosa [Pc126134]
Fomitopsis pinicola [Fp161593]
Ceriporiopsis subvermispora [Cs60717]
Wolfiporia cocos [Wc138222]
Auricularia delicata [Ad66251]
Stereum hirsutum [Sh100272]
Heterobasidion annosum [Hea386535]
Pleurotus ostreatus PC15 [Plo1067985]
Pleurotus ostreatus PC9 [Po73134]
Punctularia strigosozonata [Pus55100]
Serpula lacrymans [Sl114090]
Laccaria bicolor [Labi293835]
Coniophora puteana [Cp92583]
Coprinus cinereus [CC1G01610]
Cryptococcus neoformans [CNAG01409]
Cryptococcus neoformans [CNAG07134]
Tremella mesenterica [Tm31681]
Dacryopinax sp [Ds25302]
Ustilago maydis [UM01246]
Trichoderma reesei [Trre120899]
Trichoderma virens [Trvi77594]
Trichoderma atoviride [Trat128651]
Fusarium verticillioides [FVEG08971]
Nectria haematococca [Neha94442]
Magnaporthe grisea [MGG06627]
Cryphonectria parasitica [Crpa96810]
Chaetomium globosum [CHG05316]
Sporotrichum thermophile [Spt2303133]
Podospora anserina [Pa7380]_
Neurospora crassa [NCU05716]
Neurospora tetrasperma [Nm121796]
Botrytis cinerea [BC1G08409]
Sclerotinia sclerotiorum [SS1G03559]
Pyrenophora tritici-repentis [PTRG06076]
Pyrenophora teres [Pt7780]
Leptosphaeria maculans [Lm4945]
Alternaria brassicicola [AB04443]
Cochliobolus heterostrophus [Cohe111157]
Cochliobolus sativus [Cos88436]
Setosphaeria turcica [St163315]
Dothistroma septosporum [Dos146076]
Mycosphaerella fijiensis [Myfi70919]
Mycosphaerella graminicola [Mygr99207]
Baudoinia compniacensis [Bc86079]
Septoria populicola [Sep105710]
Septoria musiva [Smu147310]
Aspergillus carbonarius [Ac3454]
Aspergillus clavatus [ACLA076040]
Aspergillus terreus [ATEG10037]
Aspergillus flavus [AFL09562]
Aspergillus aculeatus [Aa53692]
Blastomyces dermatitidis [BDBG02836]
Paracoccidioides brasiliensis [PABG03030]
Coccidioides posadasii [CPSG08224]
Microsporum canis [MCYG03918]
Trichophyton equinum [TEQG03334]
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Schizosaccharomyces cryophilus [SPOG01305]
Schizosaccharomyces pombe [19112035]
Schizosaccharomyces japonicus [SJAG00033]
Candida glabrata [50294241]
Saccharomyces cerevisiae [6323157]
Ashbya gossypii [45200903]
Hansenula polymorpha NCYC 495 leu1.1 [Hp14158]
Wickerhamomyces anomalus [Wa70759]
Pichia stipitis [Pist54287]
Spathaspora passalidarum [Sp51766]
Candida albicans SC5314 [C196822]
Candida tenuis [Ct115347]
Candida caseinolytica [Cc1518]
Yarrowia lipolytica [50556976]
Lipomyces starkeyi [Ls75874]
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Rhodotorula graminis [Rg67001]
Sporobolomyces roseus [Spro19367]
Phycomyces blakesleeanus [Phybl36754]
Rhizopus oryzae [RO3G00990]
Allomyces macrogynus atcc 38327 [AMAG13096]
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Batrachochytrium dendrobatidis [BDEG02369]
Spizellomyces punctatus daom br117 [Sp03111T0]
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DUF298
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DUF2271
Barstar
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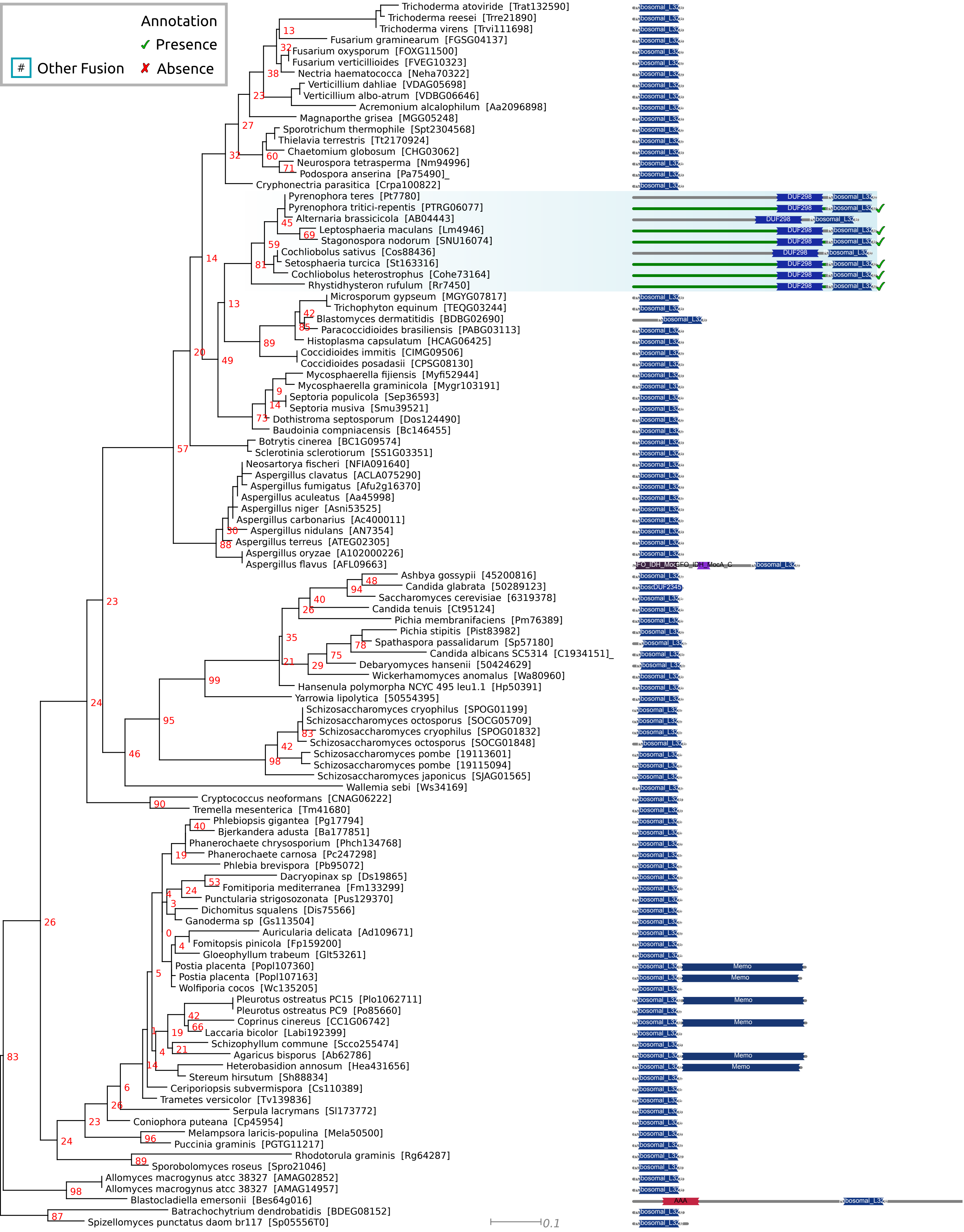
CRAL_TRIO_N
UBA
RGS
DUF2779
HGD
Annotation
✓ Presence
Other Fusion
✗ Absence


Annotation
✓ Presence
Other Fusion
✗ Absence
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Fusarium graminearum [FGSG04137]
Fusarium oxysporum [FOXG11500]
Fusarium verticillioides [FVEG10323]
Nectria haematococca [Neha70322]
Verticillium dahliae [VDAG05698]
Verticillium albo-atrum [VDBG06646]
Acremonium alcalophilum [Aa2096898]
Magnaporthe grisea [MGG05248]
Sporotrichum thermophile [Spt2304568]
Thielavia terrestris [Tt2170924]
Chaetomium globosum [CHG03062]
Neurospora tetrasperma [Nm94996]
Podospora anserina [Pa75490]_
Cryphonectria parasitica [Crpa100822]
Pyrenophora teres [Pt7780]
Pyrenophora tritici-repentis [PTRG06077]
Alternaria brassicicola [AB04443]
Leptosphaeria maculans [Lm4946]
Stagonospora nodorum [SNU16074]
Cochliobolus sativus [Cos88436]
Setosphaeria turcica [St163316]
Cochliobolus heterostrophus [Cohe73164]
Rhystidhysteron rufulum [Rr7450]
Microsporum gypseum [MGYG07817]
Trichophyton equinum [TEQG03244]
Blastomyces dermatitidis [BDBG02690]
Paracoccidioides brasiliensis [PABG03113]
Histoplasma capsulatum [HCAG06425]
Coccidioides immitis [CIMG09506]
Coccidioides posadasii [CPSG08130]
Mycosphaerella fijiensis [Myfi52944]
Mycosphaerella graminicola [Mygr103191]
Septoria populicola [Sep36593]
Septoria musiva [Smu39521]
Dothistroma septosporum [Dos124490]
Baudoinia compniacensis [Bc146455]
Botrytis cinerea [BC1G09574]
Sclerotinia sclerotiorum [SS1G03351]
Neosartorya fischeri [NFIA091640]
Aspergillus clavatus [ACLA075290]
Aspergillus fumigatus [Afu2g16370]
Aspergillus aculeatus [Aa45998]
Aspergillus niger [Asni53525]
Aspergillus carbonarius [Ac400011]
Aspergillus nidulans [AN7354]
Aspergillus terreus [ATEG02305]
Aspergillus oryzae [A102000226]
Aspergillus flavus [AFL09663]
Ashbya gossypii [45200816]
Candida glabrata [50289123]
Saccharomyces cerevisiae [6319378]
Candida tenuis [Ct95124]
Pichia membranifaciens [Pm76389]
Pichia stipitis [Pist83982]
Spathaspora passalidarum [Sp57180]
Candida albicans SC5314 [C1934151]_
Debaryomyces hansenii [50424629]
Wickerhamomyces anomalus [Wa80960]
Hansenula polymorpha NCYC 495 leu1.1 [Hp50391]
Yarrowia lipolytica [50554395]
Schizosaccharomyces cryophilus [SPOG01199]
Schizosaccharomyces octosporus [SOCG05709]
Schizosaccharomyces cryophilus [SPOG01832]
Schizosaccharomyces octosporus [SOCG01848]
Schizosaccharomyces pombe [19113601]
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Wallemia sebi [Ws34169]
Cryptococcus neoformans [CNAG06222]
Tremella mesenterica [Tm41680]
Phlebiopsis gigantea [Pg17794]
Bjerkandera adusta [Ba177851]
Phanerochaete chrysosporium [Phch134768]
Phanerochaete carnosa [Pc247298]
Phlebia brevispora [Pb95072]
Dacryopinax sp [Ds19865]
Fomitiporia mediterranea [Fm133299]
Punctularia strigosozonata [Pus129370]
Dichomitus squalens [Dis75566]
Ganoderma sp [Gs113504]
Auricularia delicata [Ad109671]
Fomitopsis pinicola [Fp159200]
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Postia placenta [Popl107360]
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Wolfiporia cocos [Wc135205]
Pleurotus ostreatus PC15 [Plo1062711]
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Coprinus cinereus [CC1G06742]
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Heterobasidion annosum [Hea431656]
Stereum hirsutum [Sh88834]
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Batrachochytrium dendrobatidis [BDEG08152]
Spizellomyces punctatus daom br117 [Sp05556T0]
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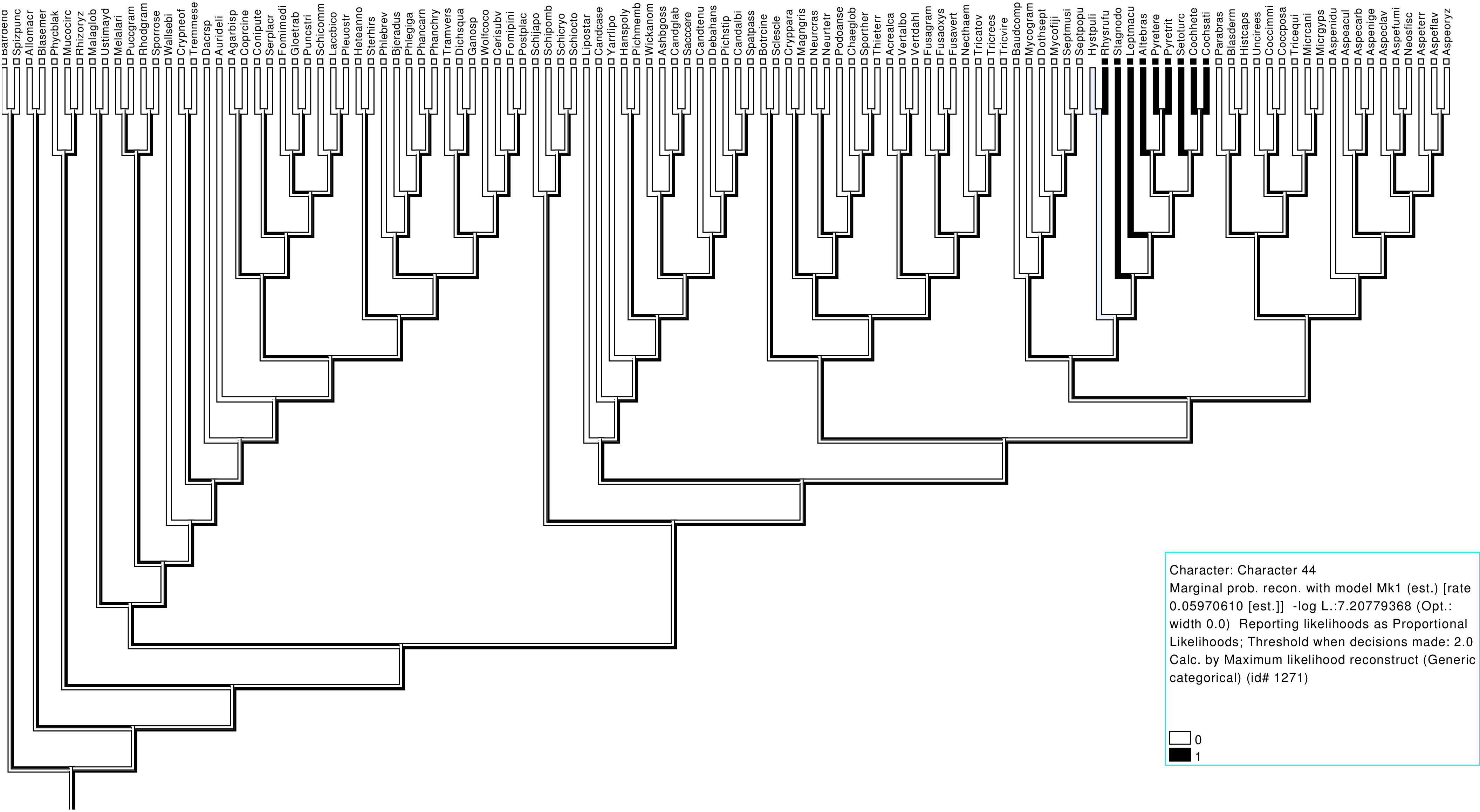

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Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 44

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
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DMLCITPKNFSADVDALIQMMGWEDKADQLICLVPNSHIPADDLPLPPIRGLDSYPQLTL
RALLTDYLDIQAIPRRSFFAEIAHYTNDEMHKERLLEFTYTSPEYLDELWDYTTRPRRSI
LEVLHEFDTVKVPWQHAISVFPVLKGRQFSIASGGELKRGPEGGTKFELMIAIVKYQTVI
KKIRQGVCTRYISALRPGSTLKVQLQRGGLNSSVNQLVGPTVLVGPGTGLAPLRSMLWEK
AAIIKAYQEENPGVELGIGPTLLLYGGRNREADFFFEDEWQQLGQLTKLNVLTAFSRDQK
QKVYVQDVIRQNYALLFKLLHDMAGSVYICGSSGQMPKAVREALTEAFQHGAEVETDRFN
>EHA223441Asni_dom2
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AGGAKCADTLRTAMAMGADRAFHVDVGESPDGGPEPLTIAKMLQGVVKSENINLVLLGKQ
AIDGDQGQTGQMLAGLLGWPQATQASKVDIKDADGTVEVTHEVDGGVETLRAKLPMVITT
DLRLNEPRYATLPNIMKAKKKPLEKKTLADFGVEDKKRLKTLKVTEPPARQGGGKVEDVD
GLIGKLKELGAL
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Dichomitus squalens [Dis171200]
Ganoderma sp [Gs138347]
Trametes versicolor [Tv170853]
Fomitopsis pinicola [Fp150929]
Wolfiporia cocos [Wc102725]
Postia placenta [Popl52076]
Ceriporiopsis subvermispora [Cs161320]
Stereum hirsutum [Sh100578]
Heterobasidion annosum [Hea419295]
Phanerochaete carnosa [Pc164681]
Phanerochaete chrysosporium [Phch132146]
Bjerkandera adusta [Ba462358]
Phlebiopsis gigantea [Pg30348]
Phlebia brevispora [Pb163702]
Agaricus bisporus [Ab210044]
Laccaria bicolor [Labi189949]
Fomitiporia mediterranea [Fm105473]
Pleurotus ostreatus PC15 [Plo1079075]
Pleurotus ostreatus PC9 [Po58992]
Serpula lacrymans [Sl102999]
Coniophora puteana [Cp169745]
Punctularia strigosozonata [Pus122201]
Schizophyllum commune [Scco82107]
Gloeophyllum trabeum [Glt75816]
Auricularia delicata [Ad145603]
Wallemia sebi [Ws36811]
Dacryopinax sp [Ds25306]
Cryptococcus neoformans [CNAG06558]
Tremella mesenterica [Tm72113]
Rhodotorula graminis [Rg56263]
Puccinia graminis [PGTG07204]
Pyrenophora tritici-repentis [PTRG09275]
Pyrenophora teres [Pt4557]
Setosphaeria turcica [St21893]
Cochliobolus heterostrophus [Cohe96864]
Cochliobolus sativus [Cos200348]
Leptosphaeria maculans [Lm4090]
Rhystidhysteron rufulum [Rr10750]
Septoria populicola [Sep53454]
Septoria musiva [Smu134857]
Dothistroma septosporum [Dos79317]
Baudoinia compniacensis [Bc31441]
Aspergillus fumigatus [Afu5g07290]
Neosartorya fischeri [NFIA079980]
Aspergillus clavatus [ACLA010540]
Aspergillus oryzae [A701000226]
Aspergillus flavus [AFL05869]
Aspergillus terreus [ATEG09341]
Aspergillus nidulans [AN10283]
Aspergillus carbonarius [Ac153533]
Aspergillus niger [Asni54887]
Aspergillus aculeatus [Aa54209]
Microsporum gypseum [MGYG03670]
Microsporum canis [MCYG06938]
Trichophyton equinum [TEQG03032]
Coccidioides posadasii [CPSG00265]
Uncinocarpus reesii [UREG04300]
Blastomyces dermatitidis [BDBG04085]
Fusarium graminearum [FGSG09557]
Fusarium oxysporum [FOXG06256]
Nectria haematococca [Neha33368]
Trichoderma reesei [Trre63204]
Trichoderma virens [Trvi77403]
Trichoderma atoviride [Trat34655]
Acremonium alcalophilum [Aa1059109]
Chaetomium globosum [CHG04518]
Sporotrichum thermophile [Spt2298590]
Podospora anserina [Pa61690]_
Thielavia terrestris [Tt2114974]
Pichia stipitis [Pist55602]
Debaryomyces hansenii [50421485]
Candida tenuis [Ct127056]
Candida albicans SC5314 [C192040]
Spathaspora passalidarum [Sp135972]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp83434]
Pichia membranifaciens [Pm30812]
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Daphnia pulex [Dapu311674]
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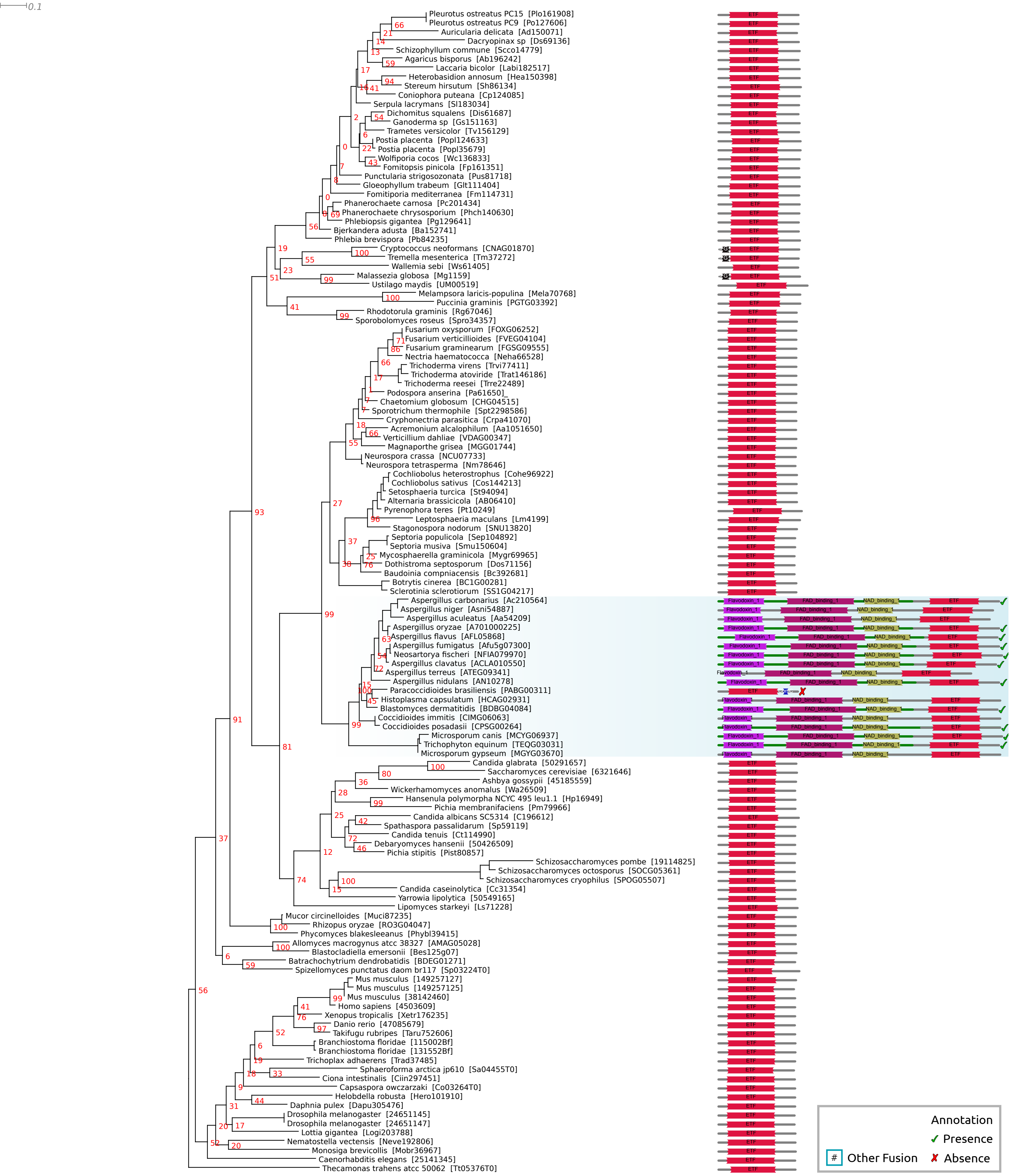
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Aspergillus fumigatus [Afu5g07300]
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Allomyces macrogynus atcc 38327 [AMAG05028]
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Batrachochytrium dendrobatidis [BDEG01271]
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Daphnia pulex [Dapu305476]
Drosophila melanogaster [24651145]
Drosophila melanogaster [24651147]
Lottia gigantea [Logi203788]
Nematostella vectensis [Neve192806]
Monosiga brevicollis [Mobr36967]
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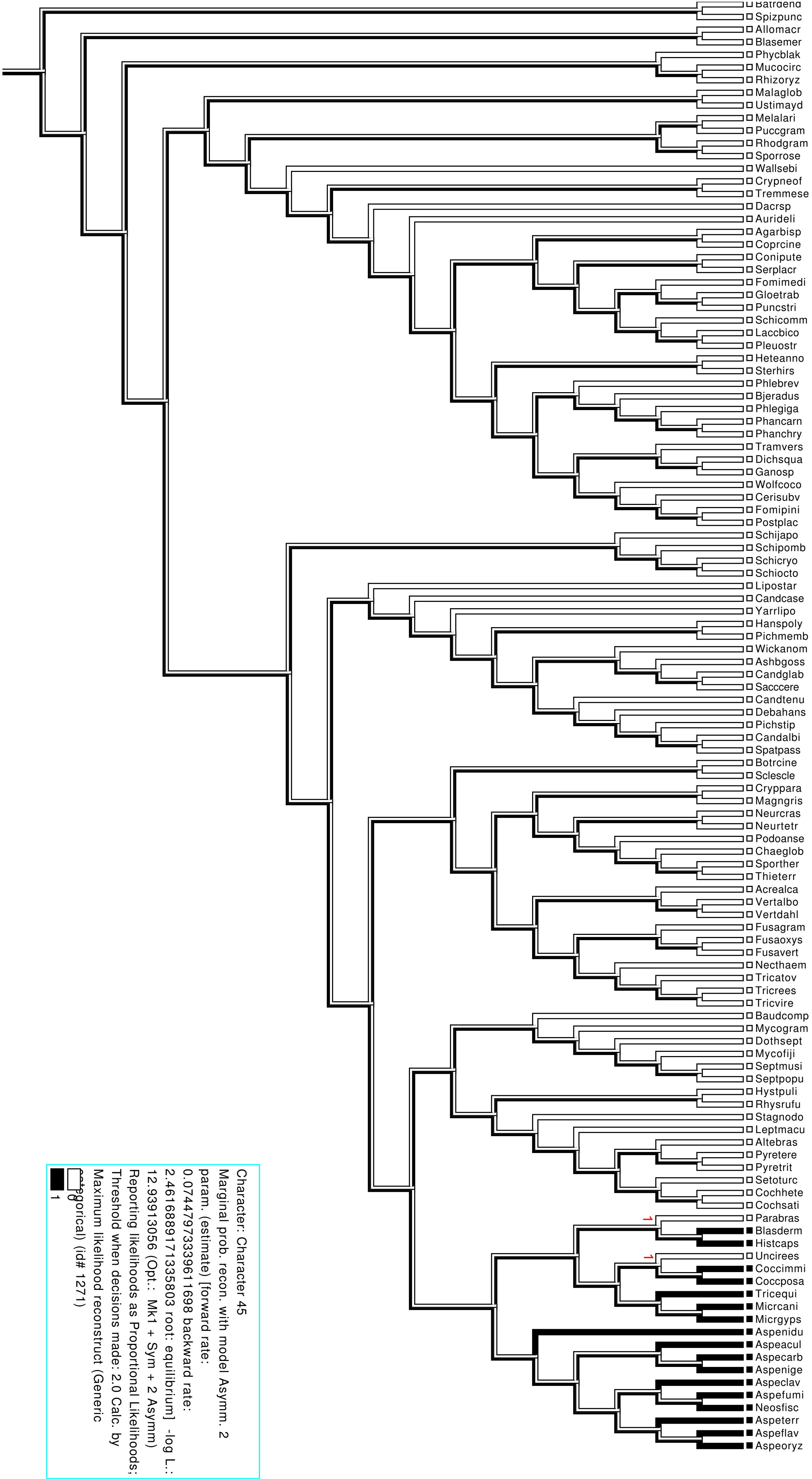
Annotation
✓ Presence
Other Fusion
✗ Absence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Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 45

September 28, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>EGO052791Sela_dom1
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DVVEGMMINTEHIIRHAMQEGIKMTLVVNKIDRLILELRIKPADAYYKIKHTIEEINTFI
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NEETRKFTRKQADPEQSRTFVHFIMDPLYKLYSHVLSQETDDLKQTLEGLGIRLKPVMYK
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>EGO052791Sela_dom2
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SKYLDDEFVVTLSVLLAVAAASASASDDAKPVFQATEITAPFLEQFTDDWSERWTPSEAT
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TGVALAGAVFTLFGMIGVLFGLVGAQQKPITKSSKKTDAPTADDKKKDESAPVAPAGGEK
KDETPVKKRK
```

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```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

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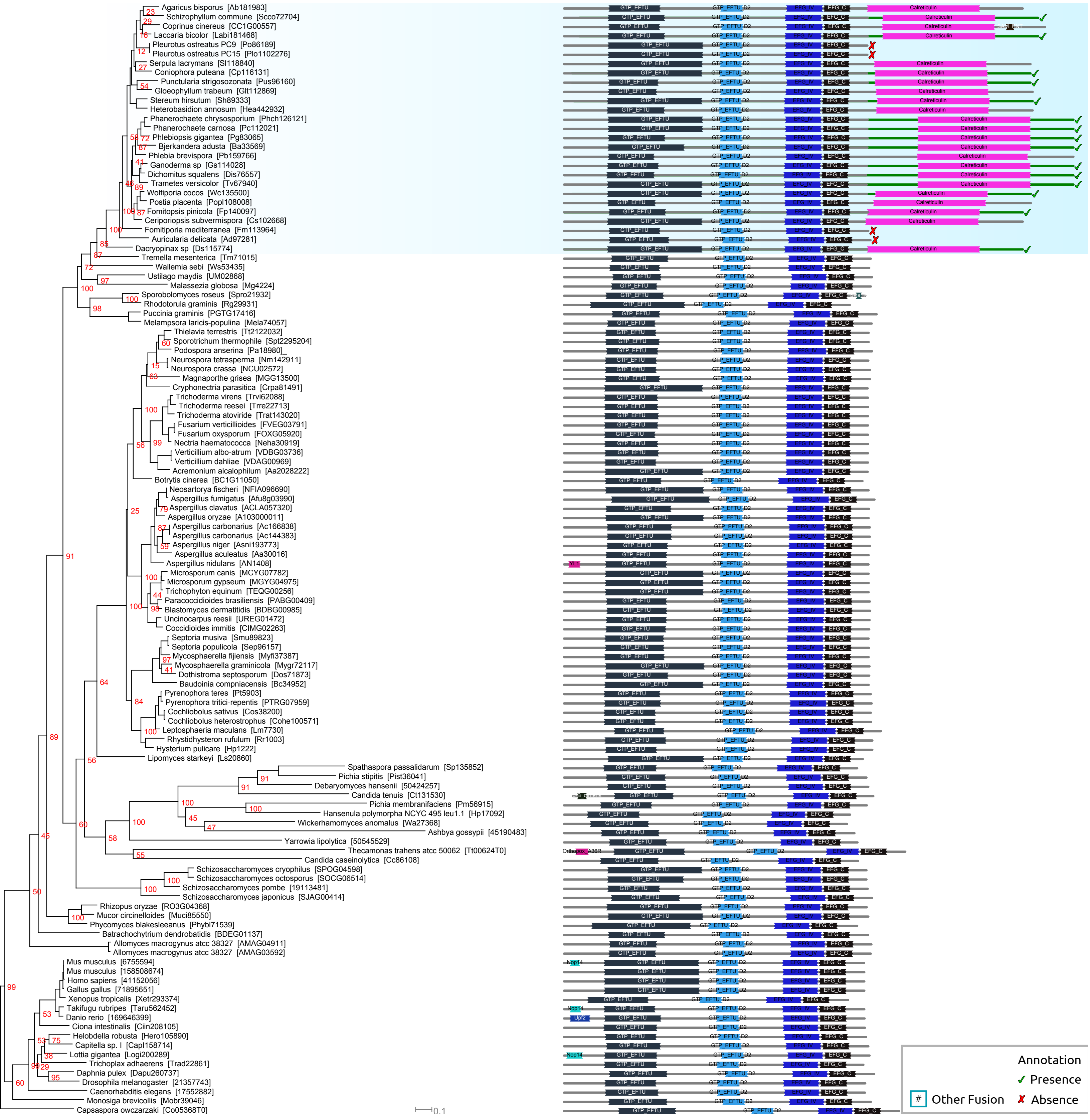
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Schizophyllum commune [Scco72704]
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Dacryopinax sp [Ds115774]
Tremella mesenterica [Tm71015]
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Magnaporthe grisea [MGG13500]
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Trichoderma virens [Trvi62088]
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Leptosphaeria maculans [Lm7730]
Rhystidhysteron rufulum [Rr1003]
Hysterium pulicare [Hp1222]
Lipomyces starkeyi [Ls20860]
Spathaspora passalidarum [Sp135852]
Pichia stipitis [Pist36041]
Debaryomyces hansenii [50424257]
Candida tenuis [Ct131530]
Pichia membranifaciens [Pm56915]
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Wickerhamomyces anomalus [Wa27368]
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Yarrowia lipolytica [50545529]
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Schizosaccharomyces octosporus [SOCG06514]
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Schizosaccharomyces japonicus [SJAG00414]
Rhizopus oryzae [RO3G04368]
Mucor circinelloides [Muci85550]
Phycomyces blakesleeanus [Phybl71539]
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Orthopox_A36R
Annotation
✓ Presence
Other Fusion
✗ Absence


Dichomitus squalens [Dis45908]
Ganoderma sp [Gs114027]
Trametes versicolor [Tv110458]
Phlebia brevispora [Pb159766]
Phanerochaete carnosa [Pc83887]
Phanerochaete chrysosporium [Phch7453]
Phlebiopsis gigantea [Pg17911]
Bjerkandera adusta [Ba46878]
Stereum hirsutum [Sh71098]
Heterobasidion annosum [Hea442932]
Fomitopsis pinicola [Fp140098]
Wolfiporia cocos [Wc22456]
Schizophyllum commune [Scco13187]
Postia placenta [Popl108008]
Fomitiporia mediterranea [Fm96000]
Coniophora puteana [Cp44846]
Serpula lacrymans [Sl118840]
Dacryopinax sp [Ds21754]
Gloeophyllum trabeum [Glt112869]
Ceriporiopsis subvermispora [Cs102668]
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Punctularia strigosozonata [Pus58629]
Coprinus cinereus [CC1G00557]
Agaricus bisporus [Ab181983]
Laccaria bicolor [Labi243722]
Pleurotus ostreatus PC15 [Plo1054419]
Pleurotus ostreatus PC9 [Po115983]
Auricularia delicata [Ad110303]
Melampsora laricis-populina [Mela72534]
Puccinia graminis [PGTG06261]
Pichia stipitis [Pist85362]
Candida tenuis [Ct93321]
Debaryomyces hansenii [50421811]
Candida albicans SC5314 [C195300]
Spathaspora passalidarum [Sp58853]
Wickerhamomyces anomalus [Wa22747]
Pichia membranifaciens [Pm73211]
Lipomyces starkeyi [Ls42048]
Candida caseinolytica [Cc47571]
Yarrowia lipolytica [50546719]
Schizosaccharomyces octosporus [SOCG04380]
Schizosaccharomyces cryophilus [SPOG00159]
Schizosaccharomyces pombe [19114524]
Schizosaccharomyces japonicus [SJAG02694]
Pneumocystis carinii [CON2862]
Pneumocystis carinii [EST8222]
Cryptococcus neoformans [CNAG02500]
Tremella mesenterica [Tm70669]
Malassezia globosa [Mg3819]
Wallemia sebi [Ws8174]
Rhodotorula graminis [Rg35252]
Sporobolomyces roseus [Spro20243]
Sporotrichum thermophile [Spt2295005]
Thielavia terrestris [Tt2121824]
Neurospora tetrasperma [Nm74601]
Podospora anserina [Pa17670]_
Chaetomium globosum [CHG01486]
Cryphonectria parasitica [Crpa107659]
Acremonium alcalophilum [Aa1019235]
Fusarium oxysporum [FOXG00565]
Fusarium verticillioides [FVEG00949]
Fusarium graminearum [FGSG00491]
Nectria haematococca [Neha65663]
Trichoderma atoviride [Trat146528]
Trichoderma virens [Trvi72041]
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Aspergillus niger [Asni205810]
Aspergillus aculeatus [Aa45171]
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Trichophyton equinum [TEQG02051]
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Pyrenophora teres [Pt14]
Rhystidhysteron rufulum [Rr7252]
Leptosphaeria maculans [Lm7784]
Cochliobolus heterostrophus [Cohe116365]
Cochliobolus sativus [Cos38208]
Setosphaeria turcica [St168222]
Baudoinia compniacensis [Bc35122]
Septoria populicola [Sep110505]
Septoria musiva [Smu150855]
Mycosphaerella fijiensis [Myfi50886]
Dothistroma septosporum [Dos71690]
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Allomyces macrogynus atcc 38327 [AMAG05457]
Blastocladiella emersonii [Bes302g00]
Batrachochytrium dendrobatidis [BDEG00936]
Spizellomyces punctatus daom br117 [Sp05332T0]
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EFG_C
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PDR_CDR
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SseC
EspB
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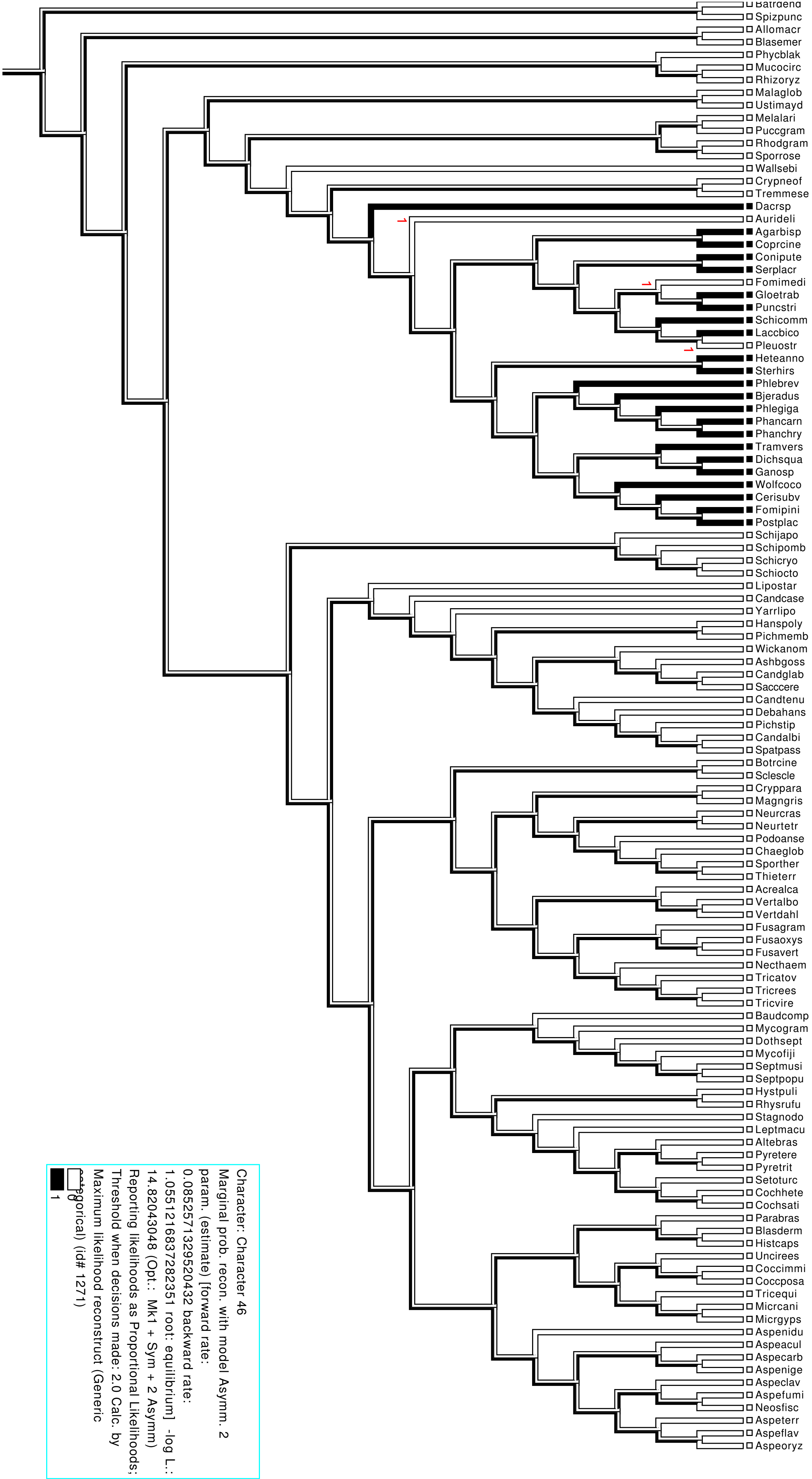
Annotation
✓ Presence
Other Fusion
✗ Absence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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Character: Character 46
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
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1.0551216837282351 root: equilibrium] -log L.:
14.82043048 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 46

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>EFY904791Meac_dom1
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NATVEPEGHIERTIDAAGFVWGADPEPLLARLAPGYQKGDRGDGMQQRFDVLVLADLLFR
HSEHGALVKTIKETMRASRDSAAYVFFTSYRPWKQDLDMGFFDVARNAGLEVEQVSERKL
EKPLFEGDPGDLDVQKTVKGFIVRWRVEDSLYIVLHQSKFAAKPPERMPPQTIAQGPLVA
>EFY904791Meac_dom2
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SIVRELLQCDDNELVMELFNMLVRPDEHFELRWHRDDIPAEASAEEEMERLGRPAFHAQY
NFALWEDESLVLIPGSHKRPRTETERNADPFEKVLPEQLVVKLGPGDIAFYNNNILHRGV
YDSKKDRVTLHGSVGHSGGSKLRARNVLQHGIGGYVDKVDFSKLSDGERQRAEEMRARLV
KLGSESGDVGYSLQG
```

2 Annotated Phylograms

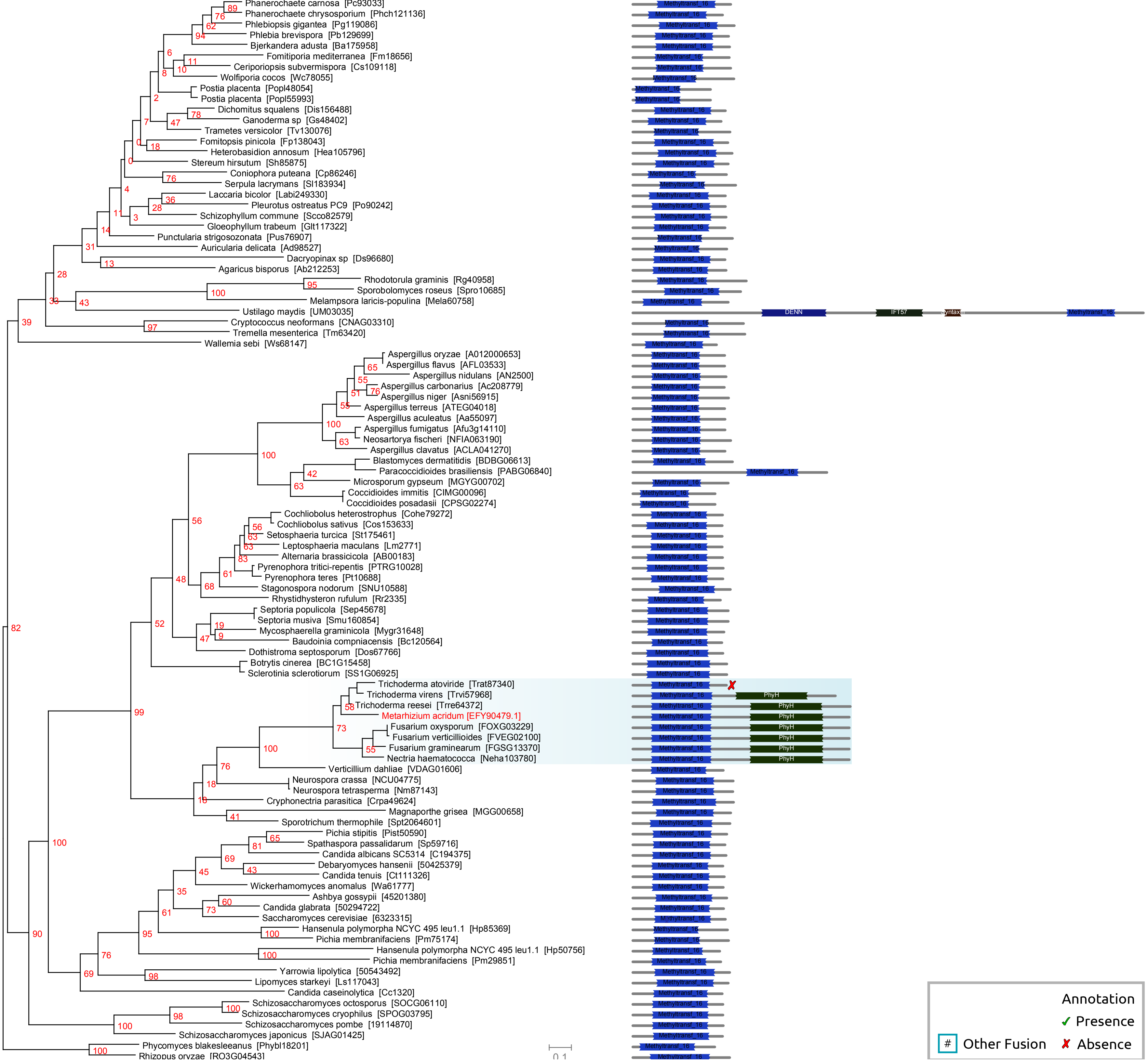
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Bjerkandera adusta [Ba175958]
Fomitiporia mediterranea [Fm18656]
Ceriporiopsis subvermispora [Cs109118]
Wolfiporia cocos [Wc78055]
Postia placenta [Popl48054]
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Dichomitus squalens [Dis156488]
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Fomitopsis pinicola [Fp138043]
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Stereum hirsutum [Sh85875]
Coniophora puteana [Cp86246]
Serpula lacrymans [Sl183934]
Laccaria bicolor [Labi249330]
Pleurotus ostreatus PC9 [Po90242]
Schizophyllum commune [Scco82579]
Gloeophyllum trabeum [Glt117322]
Punctularia strigosozonata [Pus76907]
Auricularia delicata [Ad98527]
Dacryopinax sp [Ds96680]
Agaricus bisporus [Ab212253]
Rhodotorula graminis [Rg40958]
Sporobolomyces roseus [Spro10685]
Melampsora laricis-populina [Mela60758]
Ustilago maydis [UM03035]
Cryptococcus neoformans [CNAG03310]
Tremella mesenterica [Tm63420]
Wallemia sebi [Ws68147]
Aspergillus oryzae [A012000653]
Aspergillus flavus [AFL03533]
Aspergillus nidulans [AN2500]
Aspergillus carbonarius [Ac208779]
Aspergillus niger [Asni56915]
Aspergillus terreus [ATEG04018]
Aspergillus aculeatus [Aa55097]
Aspergillus fumigatus [Afu3g14110]
Neosartorya fischeri [NFIA063190]
Aspergillus clavatus [ACLA041270]
Blastomyces dermatitidis [BDBG06613]
Paracoccidioides brasiliensis [PABG06840]
Microsporum gypseum [MGYG00702]
Coccidioides immitis [CIMG00096]
Coccidioides posadasii [CPSG02274]
Cochliobolus heterostrophus [Cohe79272]
Cochliobolus sativus [Cos153633]
Setosphaeria turcica [St175461]
Leptosphaeria maculans [Lm2771]
Alternaria brassicicola [AB00183]
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Pyrenophora teres [Pt10688]
Stagonospora nodorum [SNU10588]
Rhystidhysteron rufulum [Rr2335]
Septoria populicola [Sep45678]
Septoria musiva [Smu160854]
Mycosphaerella graminicola [Mygr31648]
Baudoinia compniacensis [Bc120564]
Dothistroma septosporum [Dos67766]
Botrytis cinerea [BC1G15458]
Sclerotinia sclerotiorum [SS1G06925]
Trichoderma atoviride [Trat87340]
Trichoderma virens [Trvi57968]
Trichoderma reesei [Trre64372]
Metarhizium acridum [EFY90479.1]
Fusarium oxysporum [FOXG03229]
Fusarium verticillioides [FVEG02100]
Fusarium graminearum [FGSG13370]
Nectria haematococca [Neha103780]
Verticillium dahliae [VDAG01606]
Neurospora crassa [NCU04775]
Neurospora tetrasperma [Nm87143]
Cryphonectria parasitica [Crpa49624]
Magnaporthe grisea [MGG00658]
Sporotrichum thermophile [Spt2064601]
Pichia stipitis [Pist50590]
Spathaspora passalidarum [Sp59716]
Candida albicans SC5314 [C194375]
Debaryomyces hansenii [50425379]
Candida tenuis [Ct111326]
Wickerhamomyces anomalus [Wa61777]
Ashbya gossypii [45201380]
Candida glabrata [50294722]
Saccharomyces cerevisiae [6323315]
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Yarrowia lipolytica [50543492]
Lipomyces starkeyi [Ls117043]
Candida caseinolytica [Cc1320]
Schizosaccharomyces octosporus [SOCG06110]
Schizosaccharomyces cryophilus [SPOG03795]
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Rhizopus oryzae [RO3G04543]
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Annotation
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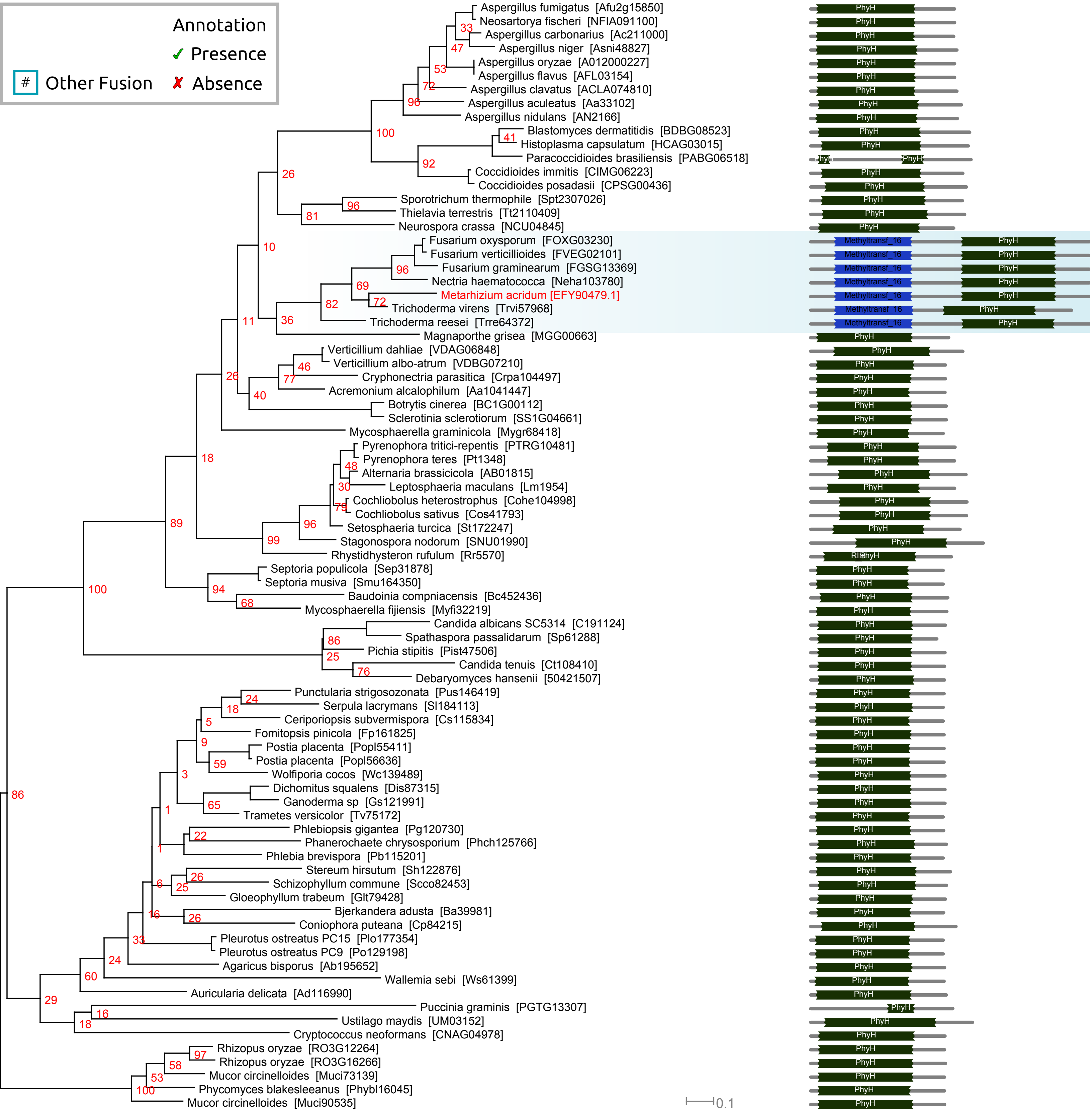
✗ Absence
Other Fusion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Other Fusion
✗ Absence
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Blastomyces dermatitidis [BDBG08523]
Histoplasma capsulatum [HCAG03015]
Paracoccidioides brasiliensis [PABG06518]
Coccidioides immitis [CIMG06223]
Coccidioides posadasii [CPSG00436]
Sporotrichum thermophile [Spt2307026]
Thielavia terrestris [Tt2110409]
Neurospora crassa [NCU04845]
Fusarium oxysporum [FOXG03230]
Fusarium verticillioides [FVEG02101]
Fusarium graminearum [FGSG13369]
Nectria haematococca [Neha103780]
Metarhizium acridum [EFY90479.1]
Trichoderma virens [Trvi57968]
Trichoderma reesei [Trre64372]
Magnaporthe grisea [MGG00663]
Verticillium dahliae [VDAG06848]
Verticillium albo-atrum [VDBG07210]
Cryphonectria parasitica [Crpa104497]
Acremonium alcalophilum [Aa1041447]
Botrytis cinerea [BC1G00112]
Sclerotinia sclerotiorum [SS1G04661]
Mycosphaerella graminicola [Mygr68418]
Pyrenophora tritici-repentis [PTRG10481]
Pyrenophora teres [Pt1348]
Alternaria brassicicola [AB01815]
Leptosphaeria maculans [Lm1954]
Cochliobolus heterostrophus [Cohe104998]
Cochliobolus sativus [Cos41793]
Setosphaeria turcica [St172247]
Stagonospora nodorum [SNU01990]
Rhystidhysteron rufulum [Rr5570]
Septoria populicola [Sep31878]
Septoria musiva [Smu164350]
Baudoinia compniacensis [Bc452436]
Mycosphaerella fijiensis [Myfi32219]
Candida albicans SC5314 [C191124]
Spathaspora passalidarum [Sp61288]
Pichia stipitis [Pist47506]
Candida tenuis [Ct108410]
Debaryomyces hansenii [50421507]
Punctularia strigosozonata [Pus146419]
Serpula lacrymans [Sl184113]
Ceriporiopsis subvermispora [Cs115834]
Fomitopsis pinicola [Fp161825]
Postia placenta [Popl55411]
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Wolfiporia cocos [Wc139489]
Dichomitus squalens [Dis87315]
Ganoderma sp [Gs121991]
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Stereum hirsutum [Sh122876]
Schizophyllum commune [Scco82453]
Gloeophyllum trabeum [Glt79428]
Bjerkandera adusta [Ba39981]
Coniophora puteana [Cp84215]
Pleurotus ostreatus PC15 [Plo177354]
Pleurotus ostreatus PC9 [Po129198]
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Ustilago maydis [UM03152]
Cryptococcus neoformans [CNAG04978]
Rhizopus oryzae [RO3G12264]
Rhizopus oryzae [RO3G16266]
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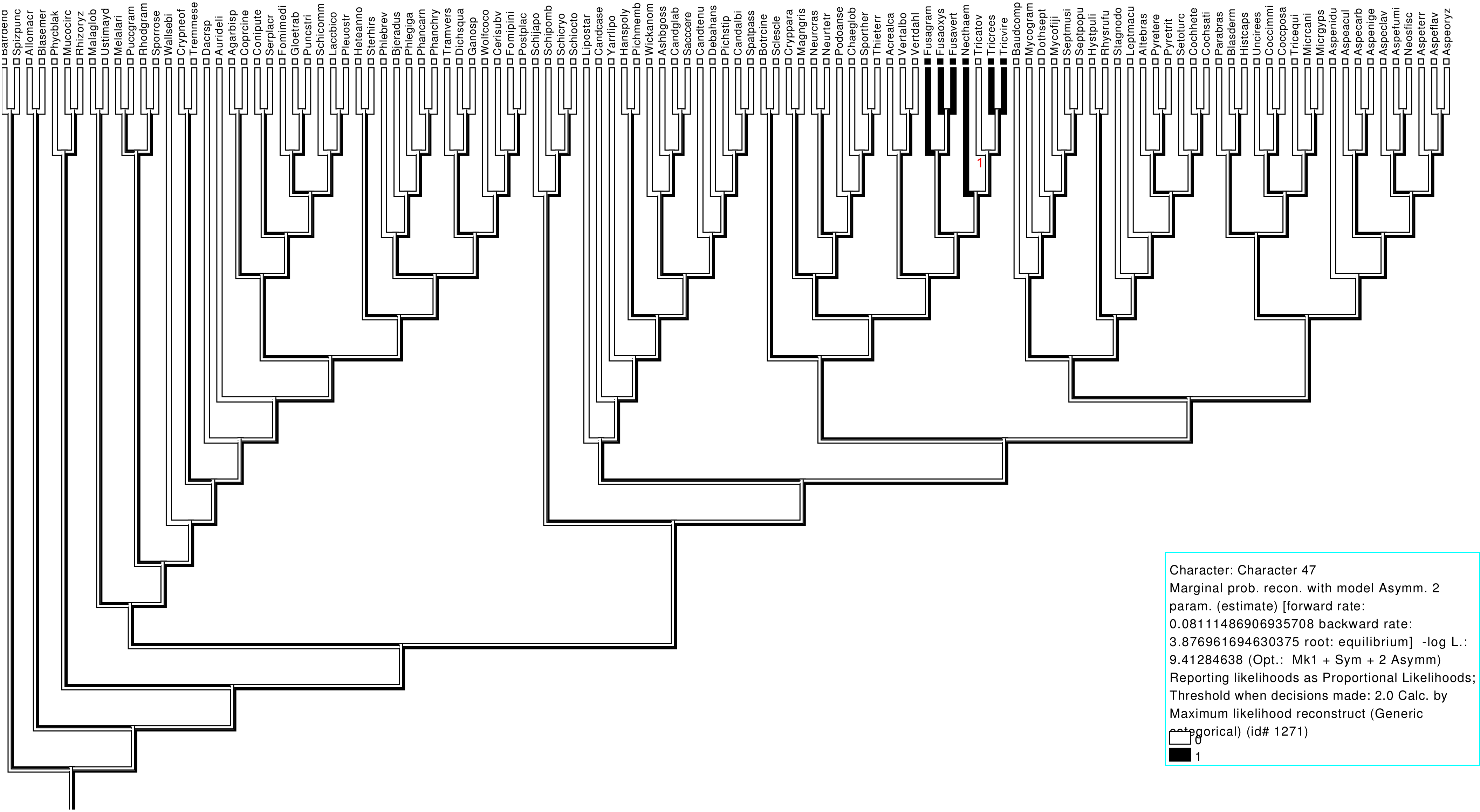
Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Marginal prob. recon. with model Asymm. 2
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0.08111486906935708 backward rate:
3.876961694630375 root: equilibrium] -log L.:
9.41284638 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 47

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>CBY021751Lema_dom1
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GSDMEGFDSEEDEENGESEDEEPIQSRVRENPYVAPIAPGASPAAKYVPPALRAPPSSDA
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TFQVIGSNIVFDYIRFFLDELTEINTELLLRVVRAAGPQLRQDDPTALKDIVVLLQKSLA
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GKLYGTLIGRKALPITSLKNLNFPYMQPKTKTFVEVILVTTILESLKGSKDKRNERAVRE
>CBY021751Lema_dom2
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CASNLYFQNRLQRGYASEAAEKDLVIIGGGVAGYVAAIKAGQAGLSVACIEKRGSLGGTC
LNVGCIPSKSLLNNSHLYHQILHDTKGRGIEVGDVKLNLPAMMKAKDTSVAGLTKGIEFL
FKKNNVEYIKGTGAFQDEHTIAVNLVEGGETSVRGKNILIATGSEATPFPGLTIDEQKVI
TSTGAINLQEVPAKMTVIGGGIIGLEMASVWSRLGSEVTVVEFLGQIGGPGMDNEIAKQS
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SDAQTDRILGIHIIGANAGEMIAEGTLALEYGASSEDVARTCHAHPTLAEAFKEAAMATY
DKAVHY
```

2 Annotated Phylograms

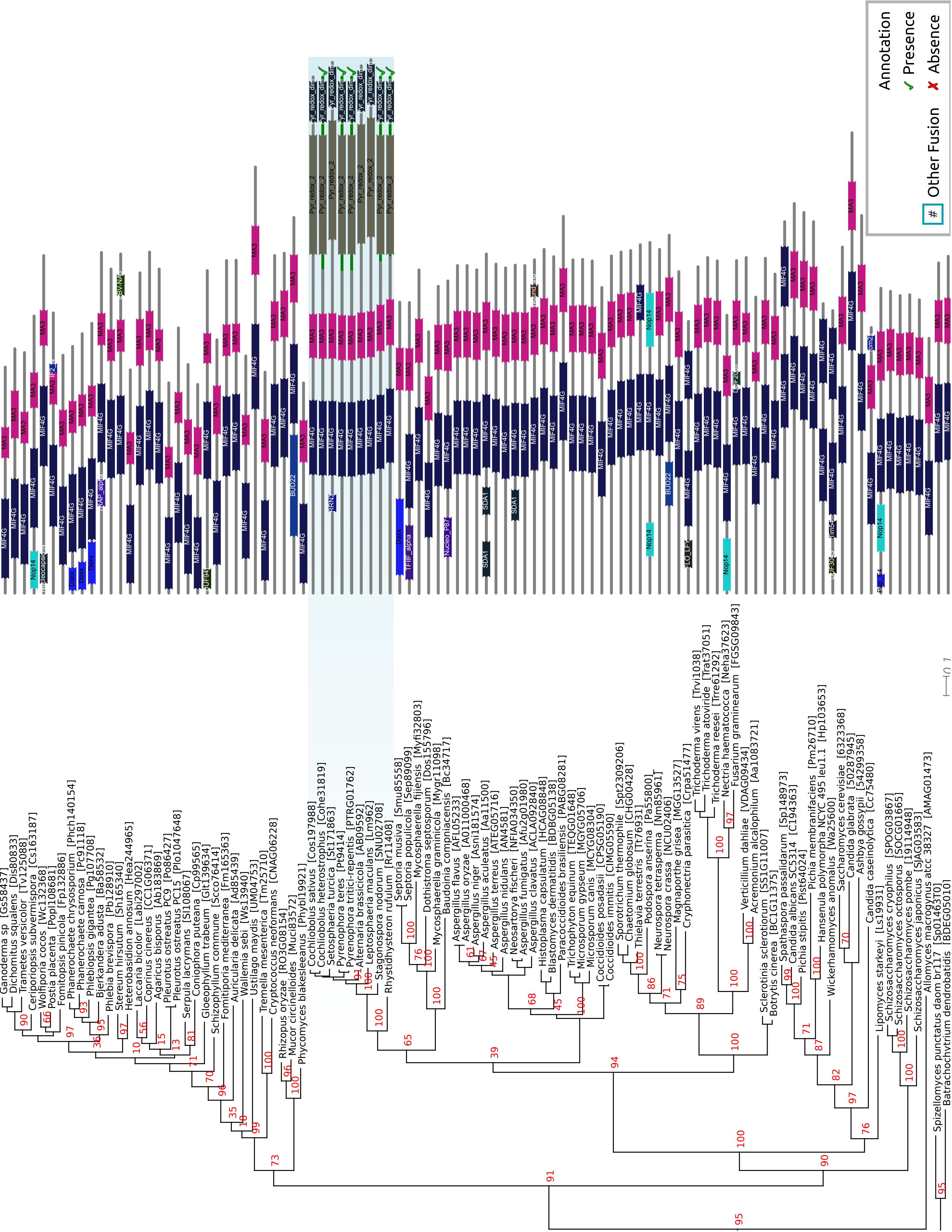
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✗ Absence
Other Fusion
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TFIIF_alpha
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RRN3
Nucleo_P87
SDA1
Tim54
Ganoderma sp [Gs58437]
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Trametes versicolor [Tv1125088]
Ceriporiopsis subvermispora [Cs1163187]
Wolfiporia cocos [Wc132368]
Postia placenta [Popl108681]
Fomitopsis pinicola [Fp132886]
Phanerochaete chrysosporium [Phch140154]
Phanerochaete carnosa [Pc91118]
Phlebiopsis gigantea [Pg107708]
Bjerkandera adusta [Ba58532]
Phlebia brevispora [Pb128910]
Stereum hirsutum [Sh165340]
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Laccaria bicolor [Labi297002]
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Serpula lacrymans [Sl108067]
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Schizophyllum commune [Scco76414]
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Auricularia delicata [Ad85439]
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Setosphaeria turcica [St171863]
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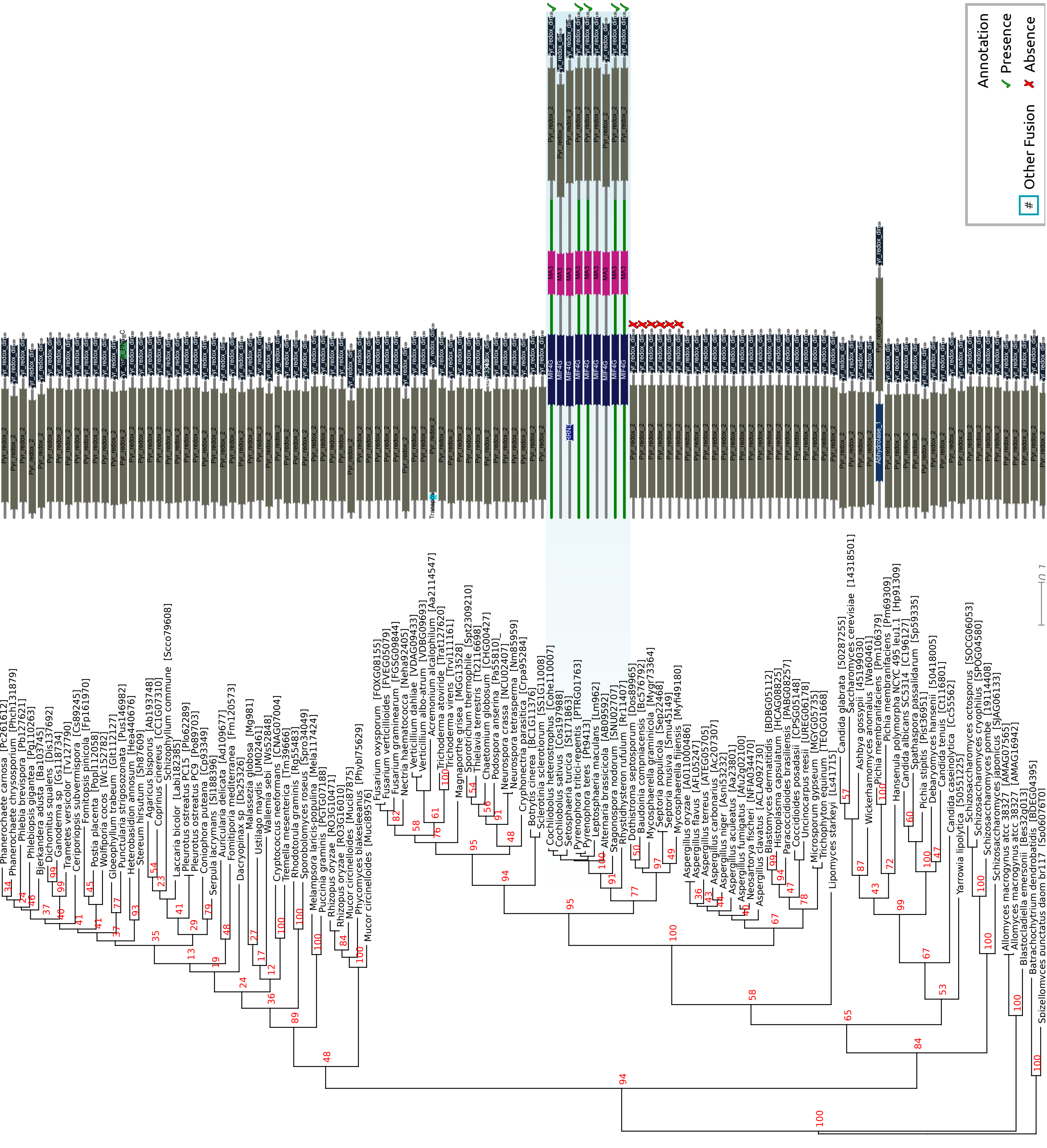
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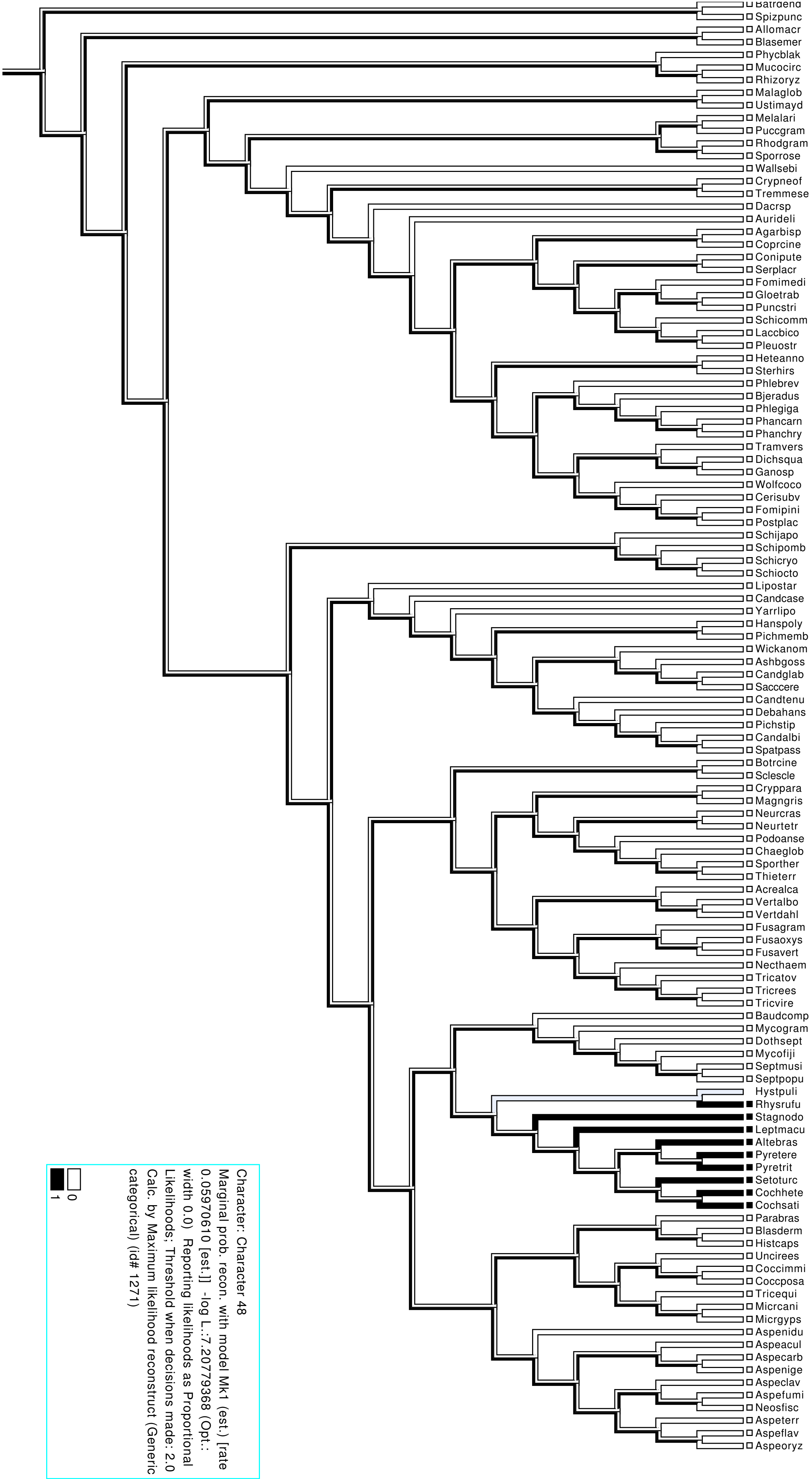
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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
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Pleuostr
Heteanno
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Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
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Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
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Fusaoxys
Fusavert
Necthaem
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Tricrees
Tricvire
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Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 48
Marginal prob. recon. with model Mk1 (est.) [rate 0.05970610 [est.]] -log L.:7.20779368 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1

Putative Fusion 48

October 5, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0032968951Pyte_dom1
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QTKPVFHKRAKTTKKVVLRLECTACKTKAQLALKRCKHFELGGDKKTKGAALVF
```

2 Annotated Phylograms

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```
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```

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3 Mesquite Cladogram

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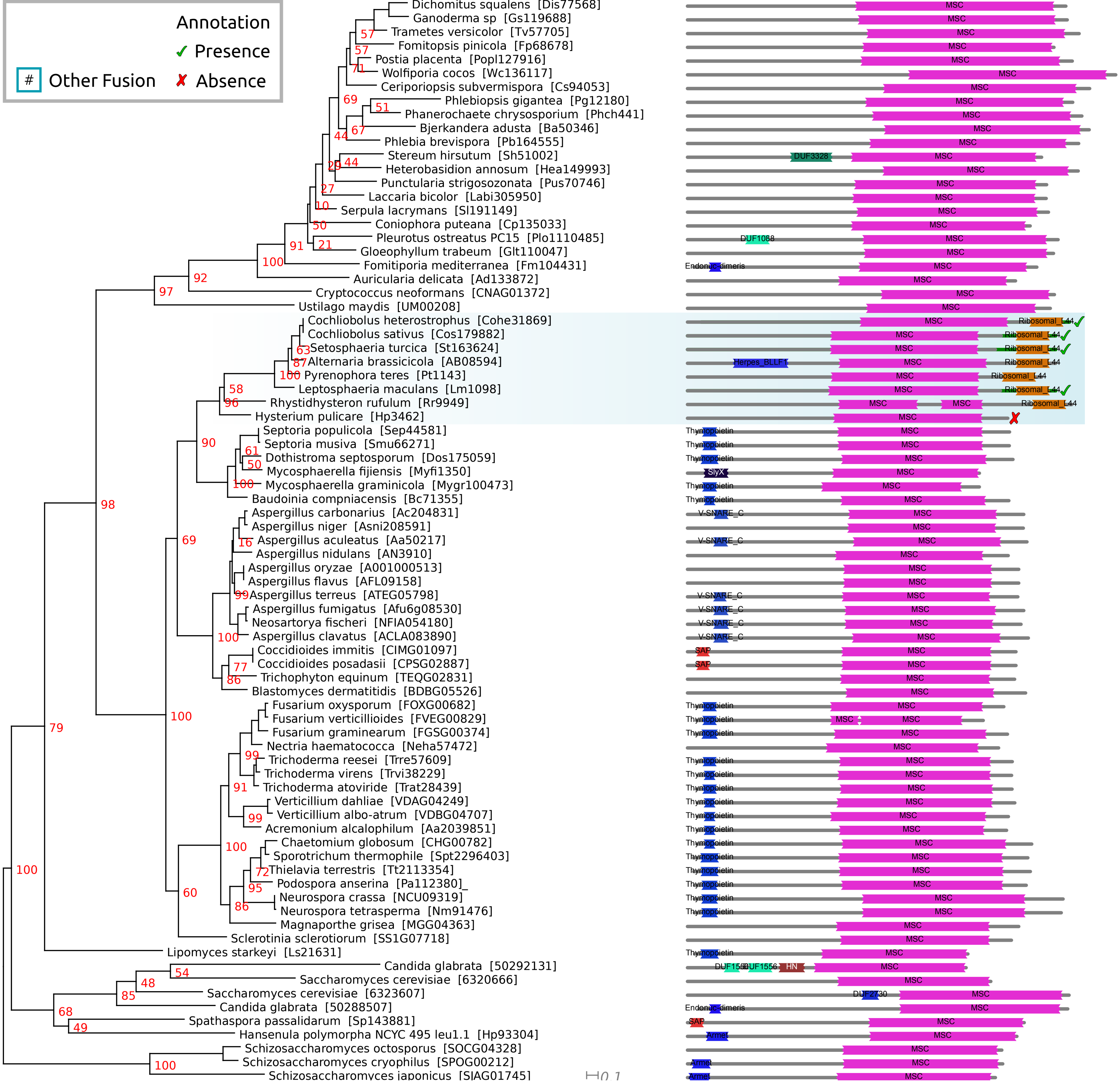
Annotation
✓ Presence
Other Fusion
✗ Absence
Dichomitus squalens [Dis77568]
Ganoderma sp [Gs119688]
Trametes versicolor [Tv57705]
Fomitopsis pinicola [Fp68678]
Postia placenta [Popl127916]
Wolfiporia cocos [Wc136117]
Ceriporiopsis subvermispora [Cs94053]
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Pleurotus ostreatus PC15 [Plo1110485]
Gloeophyllum trabeum [Glt110047]
Fomitiporia mediterranea [Fm104431]
Auricularia delicata [Ad133872]
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Alternaria brassicicola [AB08594]
Pyrenophora teres [Pt1143]
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Rhizopus oryzae [RO3G03329]
Puccinia graminis [PGTG09489]
Melampsora laricis-populina [Mela107807]
Saccharomyces cerevisiae [6321934]
Saccharomyces cerevisiae [6681849]
Candida glabrata [50295351]
Candida caseinolytica [Cc2419]
Pichia membranifaciens [Pm51563]
Candida tenuis [Ct115674]
Spathaspora passalidarum [Sp62857]
Wickerhamomyces anomalus [Wa82054]
Pichia stipitis [Pist81825]
Ashbya gossypii [45198552]
Candida albicans SC5314 [C1949091]_
Yarrowia lipolytica [50545894]
Lipomyces starkeyi [Ls41923]
Debaryomyces hansenii [50424663]
Allomyces macrogynus atcc 38327 [AMAG00981]
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Blastocladiella emersonii [Bes30g07]
Rhodotorula graminis [Rg31851]
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Schizosaccharomyces pombe [19115216]
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Cryptococcus neoformans [CNAG04884]
Wolfiporia cocos [Wc105582]
Fomitopsis pinicola [Fp160025]
Postia placenta [Popl122430]
Trametes versicolor [Tv50052]
Phlebia brevispora [Pb98665]
Gloeophyllum trabeum [Glt63194]
Stereum hirsutum [Sh85428]
Punctularia strigosozonata [Pus102388]
Coniophora puteana [Cp109567]
Wallemia sebi [Ws62775]
Schizophyllum commune [Scco111908]
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Laccaria bicolor [Labi310126]
Coprinus cinereus [CC1G05276]
Serpula lacrymans [Sl149841]
Pleurotus ostreatus PC15 [Plo45869]
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Phanerochaete chrysosporium [Phch3878]
Auricularia delicata [Ad136046]
Batrachochytrium dendrobatidis [BDEG04919]
Spizellomyces punctatus daom br117 [Sp06444T0]
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Polysacc_deac
Annotation
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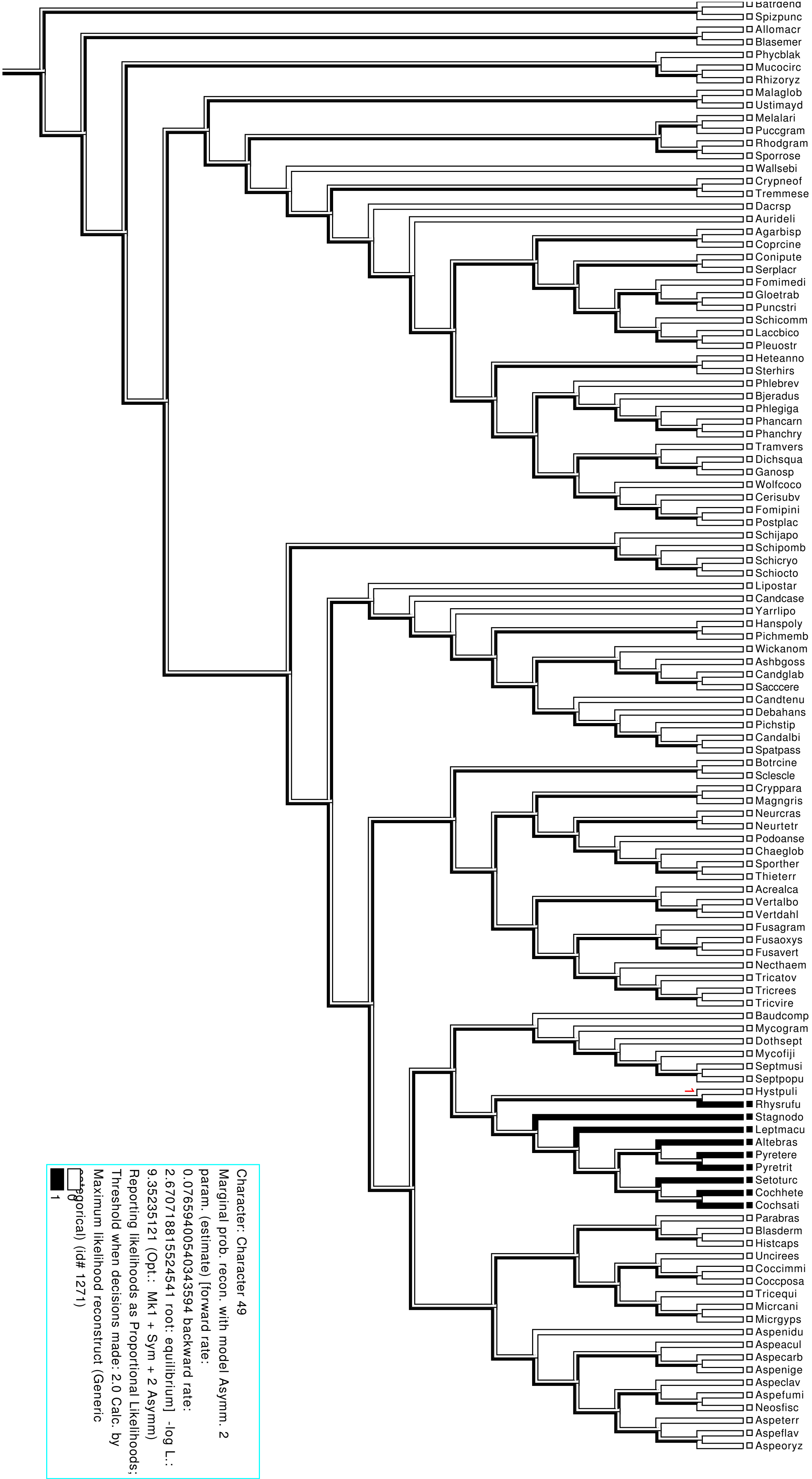
Other Fusion
✗ Absence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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
1
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 49
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.07659400540343594 backward rate:
2.670718815524541 root: equilibrium] -log L.:
9.35235121 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 49

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>Plo1062711_dom1
MAIKIIKKRTKHFKRHQSDRYVSVKEAWRKPKGIDNRVRRRFKGQTPMPKIGYGSNKKTR
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>Plo1062711_dom2
RLRSEEKDVRSASHAGSWYTDNRDELNEELEGWLEAVGPSEDFPVAGSKAIIAPHAGYSY
SGPAAAWAYKSIGTTGIKRVFILGPSHHFYLEGCALSRCKEYETPIGNLPLDIDTINELR
ATNEFEDLSLKADEAEHSLEMHLPYVRKIFEGQDISIVPIVVGAISKSLEASYGKLLAPF
LSREDTFCVVSSDFCHWYAITSCLLQIHAYYQAGIRGTRFSYTYYYPEPAPSDKPGINLT
RSVQPSTSHRIHKSIERLDREAMDLLAMPPSSAKDAHANFAEYLAQTHNTICGRHPIGVL
LGALAELEESRKSTLKWVRYEQSSACVNIADSSVSYASAWVRF
```

2 Annotated Phylograms

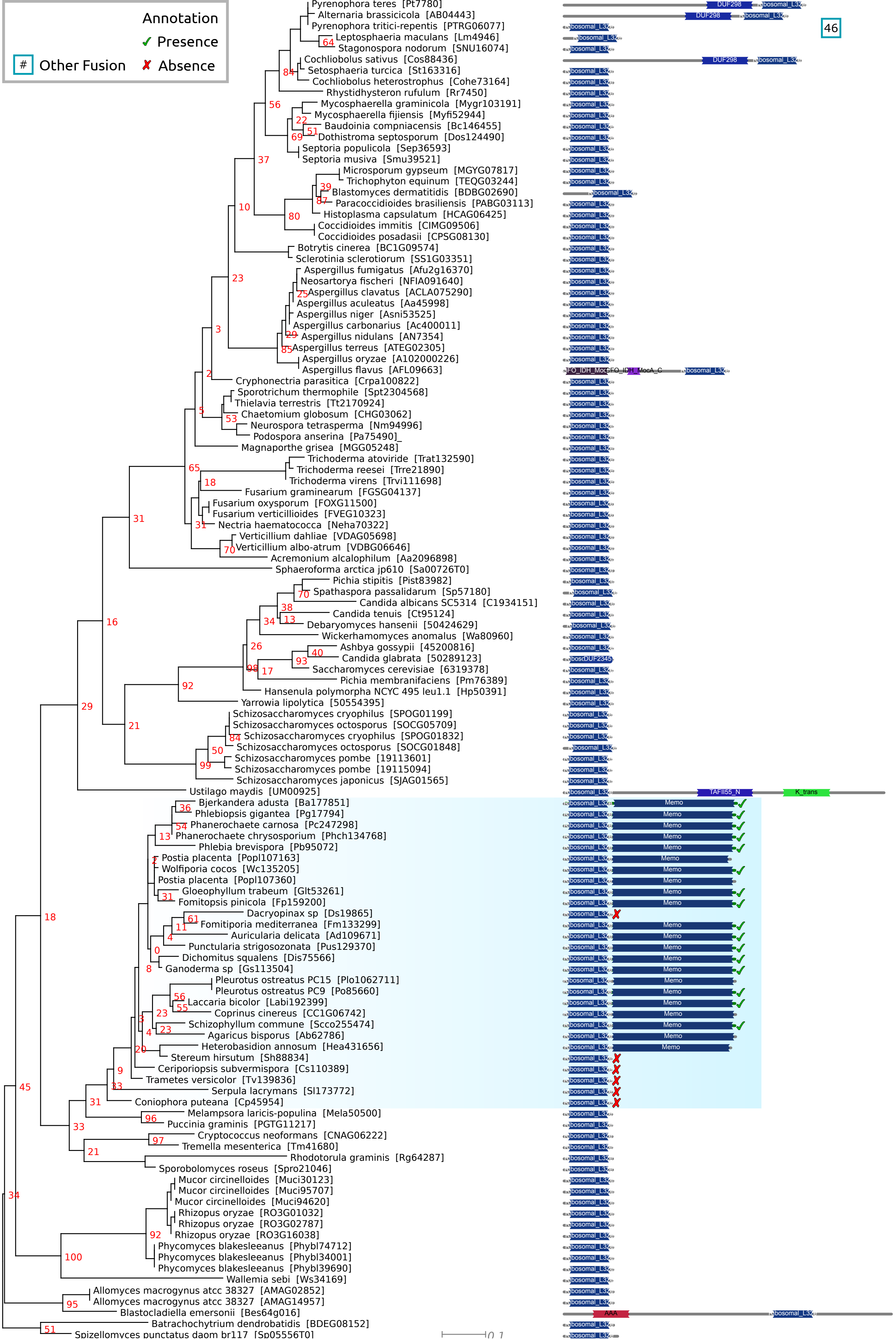
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 —m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
46
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Alternaria brassicicola [AB04443]
Pyrenophora tritici-repentis [PTRG06077]
Leptosphaeria maculans [Lm4946]
Stagonospora nodorum [SNU16074]
Cochliobolus sativus [Cos88436]
Setosphaeria turcica [St163316]
Cochliobolus heterostrophus [Cohe73164]
Rhystidhysteron rufulum [Rr7450]
Mycosphaerella graminicola [Mygr103191]
Mycosphaerella fijiensis [Myfi52944]
Baudoinia compniacensis [Bc146455]
Dothistroma septosporum [Dos124490]
Septoria populicola [Sep36593]
Septoria musiva [Smu39521]
Microsporum gypseum [MGYG07817]
Trichophyton equinum [TEQG03244]
Blastomyces dermatitidis [BDBG02690]
Paracoccidioides brasiliensis [PABG03113]
Histoplasma capsulatum [HCAG06425]
Coccidioides immitis [CIMG09506]
Coccidioides posadasii [CPSG08130]
Botrytis cinerea [BC1G09574]
Sclerotinia sclerotiorum [SS1G03351]
Aspergillus fumigatus [Afu2g16370]
Neosartorya fischeri [NFIA091640]
Aspergillus clavatus [ACLA075290]
Aspergillus aculeatus [Aa45998]
Aspergillus niger [Asni53525]
Aspergillus carbonarius [Ac400011]
Aspergillus nidulans [AN7354]
Aspergillus terreus [ATEG02305]
Aspergillus oryzae [A102000226]
Aspergillus flavus [AFL09663]
Cryphonectria parasitica [Crpa100822]
Sporotrichum thermophile [Spt2304568]
Thielavia terrestris [Tt2170924]
Chaetomium globosum [CHG03062]
Neurospora tetrasperma [Nm94996]
Podospora anserina [Pa75490]_
Magnaporthe grisea [MGG05248]
Trichoderma atoviride [Trat132590]
Trichoderma reesei [Tre21890]
Trichoderma virens [Trvi111698]
Fusarium graminearum [FGSG04137]
Fusarium oxysporum [FOXG11500]
Fusarium verticillioides [FVEG10323]
Nectria haematococca [Neha70322]
Verticillium dahliae [VDAG05698]
Verticillium albo-atrum [VDBG06646]
Acremonium alcalophilum [Aa2096898]
Sphaeroforma arctica jp610 [Sa00726T0]
Pichia stipitis [Pist83982]
Spathaspora passalidarum [Sp57180]
Candida albicans SC5314 [C1934151]
Candida tenuis [Ct95124]
Debaryomyces hansenii [50424629]
Wickerhamomyces anomalus [Wa80960]
Ashbya gossypii [45200816]
Candida glabrata [50289123]
Saccharomyces cerevisiae [6319378]
Pichia membranifaciens [Pm76389]
Hansenula polymorpha NCYC 495 leu1.1 [Hp50391]
Yarrowia lipolytica [50554395]
Schizosaccharomyces cryophilus [SPOG01199]
Schizosaccharomyces octosporus [SOCG05709]
Schizosaccharomyces cryophilus [SPOG01832]
Schizosaccharomyces octosporus [SOCG01848]
Schizosaccharomyces pombe [19113601]
Schizosaccharomyces pombe [19115094]
Schizosaccharomyces japonicus [SJAG01565]
Ustilago maydis [UM00925]
Bjerkandera adusta [Ba177851]
Phlebiopsis gigantea [Pg17794]
Phanerochaete carnosa [Pc247298]
Phanerochaete chrysosporium [Phch134768]
Phlebia brevispora [Pb95072]
Postia placenta [Popl107163]
Wolfiporia cocos [Wc135205]
Postia placenta [Popl107360]
Gloeophyllum trabeum [Glt53261]
Fomitopsis pinicola [Fp159200]
Dacryopinax sp [Ds19865]
Fomitiporia mediterranea [Fm133299]
Auricularia delicata [Ad109671]
Punctularia strigosozonata [Pus129370]
Dichomitus squalens [Dis75566]
Ganoderma sp [Gs113504]
Pleurotus ostreatus PC15 [Plo1062711]
Pleurotus ostreatus PC9 [Po85660]
Laccaria bicolor [Labi192399]
Coprinus cinereus [CC1G06742]
Schizophyllum commune [Scco255474]
Agaricus bisporus [Ab62786]
Heterobasidion annosum [Hea431656]
Stereum hirsutum [Sh88834]
Ceriporiopsis subvermispora [Cs110389]
Trametes versicolor [Tv139836]
Serpula lacrymans [Sl173772]
Coniophora puteana [Cp45954]
Melampsora laricis-populina [Mela50500]
Puccinia graminis [PGTG11217]
Cryptococcus neoformans [CNAG06222]
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Rhodotorula graminis [Rg64287]
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Mucor circinelloides [Muci30123]
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Phycomyces blakesleeanus [Phybl74712]
Phycomyces blakesleeanus [Phybl34001]
Phycomyces blakesleeanus [Phybl39690]
Wallemia sebi [Ws34169]
Allomyces macrogynus atcc 38327 [AMAG02852]
Allomyces macrogynus atcc 38327 [AMAG14957]
Blastocladiella emersonii [Bes64g016]
Batrachochytrium dendrobatidis [BDEG08152]
Spizellomyces punctatus daom br117 [Sp05556T0]
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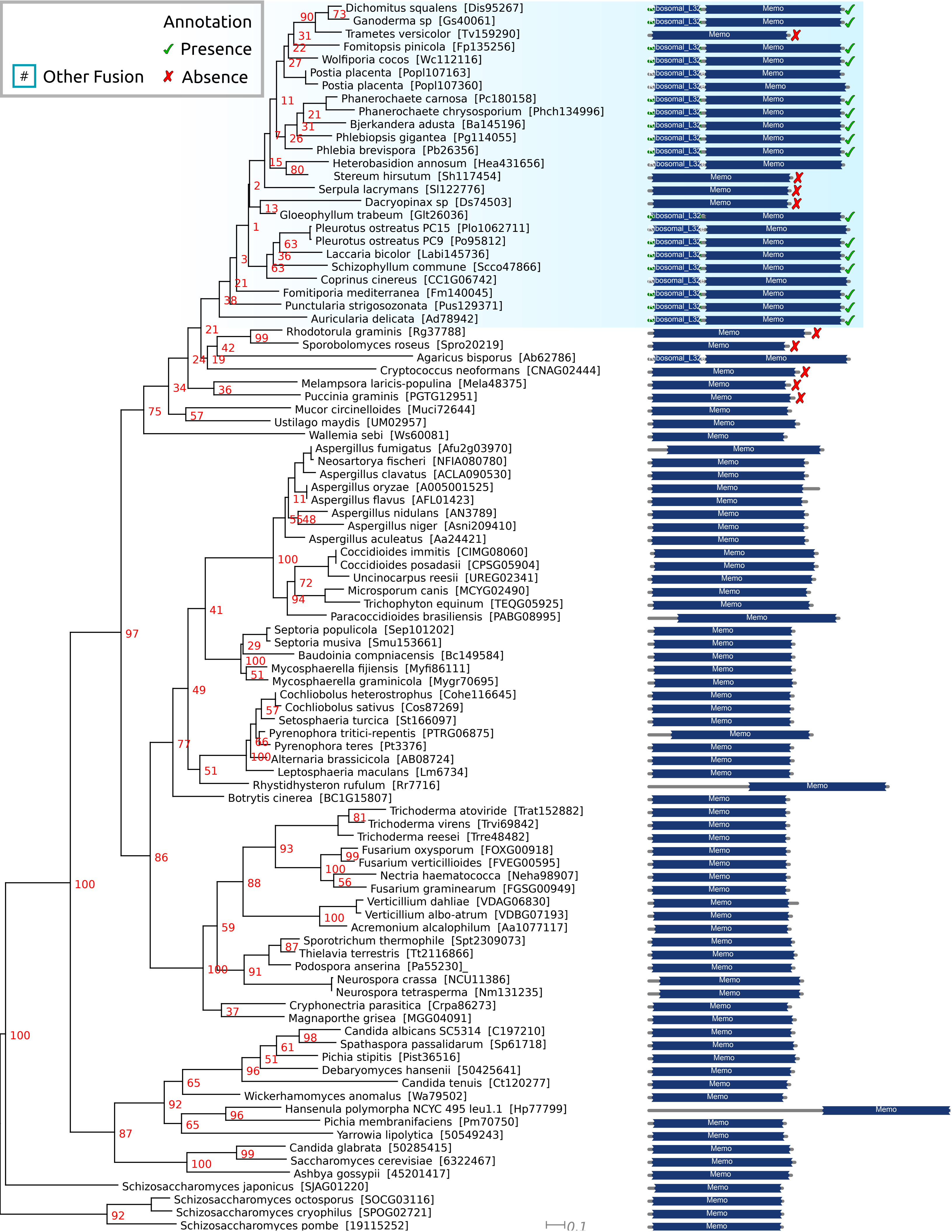
GFO_IDH_MocA_C
DUF2345
TAFII55_N
K_trans
Memo
AAA


Annotation
✓ Presence
Other Fusion
✗ Absence
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Ganoderma sp [Gs40061]
Trametes versicolor [Tv159290]
Fomitopsis pinicola [Fp135256]
Wolfiporia cocos [Wc112116]
Postia placenta [Popl107163]
Postia placenta [Popl107360]
Phanerochaete carnosa [Pc180158]
Phanerochaete chrysosporium [Phch134996]
Bjerkandera adusta [Ba145196]
Phlebiopsis gigantea [Pg114055]
Phlebia brevispora [Pb26356]
Heterobasidion annosum [Hea431656]
Stereum hirsutum [Sh117454]
Serpula lacrymans [Sl122776]
Dacryopinax sp [Ds74503]
Gloeophyllum trabeum [Glt26036]
Pleurotus ostreatus PC15 [Plo1062711]
Pleurotus ostreatus PC9 [Po95812]
Laccaria bicolor [Labi145736]
Schizophyllum commune [Scco47866]
Coprinus cinereus [CC1G06742]
Fomitiporia mediterranea [Fm140045]
Punctularia strigosozonata [Pus129371]
Auricularia delicata [Ad78942]
Rhodotorula graminis [Rg37788]
Sporobolomyces roseus [Spro20219]
Agaricus bisporus [Ab62786]
Cryptococcus neoformans [CNAG02444]
Melampsora laricis-populina [Mela48375]
Puccinia graminis [PGTG12951]
Mucor circinelloides [Muci72644]
Ustilago maydis [UM02957]
Wallemia sebi [Ws60081]
Aspergillus fumigatus [Afu2g03970]
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Aspergillus clavatus [ACLA090530]
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Aspergillus niger [Asni209410]
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Microsporum canis [MCYG02490]
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Cochliobolus sativus [Cos87269]
Setosphaeria turcica [St166097]
Pyrenophora tritici-repentis [PTRG06875]
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Alternaria brassicicola [AB08724]
Leptosphaeria maculans [Lm6734]
Rhystidhysteron rufulum [Rr7716]
Botrytis cinerea [BC1G15807]
Trichoderma atoviride [Trat152882]
Trichoderma virens [Trvi69842]
Trichoderma reesei [Tre48482]
Fusarium oxysporum [FOXG00918]
Fusarium verticillioides [FVEG00595]
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Fusarium graminearum [FGSG00949]
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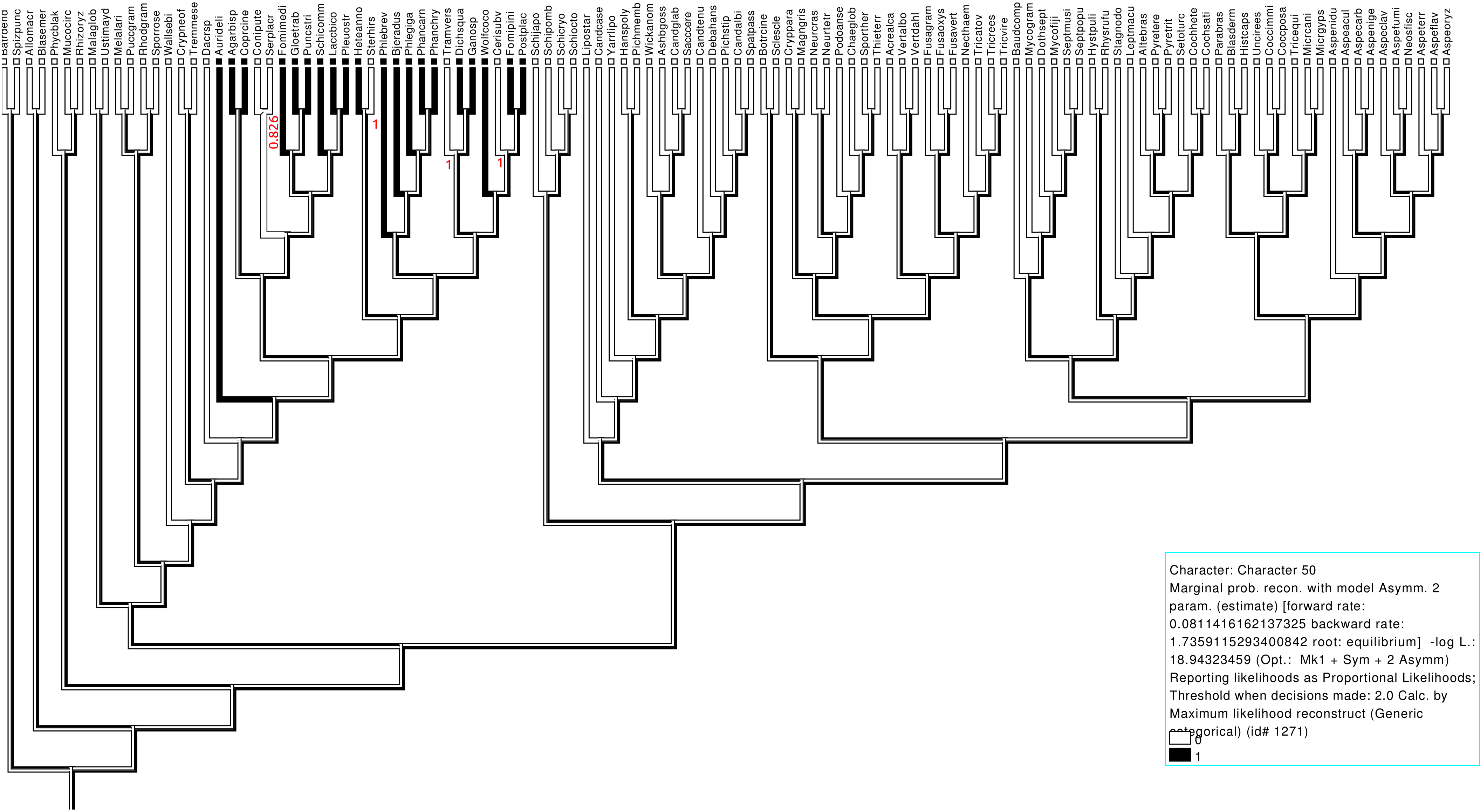
Acremonium alcalophilum [Aa1077117]
Sporotrichum thermophile [Spt2309073]
Thielavia terrestris [Tt2116866]
Podospora anserina [Pa55230]_
Neurospora crassa [NCU11386]
Neurospora tetrasperma [Nm131235]
Cryphonectria parasitica [Crpa86273]
Magnaporthe grisea [MGG04091]
Candida albicans SC5314 [C197210]
Spathaspora passalidarum [Sp61718]
Pichia stipitis [Pist36516]
Debaryomyces hansenii [50425641]
Candida tenuis [Ct120277]
Wickerhamomyces anomalus [Wa79502]
Hansenula polymorpha NCYC 495 leu1.1 [Hp77799]
Pichia membranifaciens [Pm70750]
Yarrowia lipolytica [50549243]
Candida glabrata [50285415]
Saccharomyces cerevisiae [6322467]
Ashbya gossypii [45201417]
Schizosaccharomyces japonicus [SJAG01220]
Schizosaccharomyces octosporus [SOCG03116]
Schizosaccharomyces cryophilus [SPOG02721]
Schizosaccharomyces pombe [19115252]
Ribosomal_L32
Memo
0.1



Character: Character 50
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.0811416162137325 backward rate: 1.7359115293400842 root: equilibrium] -log L.: 18.94323459 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

□ 0
■ 1

Putative Fusion 50

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0012096401Aste_dom1
MATWAYPPLPAEHLDREADSALARELEWLLRSLQDSLTSLREGLRECAVLLAPKEPGSTL
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VSVRNLVNQSLDIVDVSAWTGDPLNANFIFSQLHLLHETISEARQLLKGENDNTRGKWWD
TSAEEEMFDPPLPPYLSFQLLIADSALVLYLRTLESATPTHTPTAFATDISLTGFNLRDR
LFGTRHRAHDEAGDVFTWKGEEVKHQETGRWKLGRRYASSASSETADKHADRKDAIYGVI
DKINENEVELAELMDELNLLDDYHGAINFDGPDYDDAVSQTIGQRDHQMLEARVRMARQQ
FGDVLPDGYLNATETELYTQLYGEPIIRHEEPEGALNIEETESDTLLREDGKGGWEEVQY
>XP_0012096401Aste_dom2
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LTVEGKFSTDPSTVFLPKDTVTGPISVILSDYSNKHIADVAHRVFGGTRVPYSTTTPPPR
AQMPQLPIPLEASQRHMSEMEANAYIATLYPGMYASVLSVLTEVRKRLGSDWIRQLLTQE
GGPHVLDASAGGAGVLAWRDVLRAEWELMVPDHPQSSPYPVGRSTVVTGSETLRLRASLM
LENTSFLPRLPDYVHIREKPTLDDQRAPPKRKQYDVIIAPHSLLGIEEEYMRKEHVENLW
NLLNPNGGVLILLEKGHQKGFEAIAGARDMLLKRHISSPGSVQYEDFLQSPGGGKYVNKE
AGMIIAPCTNHEKCPMFNVAGHSKGRKDYCHFEQRYIRPPFLQRILGIKDRNHEDVKFSY
VAVQRGVDRREKDGIVQGAAATDAAFVGYEHLHDSPAEQSEATEEPTSTTAEGSERPSAE
GAEQFHALTLPRIVYPPMKRRGHVIFDLCTSAGKIERWTVPRSYSRRAFKDARKAQWGDL
WALGAKTRIPRSLRLGDKHGEGKKERLARRAVERAEMNETEEMQLEEAGSAWPDLPVPKR
KKGQNIPSWKKHADKKKLRQATKKHAAAQLAHDDSLA
```

2 Annotated Phylograms

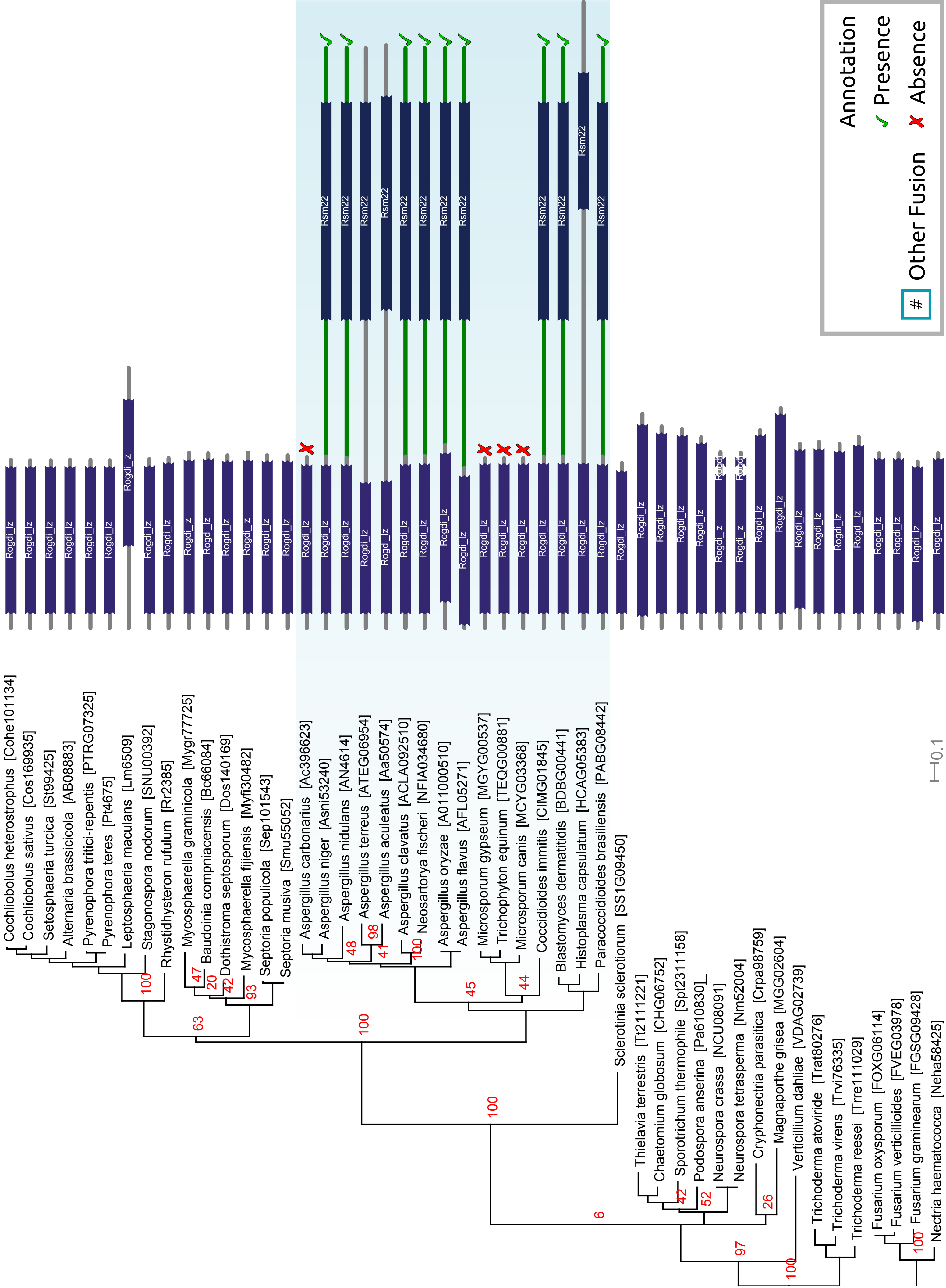
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
✗ Absence
Other Fusion
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Cochliobolus sativus [Cos169935]
Setosphaeria turcica [St99425]
Alternaria brassicicola [AB08883]
Pyrenophora tritici-repentis [PTRG07325]
Pyrenophora teres [Pt4675]
Leptosphaeria maculans [Lm6509]
Stagonospora nodorum [SNU00392]
Rhystidhysteron rufulum [Rr2385]
Mycosphaerella graminicola [Mygr77725]
Baudoinia compniacensis [Bc66084]
Dothistroma septosporum [Dos140169]
Mycosphaerella fijiensis [Myfi30482]
Septoria populicola [Sep101543]
Septoria musiva [Smu55052]
Aspergillus carbonarius [Ac396623]
Aspergillus niger [Asni53240]
Aspergillus nidulans [AN4614]
Aspergillus terreus [ATEG06954]
Aspergillus aculeatus [Aa50574]
Aspergillus clavatus [ACLA092510]
Neosartorya fischeri [NFIA034680]
Aspergillus oryzae [AO11000510]
Aspergillus flavus [AFL05271]
Microsporum gypseum [MGYG00537]
Trichophyton equinum [TEQG00881]
Microsporum canis [MCYG03368]
Coccidioides immitis [CIMG01845]
Blastomyces dermatitidis [BDBG00441]
Histoplasma capsulatum [HCAG05383]
Paracoccidioides brasiliensis [PABG08442]
Sclerotinia sclerotiorum [SS1G09450]
Thielavia terrestris [Tt2111221]
Chaetomium globosum [CHG06752]
Sporotrichum thermophile [Spt2311158]
Podospora anserina [Pa610830]
Neurospora crassa [NCU08091]
Neurospora tetrasperma [Nm52004]
Cryphonectria parasitica [Crpa98759]
Magnaporthe grisea [MGG02604]
Verticillium dahliae [VDAG02739]
Trichoderma atoviride [Trat80276]
Trichoderma virens [Trvi76335]
Trichoderma reesei [Trre111029]
Fusarium oxysporum [FOXG06114]
Fusarium verticillioides [FVEG03978]
Fusarium graminearum [FGSG09428]
Nectria haematococca [Neha58425]
100
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20
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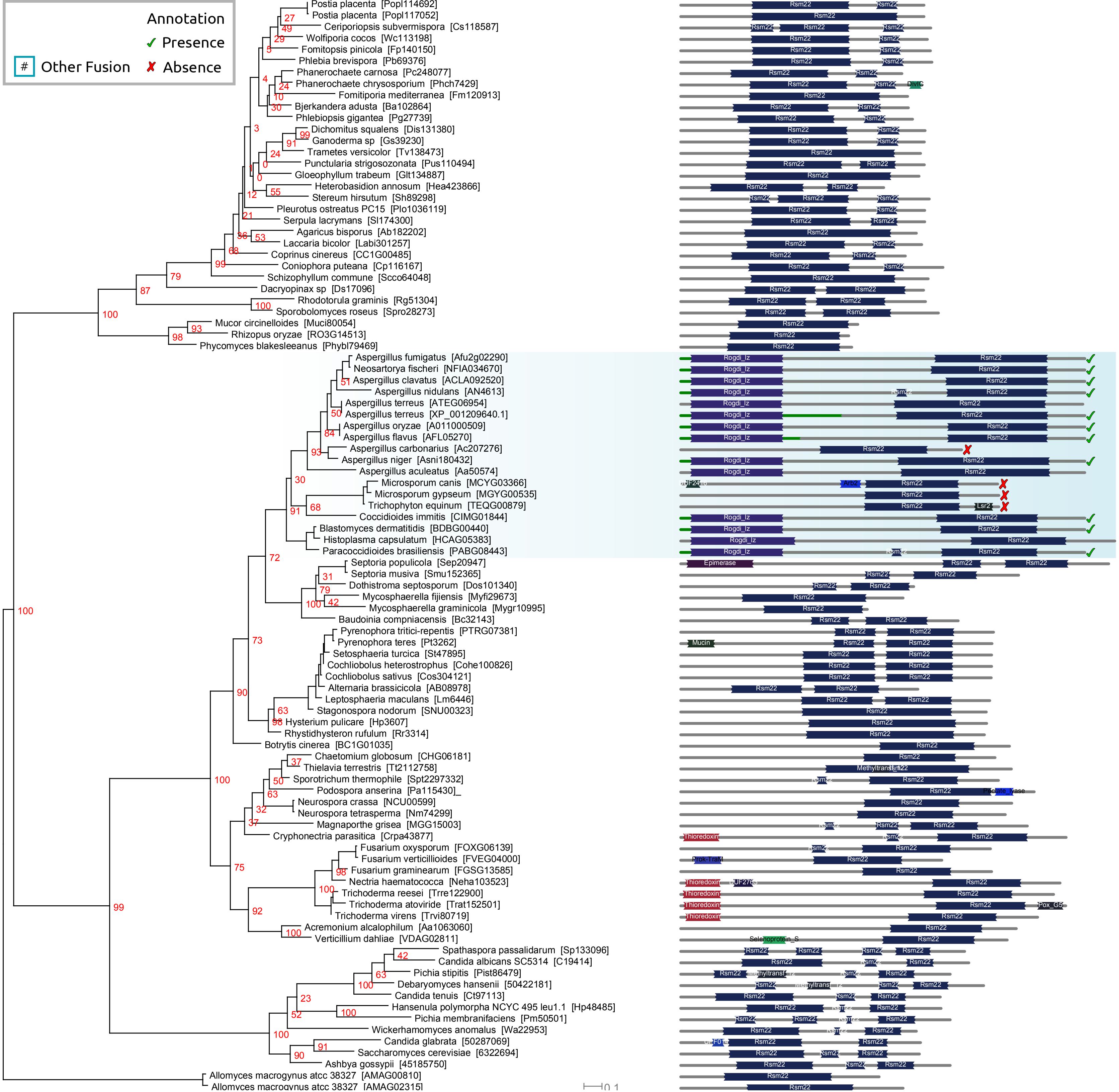
Rsm22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✗ Absence
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Wolfiporia cocos [Wc113198]
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Phlebia brevispora [Pb69376]
Phanerochaete carnosa [Pc248077]
Phanerochaete chrysosporium [Phch7429]
Fomitiporia mediterranea [Fm120913]
Bjerkandera adusta [Ba102864]
Phlebiopsis gigantea [Pg27739]
Dichomitus squalens [Dis131380]
Ganoderma sp [Gs39230]
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Punctularia strigosozonata [Pus110494]
Gloeophyllum trabeum [Glt134887]
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Stereum hirsutum [Sh89298]
Pleurotus ostreatus PC15 [Plo1036119]
Serpula lacrymans [Sl174300]
Agaricus bisporus [Ab182202]
Laccaria bicolor [Labi301257]
Coprinus cinereus [CC1G00485]
Coniophora puteana [Cp116167]
Schizophyllum commune [Scco64048]
Dacrypinax sp [Ds17096]
Rhodotorula graminis [Rg51304]
Sporobolomyces roseus [Spro28273]
Mucor circinelloides [Muci80054]
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Phycomyces blakesleeanus [Phybl79469]
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Neosartorya fischeri [NFIA034670]
Aspergillus clavatus [ACLA092520]
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Aspergillus terreus [ATEG06954]
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Aspergillus oryzae [A011000509]
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Microsporum canis [MCYG03366]
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Stagonospora nodorum [SNU00323]
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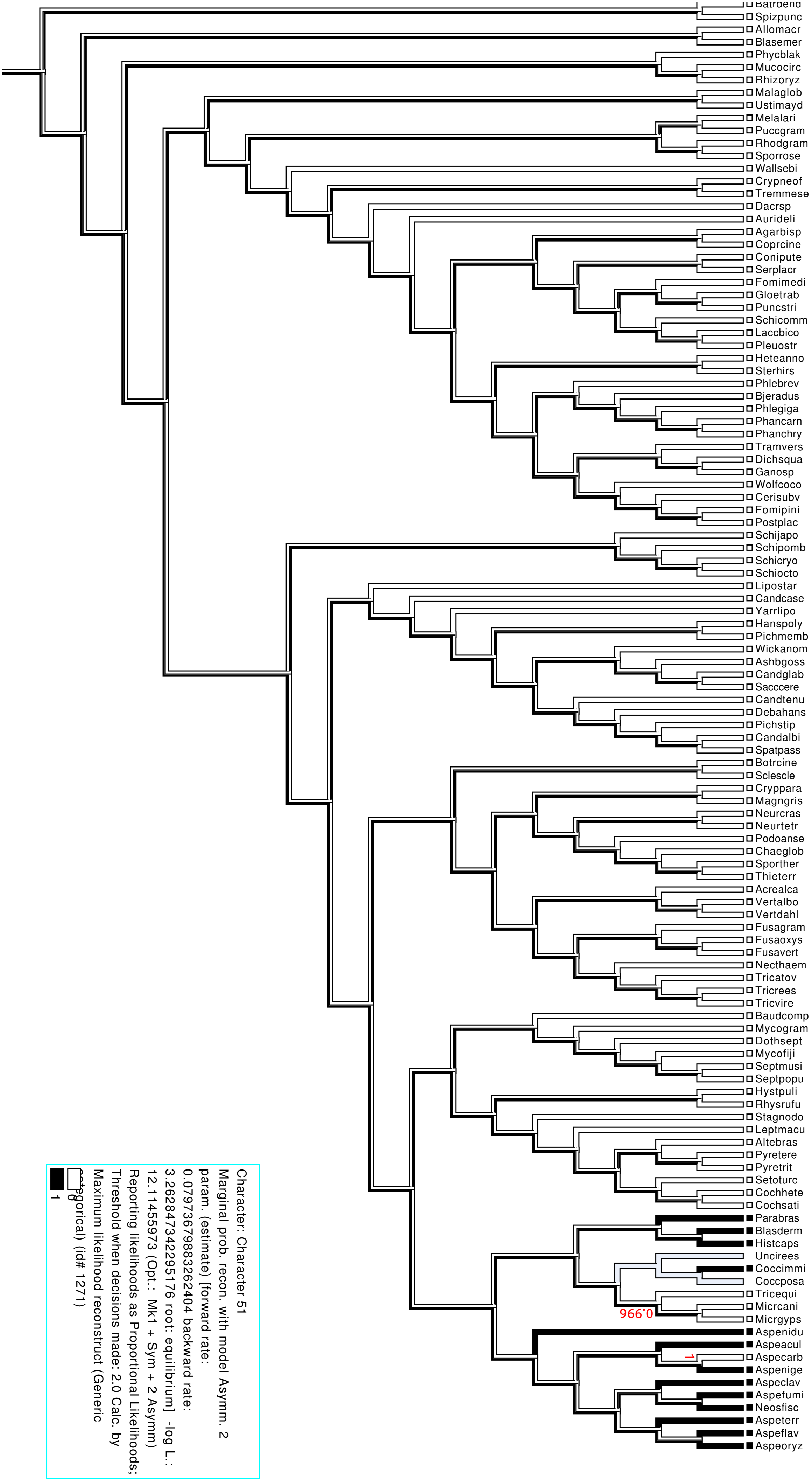
Selenoprotein_S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Rhizoryz
Malaglob
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Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
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Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
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Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Character: Character 51
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.07973679883262404 backward rate:
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12.11455973 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 51

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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EMVKREKDQH
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2 Annotated Phylograms

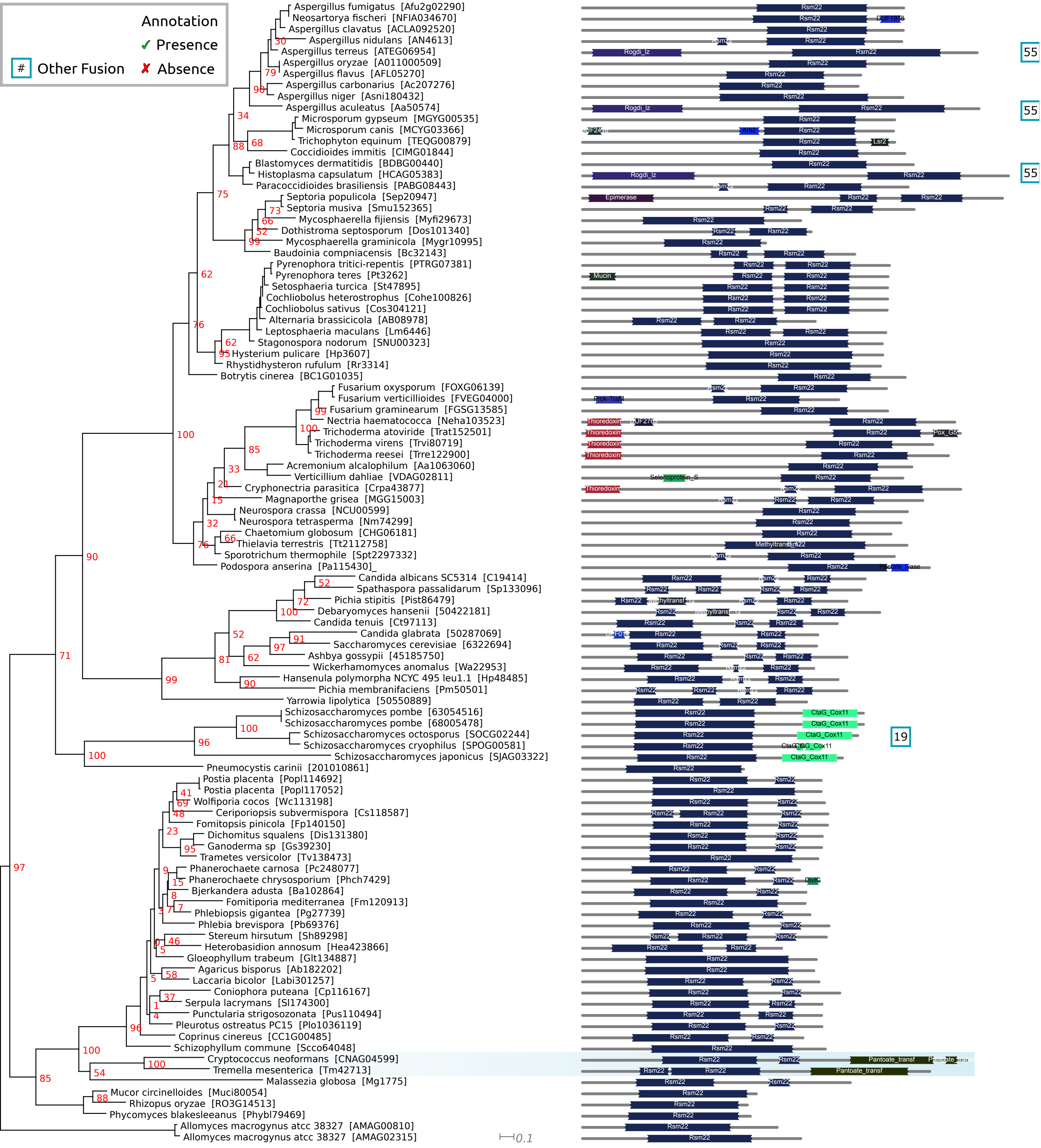
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Other Fusion
✗ Absence
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Neosartorya fischeri [NFIA034670]
Aspergillus clavatus [ACLA092520]
Aspergillus nidulans [AN4613]
Aspergillus terreus [ATEG06954]
Aspergillus oryzae [A011000509]
Aspergillus flavus [AFL05270]
Aspergillus carbonarius [Ac207276]
Aspergillus niger [Asni180432]
Aspergillus aculeatus [Aa50574]
Microsporum gypseum [MGYG00535]
Microsporum canis [MCYG03366]
Trichophyton equinum [TEQG00879]
Coccidioides immitis [CIMG01844]
Blastomyces dermatitidis [BDBG00440]
Histoplasma capsulatum [HCAG05383]
Paracoccidioides brasiliensis [PABG08443]
Septoria populicola [Sep20947]
Septoria musiva [Smu152365]
Mycosphaerella fijiensis [Myfi29673]
Dothistroma septosporum [Dos101340]
Mycosphaerella graminicola [Mygr10995]
Baudoinia compniacensis [Bc32143]
Pyrenophora tritici-repentis [PTRG07381]
Pyrenophora teres [Pt3262]
Setosphaeria turcica [St47895]
Cochliobolus heterostrophus [Cohe100826]
Cochliobolus sativus [Cos304121]
Alternaria brassicicola [AB08978]
Leptosphaeria maculans [Lm6446]
Stagonospora nodorum [SNU00323]
Hysterium pulicare [Hp3607]
Rhystidhysteron rufulum [Rr3314]
Botrytis cinerea [BC1G01035]
Fusarium oxysporum [FOXG06139]
Fusarium verticillioides [FVEG04000]
Fusarium graminearum [FGSG13585]
Nectria haematococca [Neha103523]
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Trichoderma reesei [Tre122900]
Acremonium alcalophilum [Aa1063060]
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Wickerhamomyces anomalus [Wa22953]
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Cryptococcus neoformans [CNAG04599]
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Malassezia globosa [Mg1775]
Mucor circinelloides [Muci80054]
Rhizopus oryzae [RO3G14513]
Phycomyces blakesleeanus [Phybl79469]
Allomyces macrogynus atcc 38327 [AMAG00810]
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Rsm22
Rogdi_lz
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Arb2
Lsr2
Epimerase
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Prok-TraM
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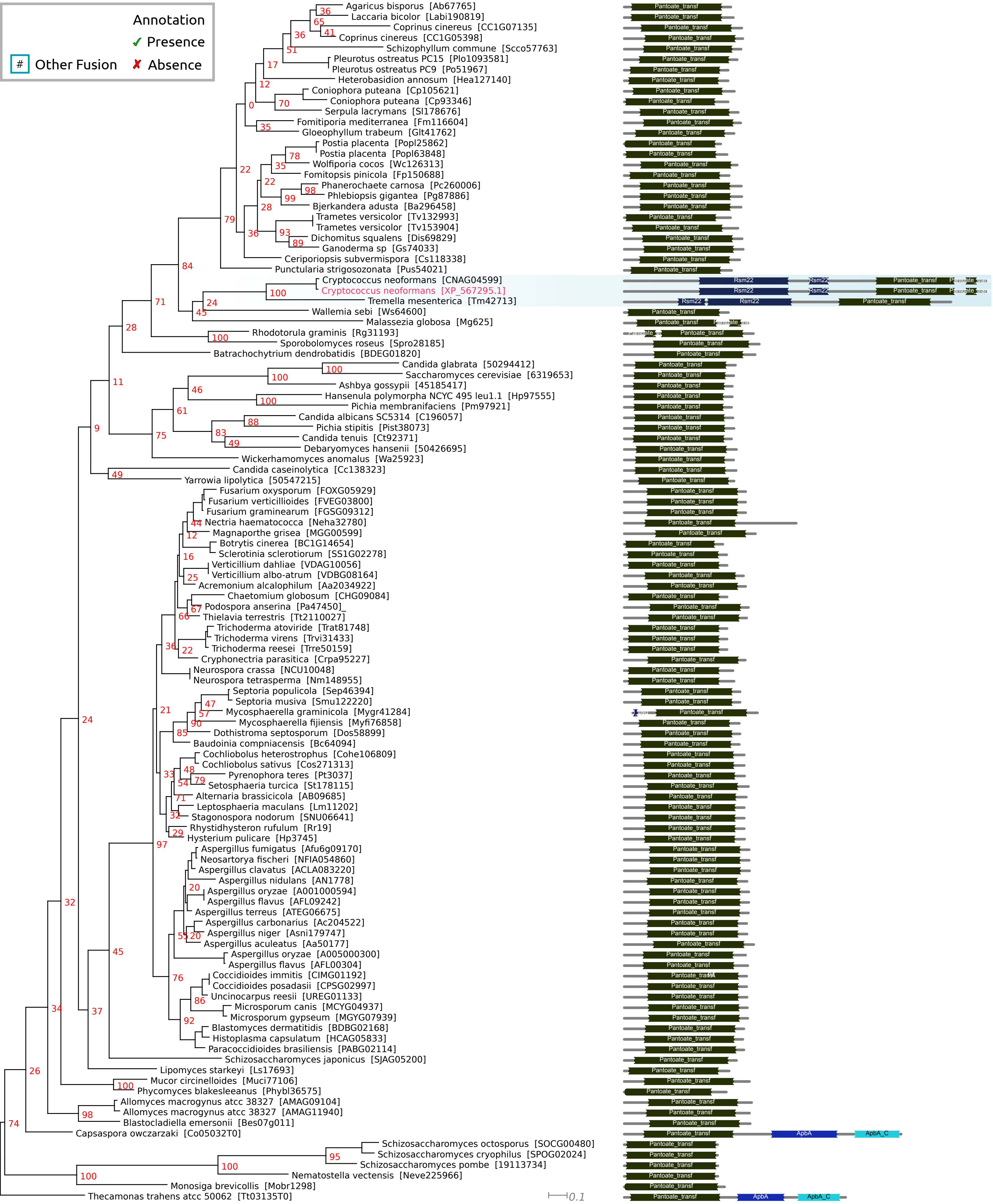
19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Heterobasidion annosum [Hea127140]
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Serpula lacrymans [Sl178676]
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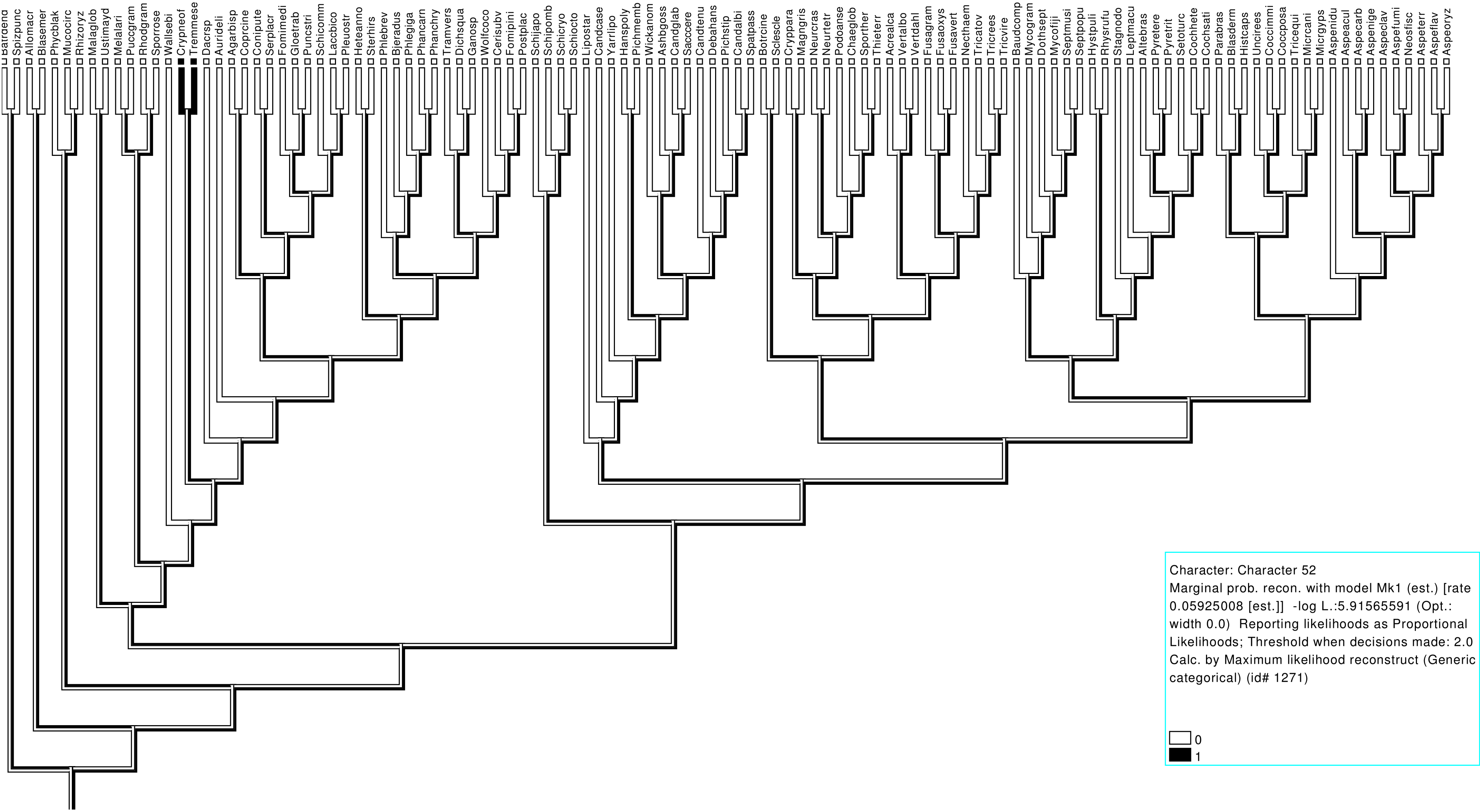
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Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
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Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
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Sporther
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Vertalbo
Vertdahl
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Fusaoxys
Fusavert
Necthaem
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Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
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Marginal prob. recon. with model Mk1 (est.) [rate 0.05925008 [est.]] -log L.:5.91565591 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 52

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>EEH048921Ajca_dom1
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DLALFSSAKTNTNTKIPTEASSIESSRRPAIMTFTSPMVDTAKRVSKMPLYLLGWQREAE
GLKVNMMDRVEFGRKKGAMPKTLRLEIESEEKIQVYSAVVKFDAKFSGLRWIMYNWKIFS
ILTFTLTFWAVSMLFTSLVWVALASLAEPTVRTNPKLKDETEEEENSSGISVKEEEGSDG
EGASSKLTMPHERQMSDEPEKIKREENTEEYTVIQTLAGSDQPEAEAGAHPVGTSTSSQI
>EEH048921Ajca_dom2
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GENDNMEPIVNEWILIDSTPASCVQIGLFHYFKDRGPIDLVISGPNYGRNSTAVFALSSG
TLGGALEAAVCGYRSIALSYAFSSRDHDPVVIAEASRHSVRLIGHLYKNWEEDVDFYSIN
VPLEAGVSEAKILYTNVLDNRWTSGSCFEAIDAAESGEGPDLQEQKLRQAGEVDAGLGKG
TKPGTGTTTPGHRHMHFKWAPKFSDVYKSVDLGPPGNDGWTVKEGMTSVTRLKANFMHSP
RPLGEIQLPFKTPIFYALVECQDSYVQPLVTQALRTRLHGIPYELIFSIRELPNPSSPLL
QYRVYEQCDFEHVLSHPATSLVNAYVIRKALIRKHYLSNSVSNWVAKHPDSILNAHVKPA
VHFELDYAEFLDEALVEAYELQESFQANEGKEEAEKEWWILKPGMSDRGRGIRLFNSESA
LREIFEGWEDDQPDSEDGEDSENGKVVANGNGKLNNDDNRDDDHGIITSQLRHFIAQPYI
HPPLLLPSESNRKFHIRTYVLAVGSLQVYVYREMLALFAEKPYLSPWDSSGAGVDDLTRH
LTNTCLQTGRGGTAKQNSVRRFWALEDTAVPSLSSSSPPTSGEPNASTNWKESVYQKICA
VTGEVFEAAARGMLVHFQTLPNAFEVFGVDFLVDSRGKVWLLELNAFPDFRQTGDELKGD
VVGKLFEAVVEVAVKPFFGIEKDIERAKARAAQLGLQLVRDLDMGMKR
```

2 Annotated Phylograms

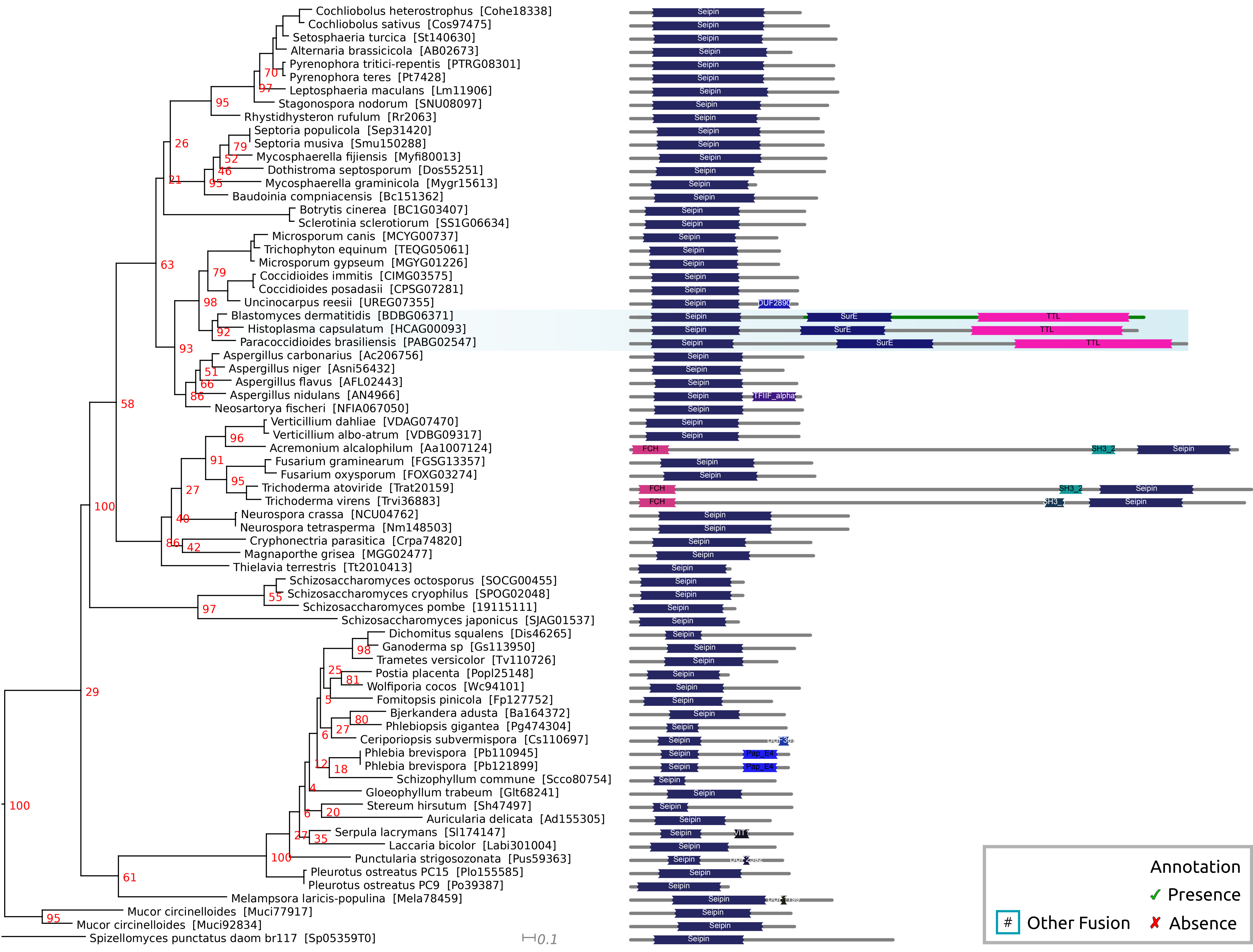
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Leptosphaeria maculans [Lm11906]
Stagonospora nodorum [SNU08097]
Rhystidhysteron rufulum [Rr2063]
Septoria populicola [Sep31420]
Septoria musiva [Smu150288]
Mycosphaerella fijiensis [Myfi80013]
Dothistroma septosporum [Dos55251]
Mycosphaerella graminicola [Mygr15613]
Baudoinia compniacensis [Bc151362]
Botrytis cinerea [BC1G03407]
Sclerotinia sclerotiorum [SS1G06634]
Microsporum canis [MCYG00737]
Trichophyton equinum [TEQG05061]
Microsporum gypseum [MGYG01226]
Coccidioides immitis [CIMG03575]
Coccidioides posadasii [CPSG07281]
Uncinocarpus reesii [UREG07355]
Blastomyces dermatitidis [BDBG06371]
Histoplasma capsulatum [HCAG00093]
Paracoccidioides brasiliensis [PABG02547]
Aspergillus carbonarius [Ac206756]
Aspergillus niger [Asni56432]
Aspergillus flavus [AFL02443]
Aspergillus nidulans [AN4966]
Neosartorya fischeri [NFIA067050]
Verticillium dahliae [VDAG07470]
Verticillium albo-atrum [VDBG09317]
Acremonium alcalophilum [Aa1007124]
Fusarium graminearum [FGSG13357]
Fusarium oxysporum [FOXG03274]
Trichoderma atoviride [Trat20159]
Trichoderma virens [Trvi36883]
Neurospora crassa [NCU04762]
Neurospora tetrasperma [Nm148503]
Cryphonectria parasitica [Crpa74820]
Magnaporthe grisea [MGG02477]
Thielavia terrestris [Tt2010413]
Schizosaccharomyces octosporus [SOCG00455]
Schizosaccharomyces cryophilus [SPOG02048]
Schizosaccharomyces pombe [19115111]
Schizosaccharomyces japonicus [SJAG01537]
Dichomitus squalens [Dis46265]
Ganoderma sp [Gs113950]
Trametes versicolor [Tv110726]
Postia placenta [Popl25148]
Wolfiporia cocos [Wc94101]
Fomitopsis pinicola [Fp127752]
Bjerkandera adusta [Ba164372]
Phlebiopsis gigantea [Pg474304]
Ceriporiopsis subvermispora [Cs110697]
Phlebia brevispora [Pb110945]
Phlebia brevispora [Pb121899]
Schizophyllum commune [Scco80754]
Gloeophyllum trabeum [Glt68241]
Stereum hirsutum [Sh47497]
Auricularia delicata [Ad155305]
Serpula lacrymans [Sl174147]
Laccaria bicolor [Labi301004]
Punctularia strigosozonata [Pus59363]
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Melampsora laricis-populina [Mela78459]
Mucor circinelloides [Muci77917]
Mucor circinelloides [Muci92834]
Spizellomyces punctatus daom br117 [Sp05359T0]
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✗ Absence
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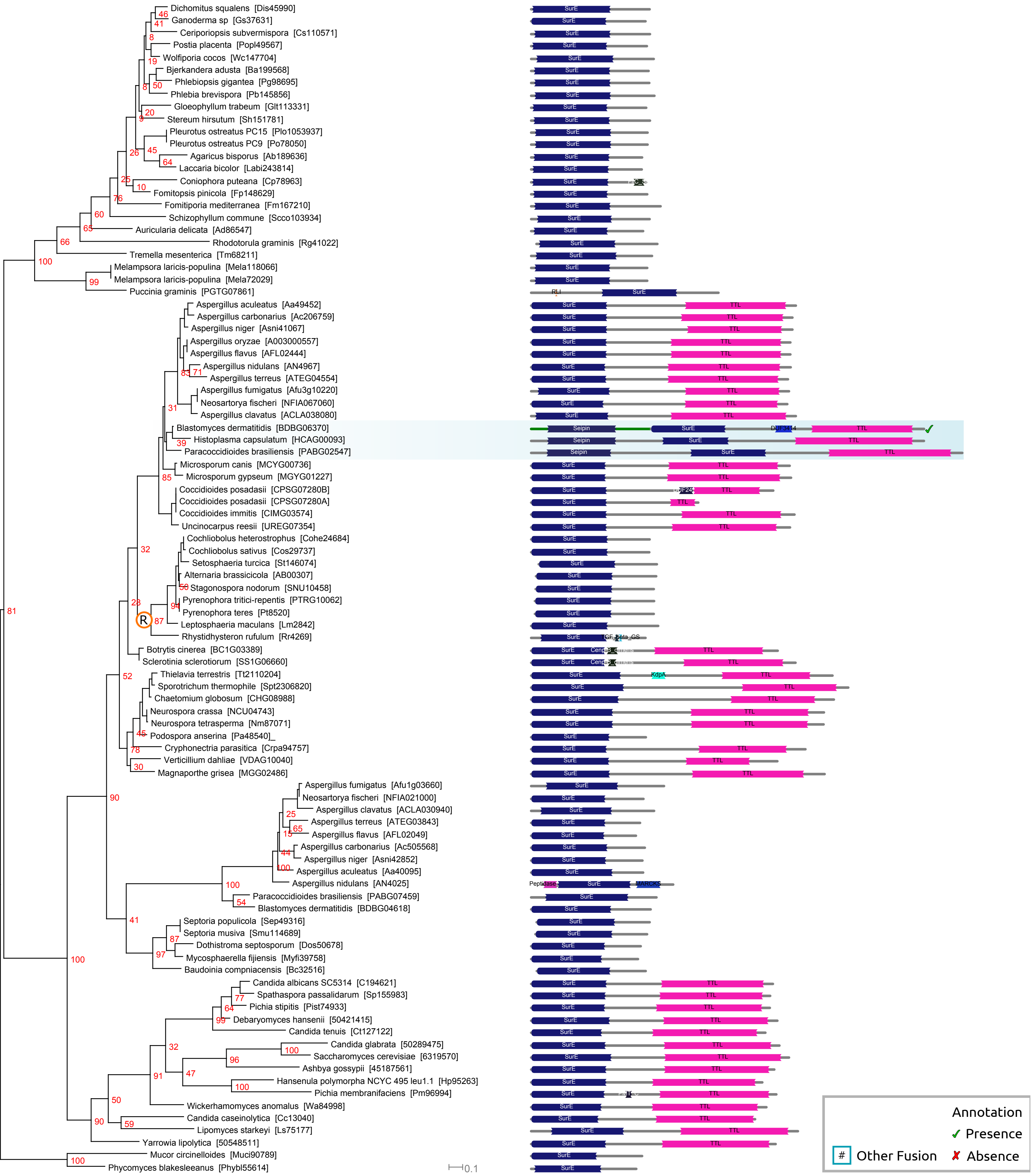
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Gloeophyllum trabeum [Glt113331]
Stereum hirsutum [Sh151781]
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Pleurotus ostreatus PC9 [Po78050]
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Laccaria bicolor [Labi243814]
Coniophora puteana [Cp78963]
Fomitopsis pinicola [Fp148629]
Fomitiporia mediterranea [Fm167210]
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Auricularia delicata [Ad86547]
Rhodotorula graminis [Rg41022]
Tremella mesenterica [Tm68211]
Melampsora laricis-populina [Mela118066]
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Puccinia graminis [PGTG07861]
Aspergillus aculeatus [Aa49452]
Aspergillus carbonarius [Ac206759]
Aspergillus niger [Asni41067]
Aspergillus oryzae [A003000557]
Aspergillus flavus [AFL02444]
Aspergillus nidulans [AN4967]
Aspergillus terreus [ATEG04554]
Aspergillus fumigatus [Afu3g10220]
Neosartorya fischeri [NFIA067060]
Aspergillus clavatus [ACLA038080]
Blastomyces dermatitidis [BDBG06370]
Histoplasma capsulatum [HCAG00093]
Paracoccidioides brasiliensis [PABG02547]
Microsporum canis [MCYG00736]
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Coccidioides posadasii [CPSG07280B]
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Alternaria brassicicola [AB00307]
Stagonospora nodorum [SNU10458]
Pyrenophora tritici-repentis [PTRG10062]
Pyrenophora teres [Pt8520]
Leptosphaeria maculans [Lm2842]
Rhystidhysteron rufulum [Rr4269]
Botrytis cinerea [BC1G03389]
Sclerotinia sclerotiorum [SS1G06660]
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Sporotrichum thermophile [Spt2306820]
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Aspergillus terreus [ATEG03843]
Aspergillus flavus [AFL02049]
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Paracoccidioides brasiliensis [PABG07459]
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Septoria populicola [Sep49316]
Septoria musiva [Smu114689]
Dothistroma septosporum [Dos50678]
Mycosphaerella fijiensis [Myfi39758]
Baudoinia compniacensis [Bc32516]
Candida albicans SC5314 [C194621]
Spathaspora passalidarum [Sp155983]
Pichia stipitis [Pist74933]
Debaryomyces hansenii [50421415]
Candida tenuis [Ct127122]
Candida glabrata [50289475]
Saccharomyces cerevisiae [6319570]
Ashbya gossypii [45187561]
Hansenula polymorpha NCYC 495 leu1.1 [Hp95263]
Pichia membranifaciens [Pm96994]
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Candida caseinolytica [Cc13040]
Lipomyces starkeyi [Ls75177]
Yarrowia lipolytica [50548511]
Mucor circinelloides [Muci90789]
Phycomyces blakesleeanus [Phybl55614]
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RLI
KdpA
MARCKS
Peptidase
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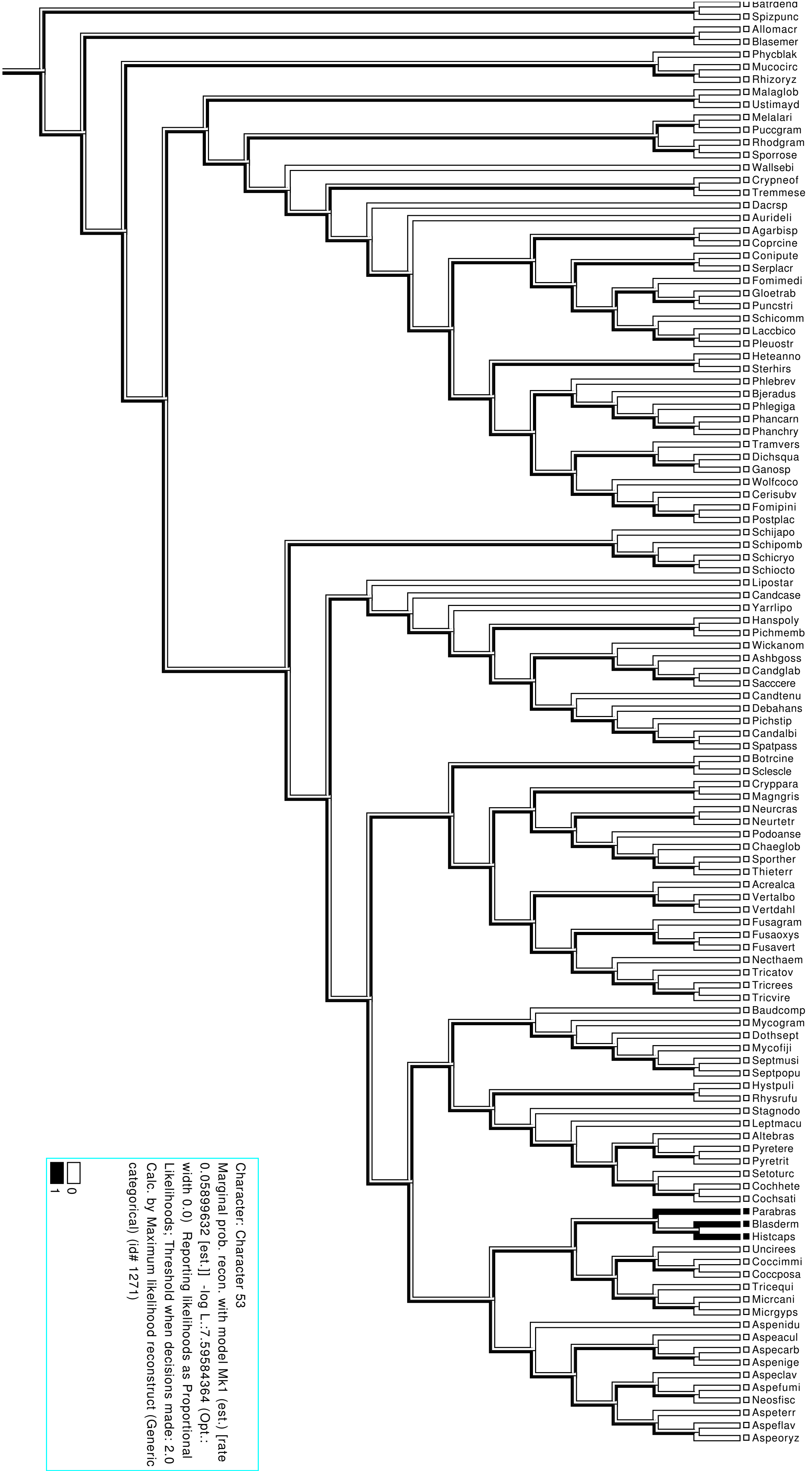
Other Fusion
✗ Absence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Spizpunc
Allomacr
Blasemer
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Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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Marginal prob. recon. with model Mk1 (est.) [rate
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width 0.0) Reporting likelihoods as Proportional
Likelihoods; Threshold when decisions made: 2.0
Calc. by Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 53

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>AEO673831Thte_dom1
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DGPSDRPGSWRKRWAAKIRSKKMSATSALARRHGVKHSALMYLSYYLPVIAWAPEYSWSY
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AGSLLVGTVVKTSVDRGRTTDDDATMHARLCGIVAGMSGAMVLIAGVARLGFLDNVLSRP
FLRGFISAIGVVVAVDQLVPELGLSGLADRAHLGHASSVDKLAFIFRHLDQVHTLTLAVA
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SGHPFTFRWPLQPANLPHMRDAMSTSFLIALLGFFESSVAAKSLGPDGFAGIQLSPNREL
VALGTANIVGACFMSLPAFGGYGRSKVNKATGGRTPVASILLSGLTLLCILVLLPYFYYL
PKPVLSSLISVVAWSLIEECPHDVSFFVRIRAWQELGLMTVIVLATIFFSLSFGMAIGVG
LSVLQVIRHATRPRIQILGRIPGTNRFENAEANLDRLEFIEGCLIVKIPEPLTFANTGEL
KARLRRLELYGTGLAHPALPRLRREDCNRNIIFDIHGVTSLDGSGTQVLEEIVRDYRQRG
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>AEO673831Thte_dom2
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LESLTLAVAALFDPRPLEEVLIDVVRFGQDADTNGAIAGGLLGARDGVDAIPARWREKLQ
FEKEFTEVADGLLARQDSGN
```

2 Annotated Phylograms

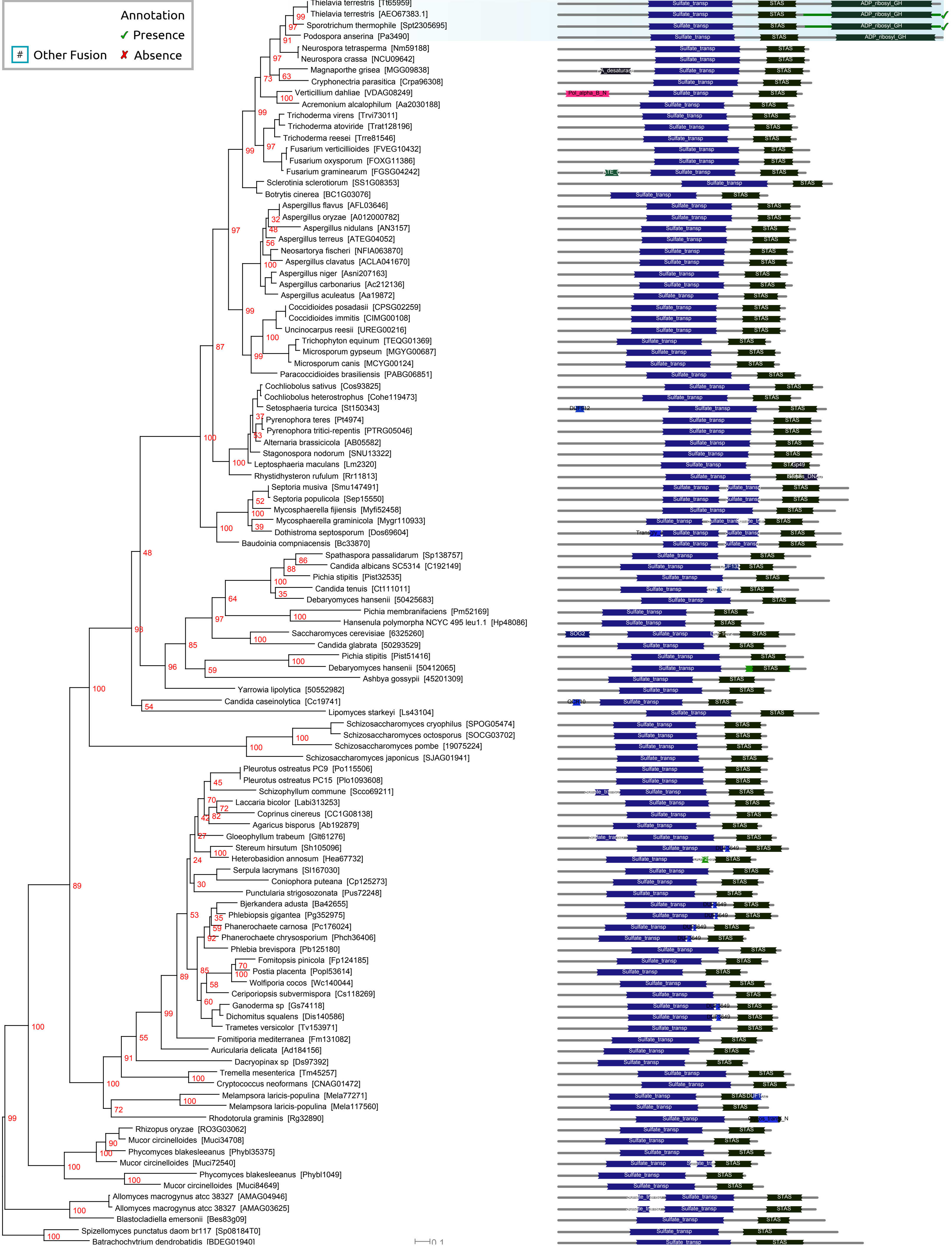
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
Other Fusion
✓ Presence
✗ Absence
Thielavia terrestris [Tt65959]
Thielavia terrestris [AEO67383.1]
Sporotrichum thermophile [Spt2305695]
Podospora anserina [Pa3490]
Neurospora tetrasperma [Nm59188]
Neurospora crassa [NCU09642]
Magnaporthe grisea [MGG09838]
Cryphonectria parasitica [Crpa96308]
Verticillium dahliae [VDAG08249]
Acremonium alcalophilum [Aa2030188]
Trichoderma virens [Trvi73011]
Trichoderma atoviride [Trat128196]
Trichoderma reesei [Trre81546]
Fusarium verticillioides [FVEG10432]
Fusarium oxysporum [FOXG11386]
Fusarium graminearum [FGSG04242]
Sclerotinia sclerotiorum [SS1G08353]
Botrytis cinerea [BC1G03076]
Aspergillus flavus [AFL03646]
Aspergillus oryzae [A012000782]
Aspergillus nidulans [AN3157]
Aspergillus terreus [ATEG04052]
Neosartorya fischeri [NFIA063870]
Aspergillus clavatus [ACLA041670]
Aspergillus niger [Asni207163]
Aspergillus carbonarius [Ac212136]
Aspergillus aculeatus [Aa19872]
Coccidioides posadasii [CPSG02259]
Coccidioides immitis [CIMG00108]
Uncinocarpus reesii [UREG00216]
Trichophyton equinum [TEQG01369]
Microsporum gypseum [MGYG00687]
Microsporum canis [MCYG00124]
Paracoccidioides brasiliensis [PABG06851]
Cochliobolus sativus [Cos93825]
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Setosphaeria turcica [St150343]
Pyrenophora teres [Pt4974]
Pyrenophora tritici-repentis [PTRG05046]
Alternaria brassicicola [AB05582]
Stagonospora nodorum [SNU13322]
Leptosphaeria maculans [Lm2320]
Rhystidhysteron rufulum [Rr11813]
Septoria musiva [Smu147491]
Septoria populicola [Sep15550]
Mycosphaerella fijiensis [Myfi52458]
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Dothistroma septosporum [Dos69604]
Baudoinia compniacensis [Bc33870]
Spathaspora passalidarum [Sp138757]
Candida albicans SC5314 [C192149]
Pichia stipitis [Pist32535]
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Debaryomyces hansenii [50425683]
Pichia membranifaciens [Pm52169]
Hansenula polymorpha NCYC 495 leu1.1 [Hp48086]
Saccharomyces cerevisiae [6325260]
Candida glabrata [50293529]
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Debaryomyces hansenii [50412065]
Ashbya gossypii [45201309]
Yarrowia lipolytica [50552982]
Candida caseinolytica [Cc19741]
Lipomyces starkeyi [Ls43104]
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Schizosaccharomyces octosporus [SOCG03702]
Schizosaccharomyces pombe [19075224]
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Ganoderma sp [Gs74118]
Dichomitus squalens [Dis140586]
Trametes versicolor [Tv153971]
Fomitiporia mediterranea [Fm131082]
Auricularia delicata [Ad184156]
Dacryopinax sp [Ds97392]
Tremella mesenterica [Tm45257]
Cryptococcus neoformans [CNAG01472]
Melampsora laricis-populina [Mela77271]
Melampsora laricis-populina [Mela117560]
Rhodotorula graminis [Rg32890]
Rhizopus oryzae [RO3G03062]
Mucor circinelloides [Muci34708]
Phycomyces blakesleeanus [Phybl35375]
Mucor circinelloides [Muci72540]
Phycomyces blakesleeanus [Phybl1049]
Mucor circinelloides [Muci84649]
Allomyces macrogynus atcc 38327 [AMAG04946]
Allomyces macrogynus atcc 38327 [AMAG03625]
Blastocladiella emersonii [Bes83g09]
Spizellomyces punctatus daom br117 [Sp08184T0]
Batrachochytrium dendrobatidis [BDEG01940]
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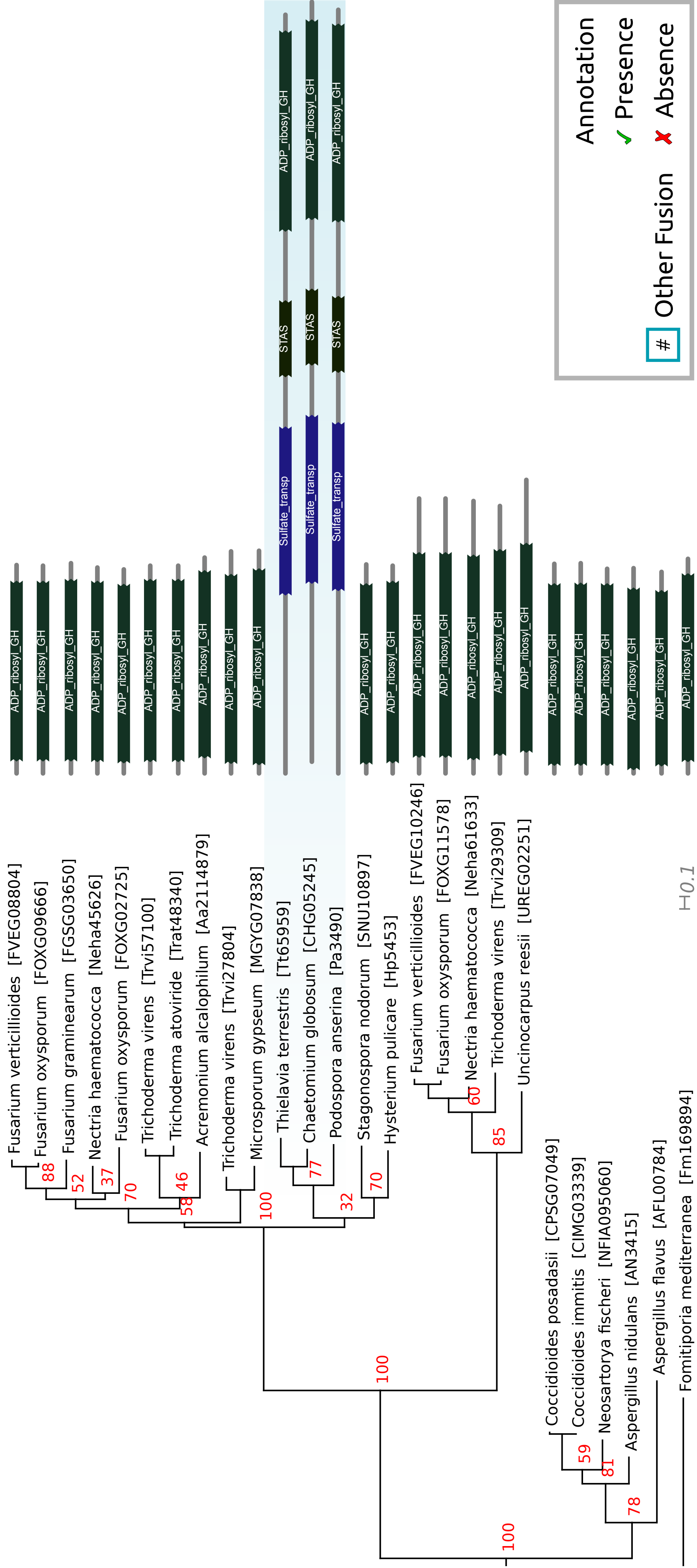
DUF1649
SOG2
Citrate_transp_N
0.1


Annotation
✓ Presence
✗ Absence
Other Fusion
Fusarium verticillioides [FVEG08804]
Fusarium oxysporum [FOXG09666]
Fusarium graminearum [FGSG03650]
Nectria haematococca [Neha45626]
Fusarium oxysporum [FOXG02725]
Trichoderma virens [Trvi57100]
Trichoderma atoviride [Trat48340]
Acremonium alcalophilum [Aa2114879]
Trichoderma virens [Trvi27804]
Microsporum gypseum [MGYG07838]
Thielavia terrestris [Tt65959]
Chaetomium globosum [CHG05245]
Podospora anserina [Pa3490]
Stagonospora nodorum [SNU10897]
Hysterium pulicare [Hp5453]
Fusarium verticillioides [FVEG10246]
Fusarium oxysporum [FOXG11578]
Nectria haematococca [Neha61633]
Trichoderma virens [Trvi29309]
Uncinocarpus reesii [UREG02251]
Coccidioides posadasii [CPSG07049]
Coccidioides immitis [CIMG03339]
Neosartorya fischeri [NFIA095060]
Aspergillus nidulans [AN3415]
Aspergillus flavus [AFL00784]
Fomitiporia mediterranea [Fm169894]
88
52
37
70
46
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60
85
100
59
81
78
100
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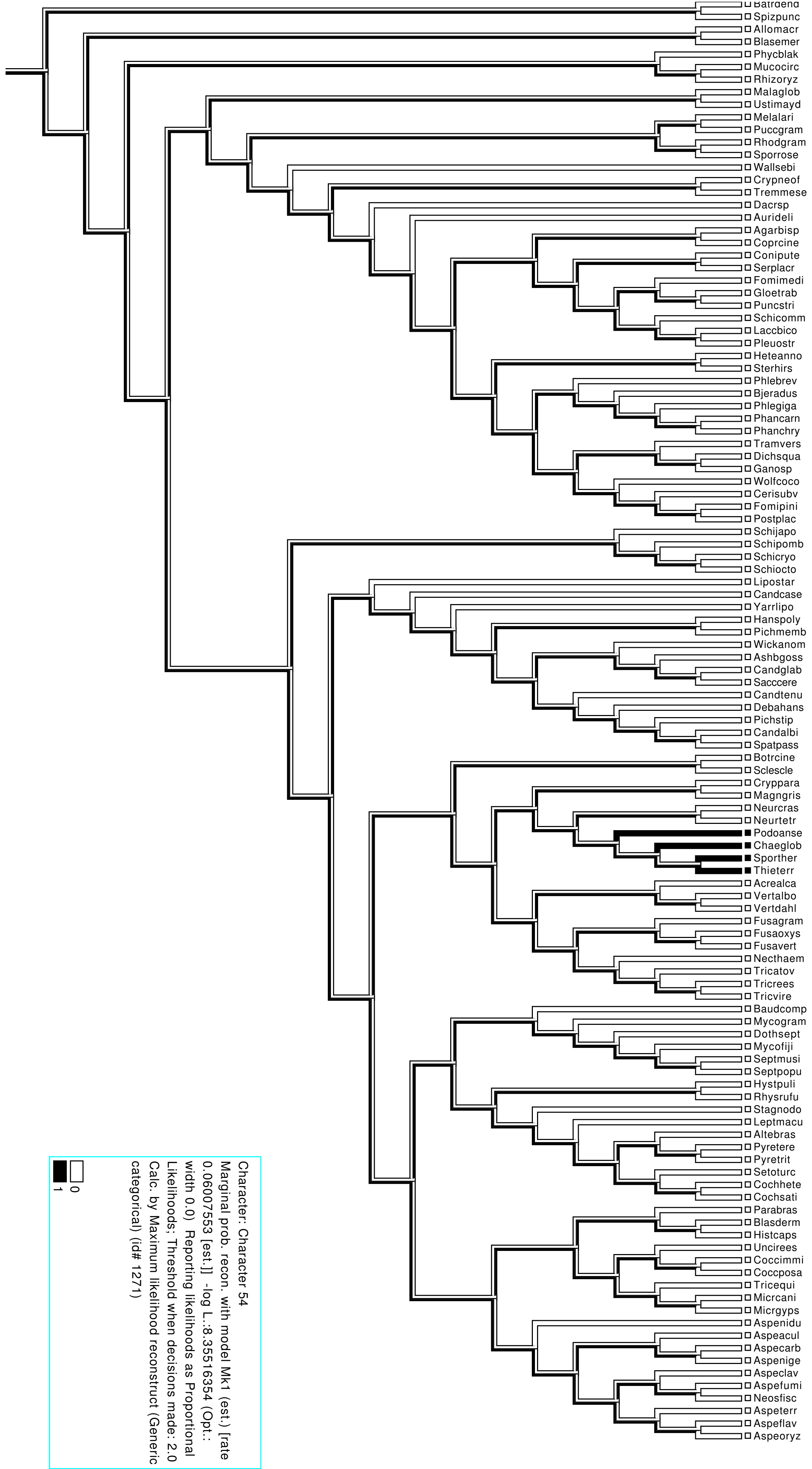
Sulfate_transp
STAS


Character: Character 54
Marginal prob. recon. with model Mk1 (est.) [rate 0.06007553 [est.]] -log L.:8.35516354 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
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1
Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz

Putative Fusion 54

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>EHA275671Asni_dom1
MPSALTFDLHAKCSTTKARASTLRLPHGDVPLPIFMPVATQASLKGLTYDQLRQTGCQLC
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HDGTPMLLTPEHSISLQNSIGSDIIMQLDDVIATTSPDQARIHEAMERSVRWLDRCIDAH
KYPERQNLFCIIQGGLDLEMRKQCCEEMVARDTPGIAIGGLSGGEAKEDFCKERVDTCTG
LLPEKKPRYVMGVGYPEDLIMGVALGADMFDCVWPTRTAESTPQSTTTTTTTPQEPIPHD
PTHEEHQYLNLI
>EHA275671Asni_dom2
PTHEEHQYLNLIRRILSEGEHRPDRTGTGTRSIFAPPQMRFSLSKPSTNTTTGIKEYTPI
LPLLTTKRVFLRAVLAELLWFISGTTSSLPLSEAGIKIWDGNGSREYLDKVGLSHREVGD
LGPVYGFQWRHFGAEYVDAKTDYSGQGVDQLAEVVKKLKENPFDRRIIMSAWNPKDMRIM
ALPPCHMFAQFYVRFPDAKRDEEGVVRDGEWGRGHLDCLLYQRSADMGLGVPFNIASYAL
LTHLLAHAVDMVPGTLVHTLGDAHVYLDHVDALKEQIEREPVAFPEVRIKREDRGSGVVD
GWKEEEFEVIGYKPHKAIKMKMSV
```

2 Annotated Phylograms

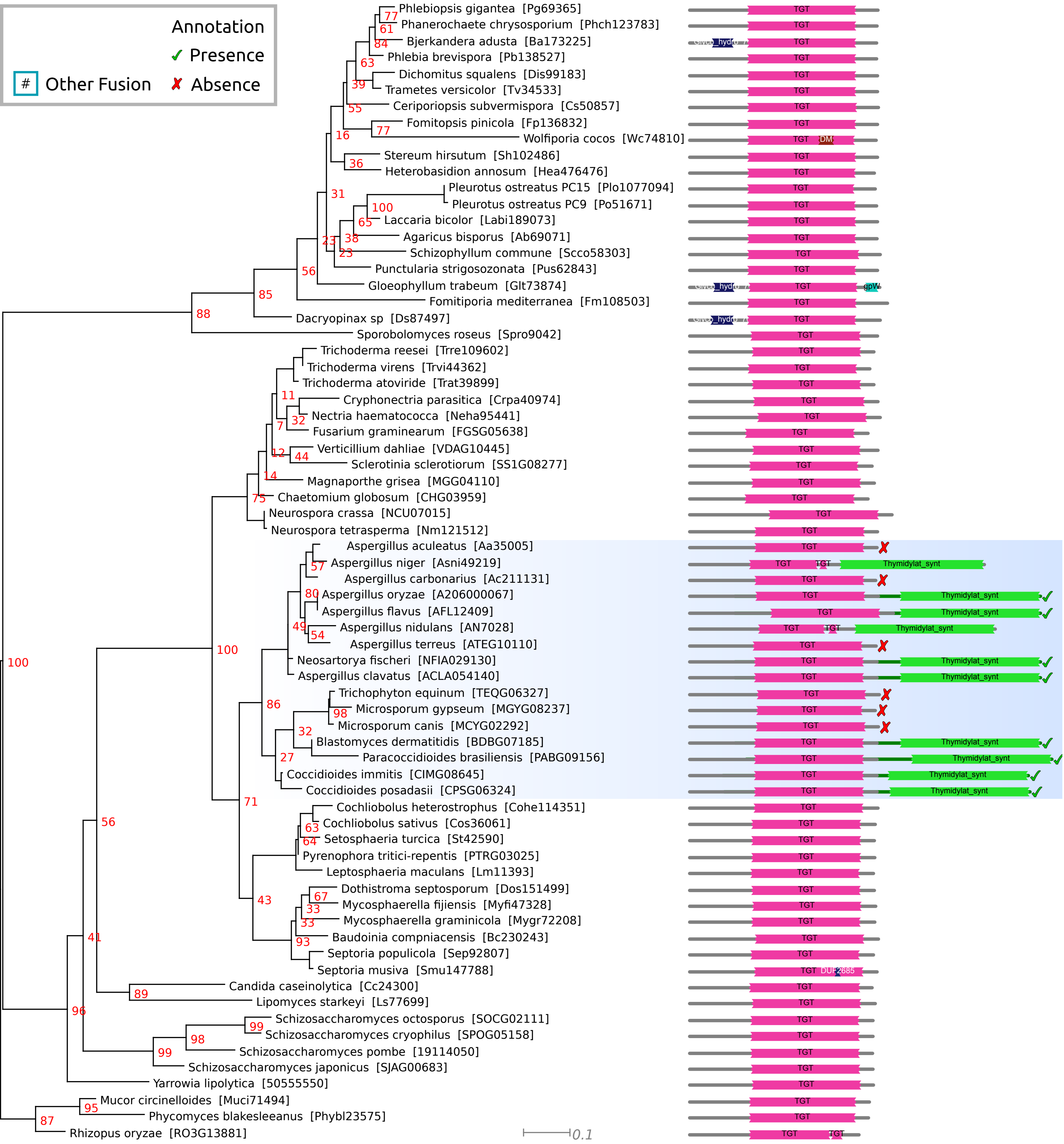
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Other Fusion
✗ Absence
Phlebiopsis gigantea [Pg69365]
Phanerochaete chrysosporium [Phch123783]
Bjerkandera adusta [Ba173225]
Phlebia brevispora [Pb138527]
Dichomitus squalens [Dis99183]
Trametes versicolor [Tv34533]
Ceriporiopsis subvermispora [Cs50857]
Fomitopsis pinicola [Fp136832]
Wolfiporia cocos [Wc74810]
Stereum hirsutum [Sh102486]
Heterobasidion annosum [Hea476476]
Pleurotus ostreatus PC15 [Plo1077094]
Pleurotus ostreatus PC9 [Po51671]
Laccaria bicolor [Labi189073]
Agaricus bisporus [Ab69071]
Schizophyllum commune [Scco58303]
Punctularia strigosozonata [Pus62843]
Gloeophyllum trabeum [Glt73874]
Fomitiporia mediterranea [Fm108503]
Dacryopinax sp [Ds87497]
Sporobolomyces roseus [Spro9042]
Trichoderma reesei [Tre109602]
Trichoderma virens [Trvi44362]
Trichoderma atoviride [Trat39899]
Cryphonectria parasitica [Crpa40974]
Nectria haematococca [Neha95441]
Fusarium graminearum [FGSG05638]
Verticillium dahliae [VDAG10445]
Sclerotinia sclerotiorum [SS1G08277]
Magnaporthe grisea [MGG04110]
Chaetomium globosum [CHG03959]
Neurospora crassa [NCU07015]
Neurospora tetrasperma [Nm121512]
Aspergillus aculeatus [Aa35005]
Aspergillus niger [Asni49219]
Aspergillus carbonarius [Ac211131]
Aspergillus oryzae [A206000067]
Aspergillus flavus [AFL12409]
Aspergillus nidulans [AN7028]
Aspergillus terreus [ATEG10110]
Neosartorya fischeri [NFIA029130]
Aspergillus clavatus [ACLA054140]
Trichophyton equinum [TEQG06327]
Microsporum gypseum [MGYG08237]
Microsporum canis [MCYG02292]
Blastomyces dermatitidis [BDBG07185]
Paracoccidioides brasiliensis [PABG09156]
Coccidioides immitis [CIMG08645]
Coccidioides posadasii [CPSG06324]
Cochliobolus heterostrophus [Cohe114351]
Cochliobolus sativus [Cos36061]
Setosphaeria turcica [St42590]
Pyrenophora tritici-repentis [PTRG03025]
Leptosphaeria maculans [Lm11393]
Dothistroma septosporum [Dos151499]
Mycosphaerella fijiensis [Myfi47328]
Mycosphaerella graminicola [Mygr72208]
Baudoinia compniacensis [Bc230243]
Septoria populicola [Sep92807]
Septoria musiva [Smu147788]
Candida caseinolytica [Cc24300]
Lipomyces starkeyi [Ls77699]
Schizosaccharomyces octosporus [SOCG02111]
Schizosaccharomyces cryophilus [SPOG05158]
Schizosaccharomyces pombe [19114050]
Schizosaccharomyces japonicus [SJAG00683]
Yarrowia lipolytica [50555550]
Mucor circinelloides [Muci71494]
Phycomyces blakesleeanus [Phybl23575]
Rhizopus oryzae [RO3G13881]
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85
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44
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80
49
54
100
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32
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71
63
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93
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89
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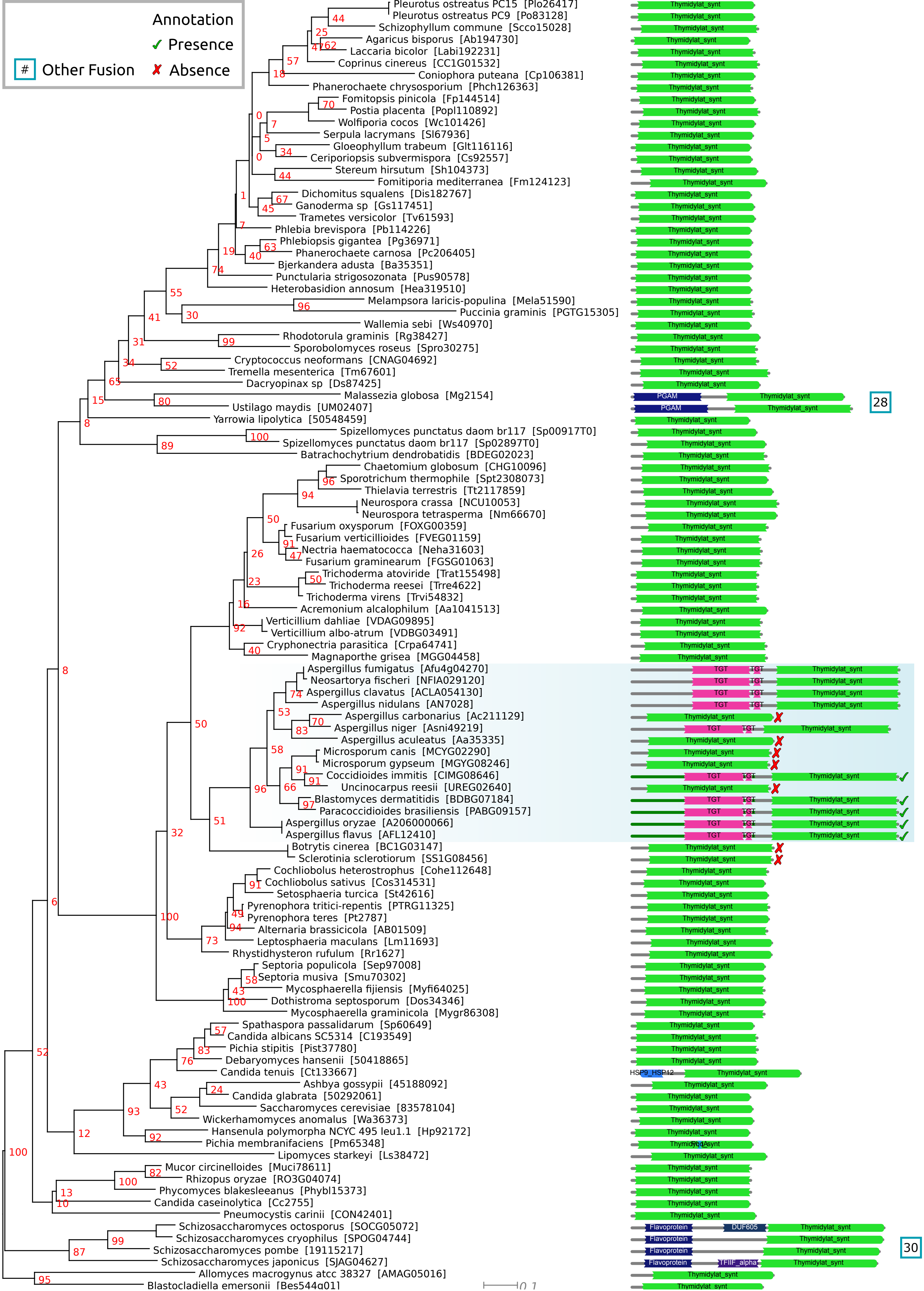
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Other Fusion
✗ Absence
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Pleurotus ostreatus PC9 [Po83128]
Schizophyllum commune [Scco15028]
Agaricus bisporus [Ab194730]
Laccaria bicolor [Labi192231]
Coprinus cinereus [CC1G01532]
Coniophora puteana [Cp106381]
Phanerochaete chrysosporium [Phch126363]
Fomitopsis pinicola [Fp144514]
Postia placenta [Popl110892]
Wolfiporia cocos [Wc101426]
Serpula lacrymans [Sl67936]
Gloeophyllum trabeum [Glt116116]
Ceriporiopsis subvermispora [Cs92557]
Stereum hirsutum [Sh104373]
Fomitiporia mediterranea [Fm124123]
Dichomitus squalens [Dis182767]
Ganoderma sp [Gs117451]
Trametes versicolor [Tv61593]
Phlebia brevispora [Pb114226]
Phlebiopsis gigantea [Pg36971]
Phanerochaete carnosa [Pc206405]
Bjerkandera adusta [Ba35351]
Punctularia strigosozonata [Pus90578]
Heterobasidion annosum [Hea319510]
Melampsora laricis-populina [Mela51590]
Puccinia graminis [PGTG15305]
Wallemia sebi [Ws40970]
Rhodotorula graminis [Rg38427]
Sporobolomyces roseus [Spro30275]
Cryptococcus neoformans [CNAG04692]
Tremella mesenterica [Tm67601]
Dacryopinax sp [Ds87425]
Malassezia globosa [Mg2154]
Ustilago maydis [UM02407]
Yarrowia lipolytica [50548459]
Spizellomyces punctatus daom br117 [Sp00917T0]
Spizellomyces punctatus daom br117 [Sp02897T0]
Batrachochytrium dendrobatidis [BDEG02023]
Chaetomium globosum [CHG10096]
Sporotrichum thermophile [Spt2308073]
Thielavia terrestris [Tt2117859]
Neurospora crassa [NCU10053]
Neurospora tetrasperma [Nm66670]
Fusarium oxysporum [FOXG00359]
Fusarium verticillioides [FVEG01159]
Nectria haematococca [Neha31603]
Fusarium graminearum [FGSG01063]
Trichoderma atoviride [Trat155498]
Trichoderma reesei [Tre4622]
Trichoderma virens [Trvi54832]
Acremonium alcalophilum [Aa1041513]
Verticillium dahliae [VDAG09895]
Verticillium albo-atrum [VDBG03491]
Cryphonectria parasitica [Crpa64741]
Magnaporthe grisea [MGG04458]
Aspergillus fumigatus [Afu4g04270]
Neosartorya fischeri [NFIA029120]
Aspergillus clavatus [ACLA054130]
Aspergillus nidulans [AN7028]
Aspergillus carbonarius [Ac211129]
Aspergillus niger [Asni49219]
Aspergillus aculeatus [Aa35335]
Microsporum canis [MCYG02290]
Microsporum gypseum [MGYG08246]
Coccidioides immitis [CIMG08646]
Uncinocarpus reesii [UREG02640]
Blastomyces dermatitidis [BDBG07184]
Paracoccidioides brasiliensis [PABG09157]
Aspergillus oryzae [A206000066]
Aspergillus flavus [AFL12410]
Botrytis cinerea [BC1G03147]
Sclerotinia sclerotiorum [SS1G08456]
Cochliobolus heterostrophus [Cohe112648]
Cochliobolus sativus [Cos314531]
Setosphaeria turcica [St42616]
Pyrenophora tritici-repentis [PTRG11325]
Pyrenophora teres [Pt2787]
Alternaria brassicicola [AB01509]
Leptosphaeria maculans [Lm11693]
Rhystidhysteron rufulum [Rr1627]
Septoria populicola [Sep97008]
Septoria musiva [Smu70302]
Mycosphaerella fijiensis [Myfi64025]
Dothistroma septosporum [Dos34346]
Mycosphaerella graminicola [Mygr86308]
Spathaspora passalidarum [Sp60649]
Candida albicans SC5314 [C193549]
Pichia stipitis [Pist37780]
Debaryomyces hansenii [50418865]
Candida tenuis [Ct133667]
Ashbya gossypii [45188092]
Candida glabrata [50292061]
Saccharomyces cerevisiae [83578104]
Wickerhamomyces anomalus [Wa36373]
Hansenula polymorpha NCYC 495 leu1.1 [Hp92172]
Pichia membranifaciens [Pm65348]
Lipomyces starkeyi [Ls38472]
Mucor circinelloides [Muci78611]
Rhizopus oryzae [RO3G04074]
Phycomyces blakesleeanus [Phybl15373]
Candida caseinolytica [Cc2755]
Pneumocystis carinii [CON42401]
Schizosaccharomyces octosporus [SOCG05072]
Schizosaccharomyces cryophilus [SPOG04744]
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Blastocladiella emersonii [Bes544g01]
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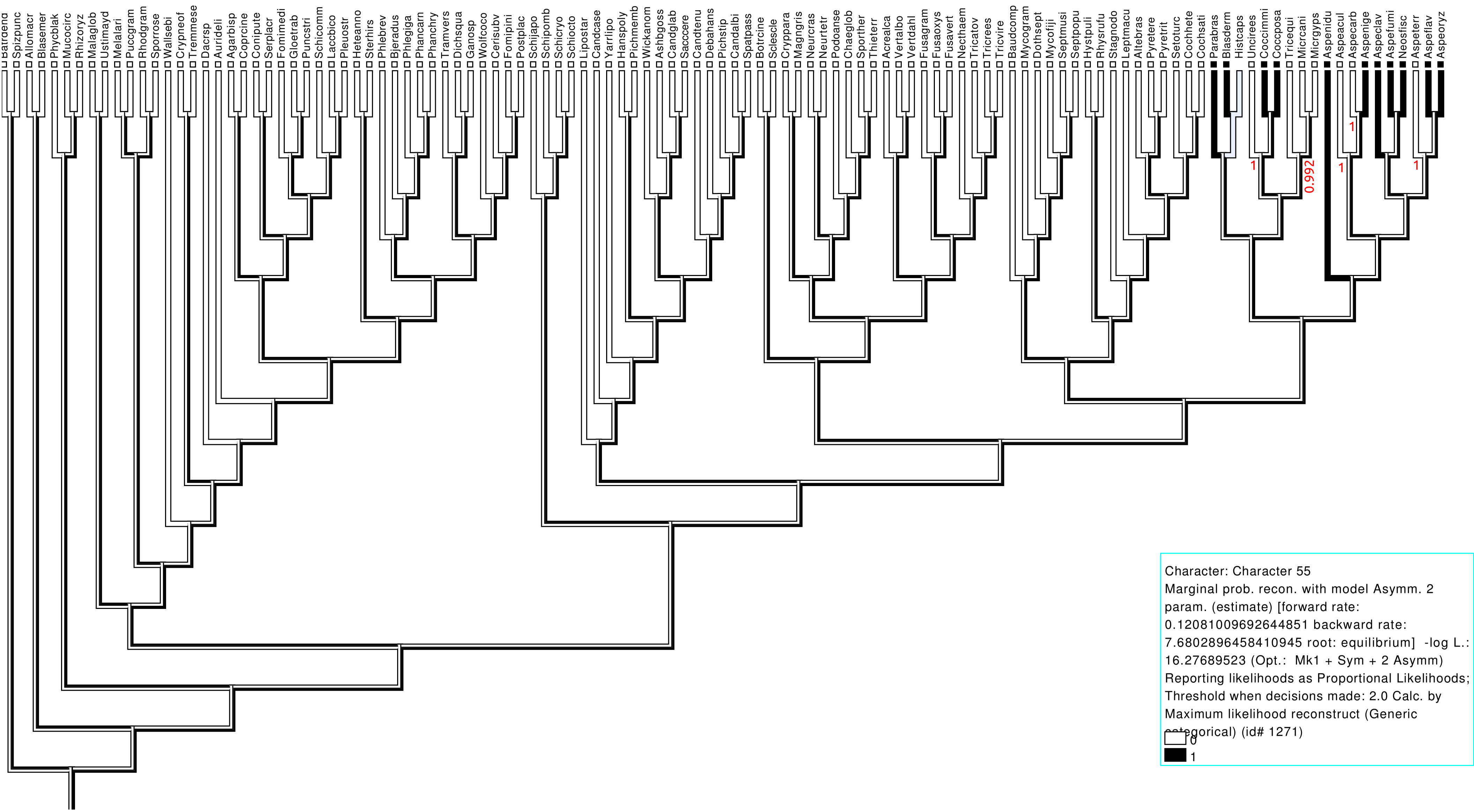
Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Pucggram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
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Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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1
0.992
1
1
Character: Character 55
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.12081009692644851 backward rate: 7.6802896458410945 root: equilibrium] -log L.: 16.27689523 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 55

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0033016801Pyte_dom1
MVLALHVWGPAFGLPSIEPECIATIAYCQRVIPRGQWTLVAEHDPTVGVTESLPILFDDD
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NYNTTTSSAYTAILPWYANYTVPPKRRQLARTRTAHMGLSSLDMDTTAEDGFAPGRGTAS
SEYEAAKRAAGIPTESKANTSLNIGRSKGLTGLLGGQMYAARFKLDALSADLLDPLSDLL
GRHDYLLHGEQPSSLDCLAFGYLSLLIYPPVPQAWLRETIKMKYPRIGAYIHKLHGDLFR
>XP_0033016801Pyte_dom2
NDEVNSAEVWSISSSSAKTPRTTLLPWVARSETFASKALASAKEIAGSIPGISKFSRGST
VVAVSKRSKSELPSPLLVNSFSRAPTASQIQSPPPPASSTKSGRFFGKANIGHTFRHKSA
GAFGPDLAKKLSQLVKMEKNVMRSMELVSRERMEVAQQLSIWGEACDDDVSDVTDKLGVL
IYEIGELEDQYVDRYDQYRVTIKSIRNIEASVQPSRDRKQKITDQIAQLKYKEPNSPKIV
VLEQELVRAEAESLVAEAQLSNITREKLKAAFNYQFDAMREHCEKLAIIAGYGKHLLELV
DDTPVTPGETRQAYDGYEASKAIIQDCEDALTNWVSQNASVSAKLSQRSRTLSQRRRNRN
HSEGVDLSGQDQALDRESGLWIPASEHHGNGYEGEELDDDINSTIASEHQRGREDERIVA
A
```

2 Annotated Phylograms

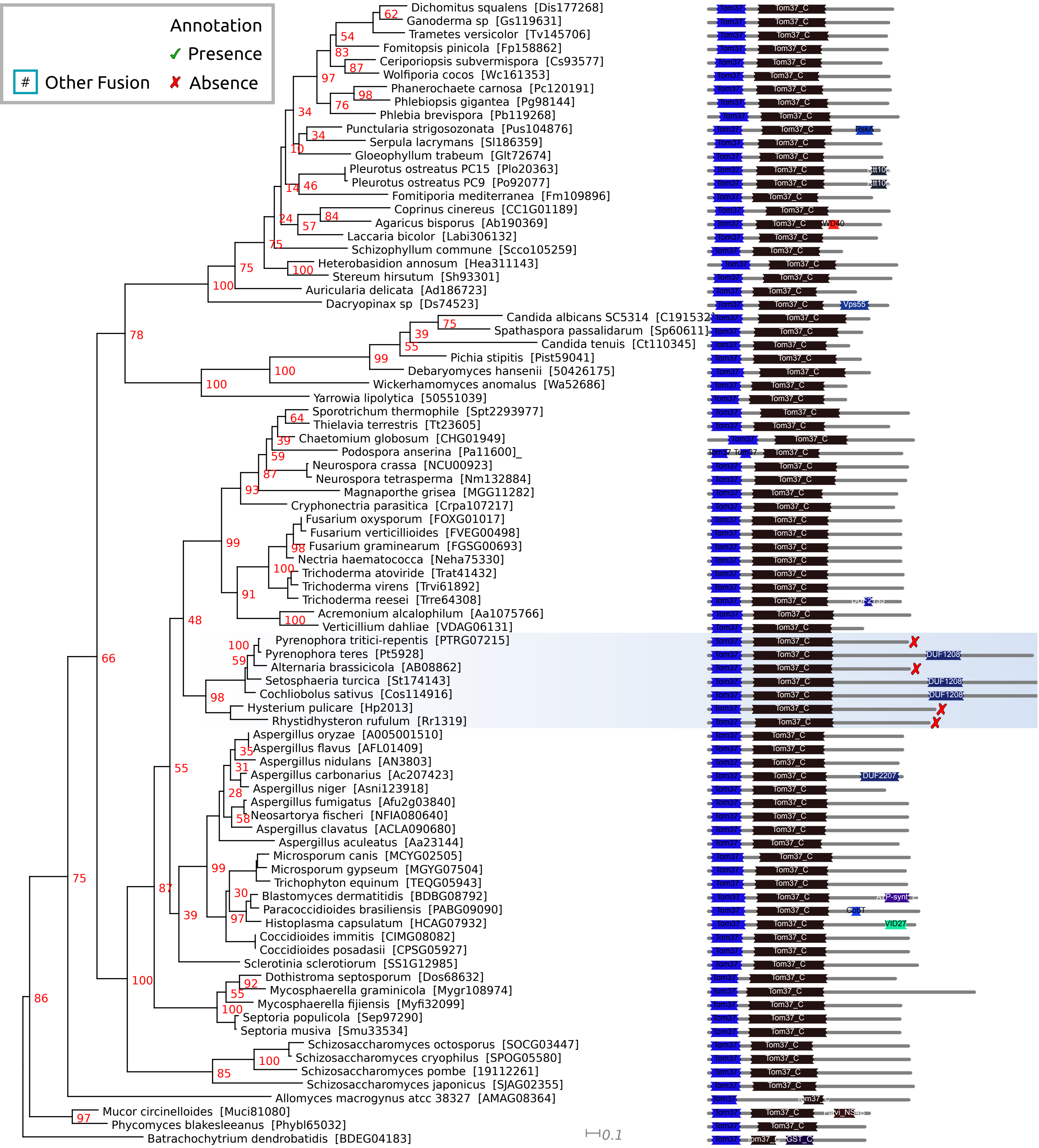
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
✗ Absence
Other Fusion
Dichomitus squalens [Dis177268]
Ganoderma sp [Gs119631]
Trametes versicolor [Tv145706]
Fomitopsis pinicola [Fp158862]
Ceriporiopsis subvermispora [Cs93577]
Wolfiporia cocos [Wc161353]
Phanerochaete carnosa [Pc120191]
Phlebiopsis gigantea [Pg98144]
Phlebia brevispora [Pb119268]
Punctularia strigosozonata [Pus104876]
Serpula lacrymans [Sl186359]
Gloeophyllum trabeum [Glt72674]
Pleurotus ostreatus PC15 [Plo20363]
Pleurotus ostreatus PC9 [Po92077]
Fomitiporia mediterranea [Fm109896]
Coprinus cinereus [CC1G01189]
Agaricus bisporus [Ab190369]
Laccaria bicolor [Labi306132]
Schizophyllum commune [Scco105259]
Heterobasidion annosum [Hea311143]
Stereum hirsutum [Sh93301]
Auricularia delicata [Ad186723]
Dacryopinax sp [Ds74523]
Candida albicans SC5314 [C191532]
Spathaspora passalidarum [Sp60611]
Candida tenuis [Ct110345]
Pichia stipitis [Pist59041]
Debaryomyces hansenii [50426175]
Wickerhamomyces anomalus [Wa52686]
Yarrowia lipolytica [50551039]
Sporotrichum thermophile [Spt2293977]
Thielavia terrestris [Tt23605]
Chaetomium globosum [CHG01949]
Podospora anserina [Pa11600]_
Neurospora crassa [NCU00923]
Neurospora tetrasperma [Nm132884]
Magnaporthe grisea [MGG11282]
Cryphonectria parasitica [Crpa107217]
Fusarium oxysporum [FOXG01017]
Fusarium verticillioides [FVEG00498]
Fusarium graminearum [FGSG00693]
Nectria haematococca [Neha75330]
Trichoderma atoviride [Trat41432]
Trichoderma virens [Trvi61892]
Trichoderma reesei [Tre64308]
Acremonium alcalophilum [Aa1075766]
Verticillium dahliae [VDAG06131]
Pyrenophora tritici-repentis [PTRG07215]
Pyrenophora teres [Pt5928]
Alternaria brassicicola [AB08862]
Setosphaeria turcica [St174143]
Cochliobolus sativus [Cos114916]
Hysterium pulicare [Hp2013]
Rhystidhysteron rufulum [Rr1319]
Aspergillus oryzae [A005001510]
Aspergillus flavus [AFL01409]
Aspergillus nidulans [AN3803]
Aspergillus carbonarius [Ac207423]
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Aspergillus fumigatus [Afu2g03840]
Neosartorya fischeri [NFIA080640]
Aspergillus clavatus [ACLA090680]
Aspergillus aculeatus [Aa23144]
Microsporum canis [MCYG02505]
Microsporum gypseum [MGYG07504]
Trichophyton equinum [TEQG05943]
Blastomyces dermatitidis [BDBG08792]
Paracoccidioides brasiliensis [PABG09090]
Histoplasma capsulatum [HCAG07932]
Coccidioides immitis [CIMG08082]
Coccidioides posadasii [CPSG05927]
Sclerotinia sclerotiorum [SS1G12985]
Dothistroma septosporum [Dos68632]
Mycosphaerella graminicola [Mygr108974]
Mycosphaerella fijiensis [Myfi32099]
Septoria populicola [Sep97290]
Septoria musiva [Smu33534]
Schizosaccharomyces octosporus [SOCG03447]
Schizosaccharomyces cryophilus [SPOG05580]
Schizosaccharomyces pombe [19112261]
Schizosaccharomyces japonicus [SJAG02355]
Allomyces macrogynus atcc 38327 [AMAG08364]
Mucor circinelloides [Muci81080]
Phycomyces blakesleeanus [Phybl65032]
Batrachochytrium dendrobatidis [BDEG04183]
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Tom37_C
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Rtt106
WD40
Vps55
DUF1208
DUF2207
ATP-synt
CobT
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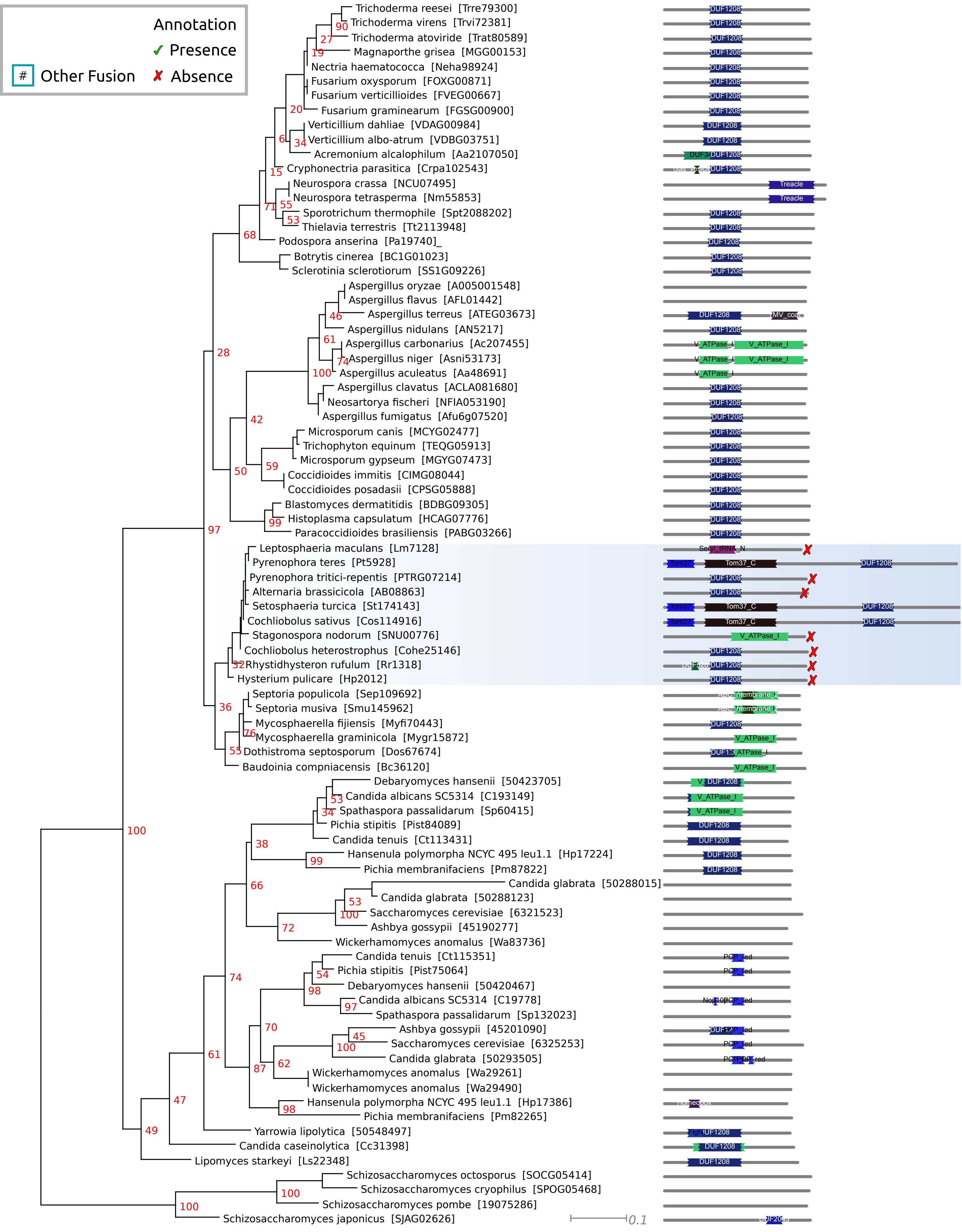
Flavi_NS4B
GST_C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Other Fusion
✗ Absence
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Nectria haematococca [Neha98924]
Fusarium oxysporum [FOXG00871]
Fusarium verticillioides [FVEG00667]
Fusarium graminearum [FGSG00900]
Verticillium dahliae [VDAG00984]
Verticillium albo-atrum [VDBG03751]
Acremonium alcalophilum [Aa2107050]
Cryphonectria parasitica [Crpa102543]
Neurospora crassa [NCU07495]
Neurospora tetrasperma [Nm55853]
Sporotrichum thermophile [Spt2088202]
Thielavia terrestris [Tt2113948]
Podospora anserina [Pa19740]_
Botrytis cinerea [BC1G01023]
Sclerotinia sclerotiorum [SS1G09226]
Aspergillus oryzae [A005001548]
Aspergillus flavus [AFL01442]
Aspergillus terreus [ATEG03673]
Aspergillus nidulans [AN5217]
Aspergillus carbonarius [Ac207455]
Aspergillus niger [Asni53173]
Aspergillus aculeatus [Aa48691]
Aspergillus clavatus [ACLA081680]
Neosartorya fischeri [NFIA053190]
Aspergillus fumigatus [Afu6g07520]
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Trichophyton equinum [TEQG05913]
Microsporum gypseum [MGYG07473]
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Coccidioides posadasii [CPSG05888]
Blastomyces dermatitidis [BDBG09305]
Histoplasma capsulatum [HCAG07776]
Paracoccidioides brasiliensis [PABG03266]
Leptosphaeria maculans [Lm7128]
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Pyrenophora tritici-repentis [PTRG07214]
Alternaria brassicicola [AB08863]
Setosphaeria turcica [St174143]
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Stagonospora nodorum [SNU00776]
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Ashbya gossypii [45190277]
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Pichia stipitis [Pist75064]
Debaryomyces hansenii [50420467]
Candida albicans SC5314 [C19778]
Spathaspora passalidarum [Sp132023]
Ashbya gossypii [45201090]
Saccharomyces cerevisiae [6325253]
Candida glabrata [50293505]
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Hansenula polymorpha NCYC 495 leu1.1 [Hp17386]
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Yarrowia lipolytica [50548497]
Candida caseinolytica [Cc31398]
Lipomyces starkeyi [Ls22348]
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Schizosaccharomyces cryophilus [SPOG05468]
Schizosaccharomyces pombe [19075286]
Schizosaccharomyces japonicus [SJAG02626]
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Tom37
Tom37_C
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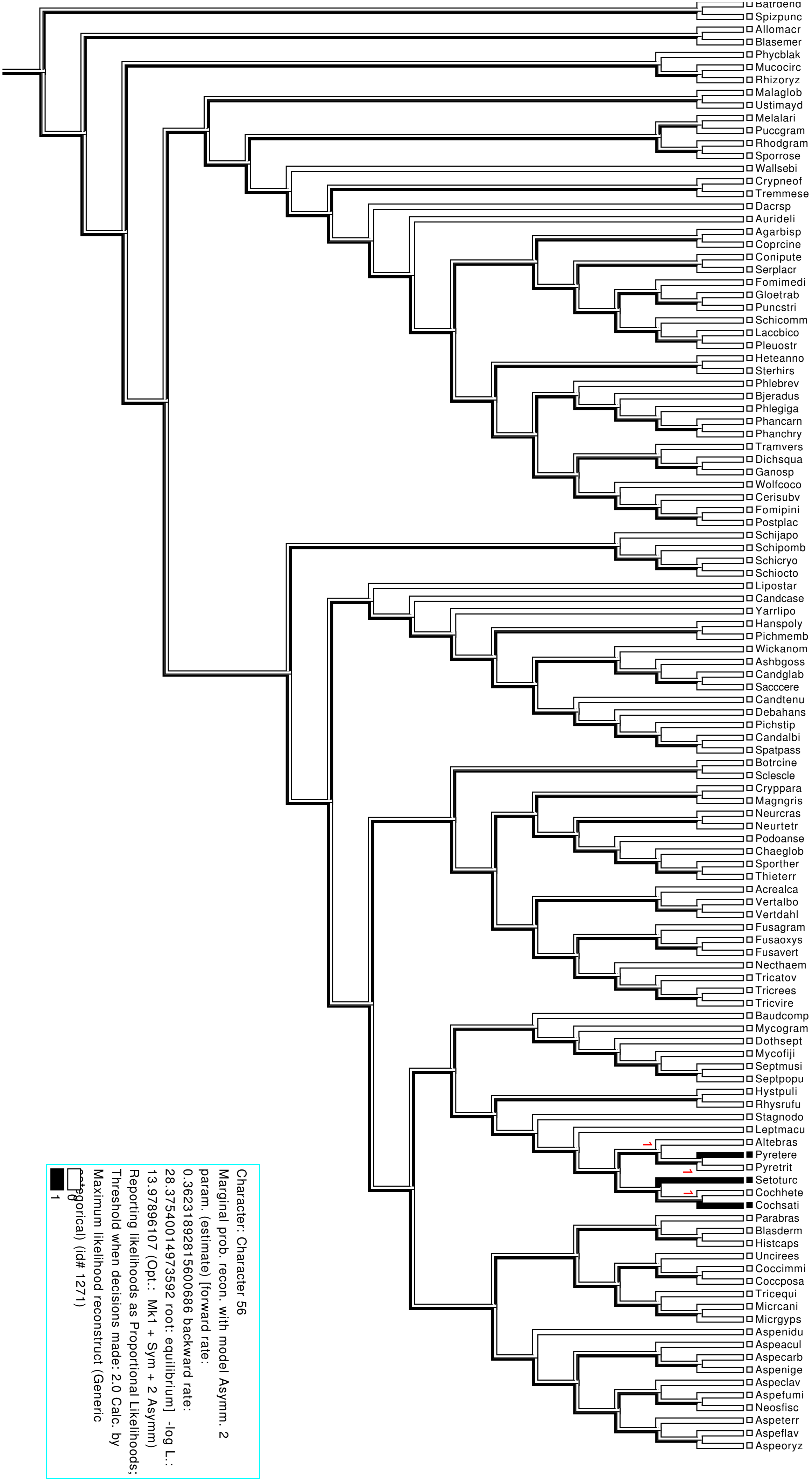
Nop10p
Homeobox
FlgN
DUF2045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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
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Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
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Heteanno
Sterhirs
Phlebrev
Bjeradus
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Phancarn
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Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
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Cryppara
Magngris
Neurcras
Neurtetr
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Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
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Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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1
1
Character: Character 56
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.36231892815600686 backward rate:
28.37540014973592 root: equilibrium] -log L.:
13.97896107 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 56

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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CNLELQNYGSVLRDCSSALNLDAHLSKAYYRSAQALLALDRLEEGLDCCDRKEAKEKVQR
EREERLRKEQEAKRALAMAFRERNLIDVPKPDGSSNPYEPRWDPEDPTNSTLVFPVFFLY
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LENNVPELKSELRVLQISAAREVDVRGGKKAIVIFVPVPQLKAFHKVQQRLTRELEKKFS
DRHVVFIAQRRMLRKPTRTSRVKQKRPRSRTLTSVHEKILEDLVFPTEIVGKRTRVAVDG
SKLLKVFLDSKDATSLEYKLDSFSSVYRRLTGKDVVFEFPVVHGDKA
```

2 Annotated Phylograms

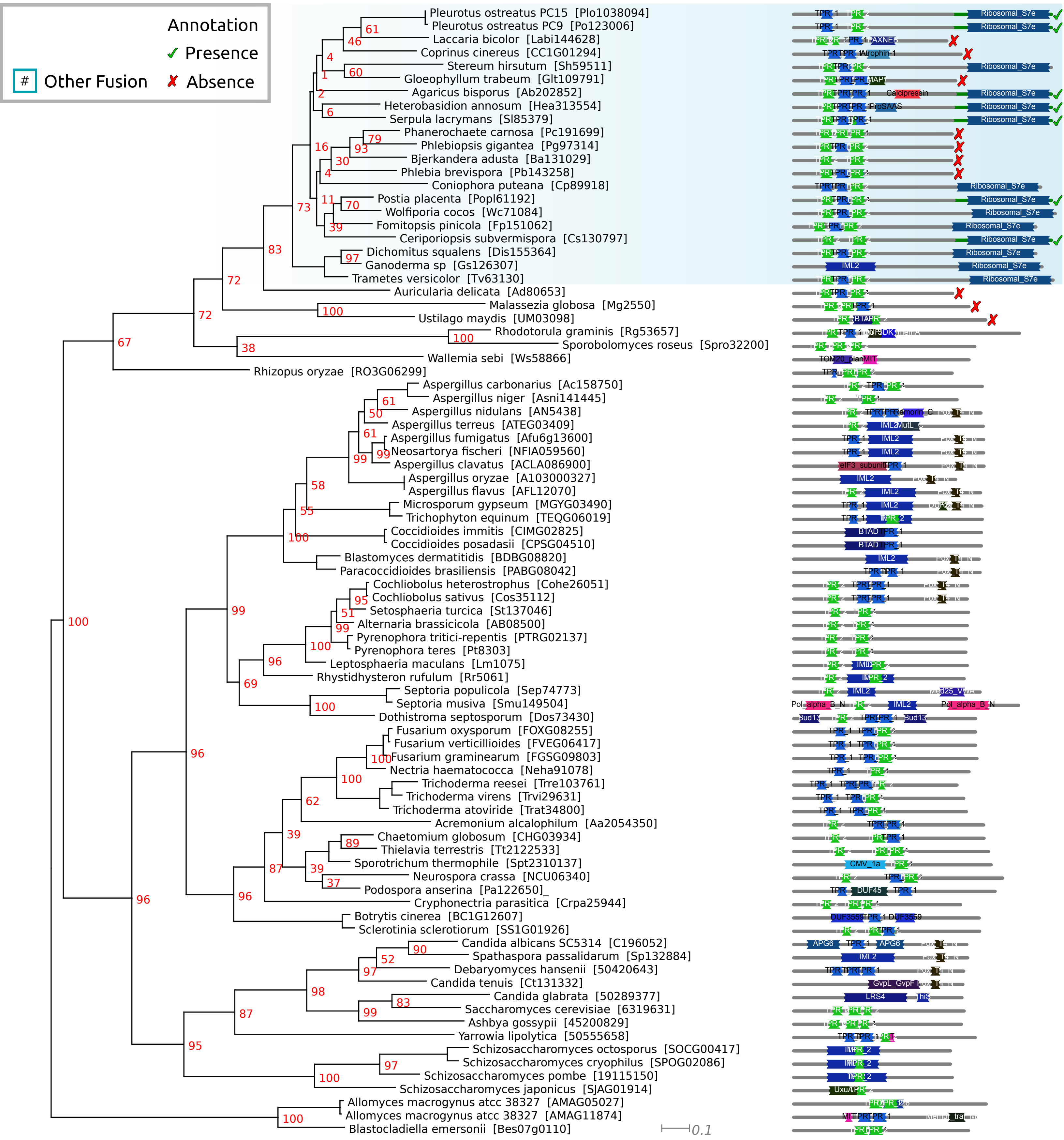
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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✗ Absence
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Laccaria bicolor [Labi144628]
Coprinus cinereus [CC1G01294]
Stereum hirsutum [Sh59511]
Gloeophyllum trabeum [Glt109791]
Agaricus bisporus [Ab202852]
Heterobasidion annosum [Hea313554]
Serpula lacrymans [Sl85379]
Phanerochaete carnosa [Pc191699]
Phlebiopsis gigantea [Pg97314]
Bjerkandera adusta [Ba131029]
Phlebia brevispora [Pb143258]
Coniophora puteana [Cp89918]
Postia placenta [Popl61192]
Wolfiporia cocos [Wc71084]
Fomitopsis pinicola [Fp151062]
Ceriporiopsis subvermispora [Cs130797]
Dichomitus squalens [Dis155364]
Ganoderma sp [Gs126307]
Trametes versicolor [Tv63130]
Auricularia delicata [Ad80653]
Malassezia globosa [Mg2550]
Ustilago maydis [UM03098]
Rhodotorula graminis [Rg53657]
Sporobolomyces roseus [Spro32200]
Wallemia sebi [Ws58866]
Rhizopus oryzae [RO3G06299]
Aspergillus carbonarius [Ac158750]
Aspergillus niger [Asni141445]
Aspergillus nidulans [AN5438]
Aspergillus terreus [ATEG03409]
Aspergillus fumigatus [Afu6g13600]
Neosartorya fischeri [NFIA059560]
Aspergillus clavatus [ACLA086900]
Aspergillus oryzae [A103000327]
Aspergillus flavus [AFL12070]
Microsporum gypseum [MGYG03490]
Trichophyton equinum [TEQG06019]
Coccidioides immitis [CIMG02825]
Coccidioides posadasii [CPSG04510]
Blastomyces dermatitidis [BDBG08820]
Paracoccidioides brasiliensis [PABG08042]
Cochliobolus heterostrophus [Cohe26051]
Cochliobolus sativus [Cos35112]
Setosphaeria turcica [St137046]
Alternaria brassicicola [AB08500]
Pyrenophora tritici-repentis [PTRG02137]
Pyrenophora teres [Pt8303]
Leptosphaeria maculans [Lm1075]
Rhystidhysteron rufulum [Rr5061]
Septoria populicola [Sep74773]
Septoria musiva [Smu149504]
Dothistroma septosporum [Dos73430]
Fusarium oxysporum [FOXG08255]
Fusarium verticillioides [FVEG06417]
Fusarium graminearum [FGSG09803]
Nectria haematococca [Neha91078]
Trichoderma reesei [Tre103761]
Trichoderma virens [Trvi29631]
Trichoderma atoviride [Trat34800]
Acremonium alcalophilum [Aa2054350]
Chaetomium globosum [CHG03934]
Thielavia terrestris [Tt2122533]
Sporotrichum thermophile [Spt2310137]
Neurospora crassa [NCU06340]
Podospora anserina [Pa122650]_
Cryphonectria parasitica [Crpa25944]
Botrytis cinerea [BC1G12607]
Sclerotinia sclerotiorum [SS1G01926]
Candida albicans SC5314 [C196052]
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Debaryomyces hansenii [50420643]
Candida tenuis [Ct131332]
Candida glabrata [50289377]
Saccharomyces cerevisiae [6319631]
Ashbya gossypii [45200829]
Yarrowia lipolytica [50555658]
Schizosaccharomyces octosporus [SOCG00417]
Schizosaccharomyces cryophilus [SPOG02086]
Schizosaccharomyces pombe [19115150]
Schizosaccharomyces japonicus [SJAG01914]
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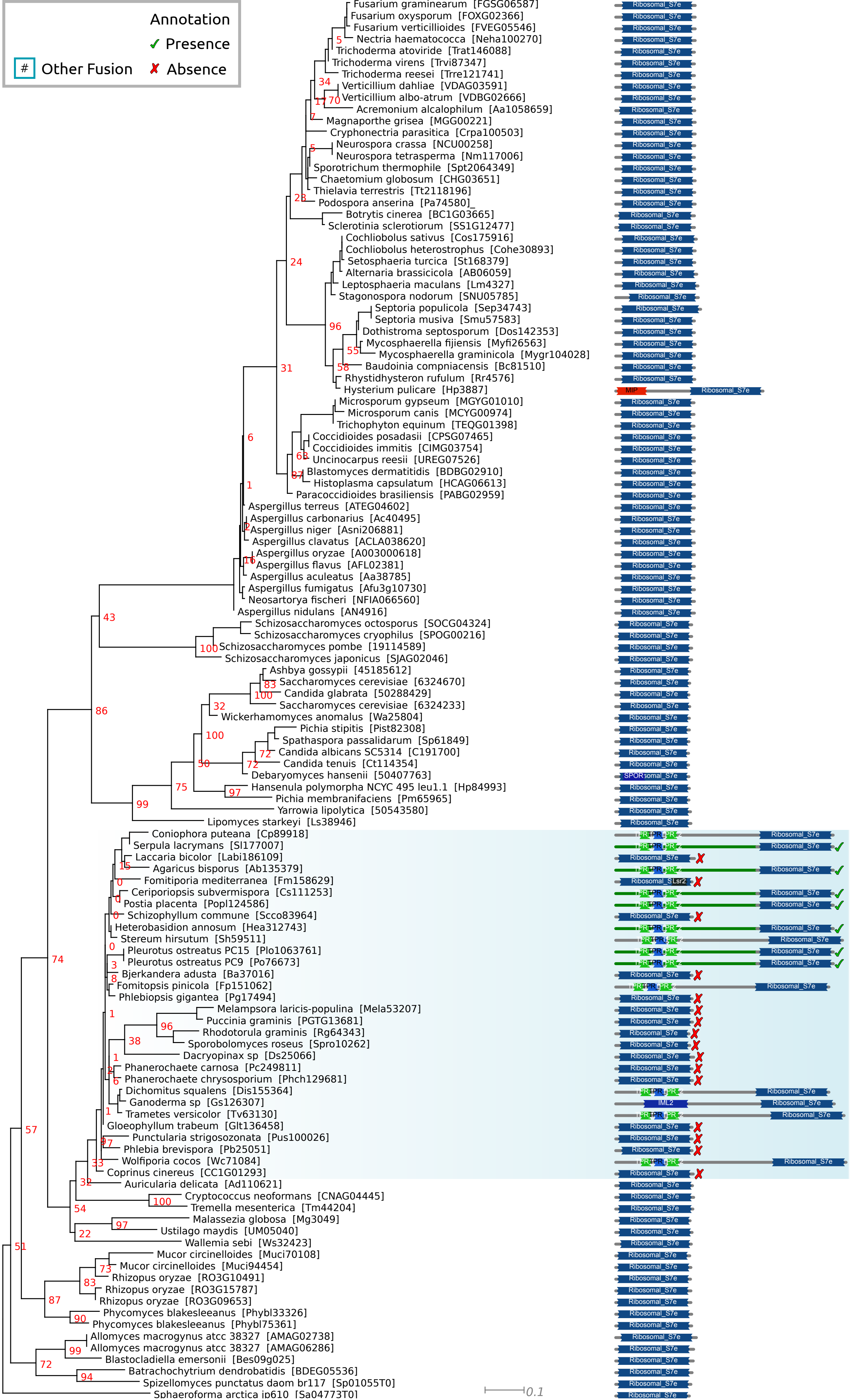
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✗ Absence
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Magnaporthe grisea [MGG00221]
Cryphonectria parasitica [Crpa100503]
Neurospora crassa [NCU00258]
Neurospora tetrasperma [Nm117006]
Sporotrichum thermophile [Spt2064349]
Chaetomium globosum [CHG03651]
Thielavia terrestris [Tt2118196]
Podospora anserina [Pa74580]
Botrytis cinerea [BC1G03665]
Sclerotinia sclerotiorum [SS1G12477]
Cochliobolus sativus [Cos175916]
Cochliobolus heterostrophus [Cohe30893]
Setosphaeria turcica [St168379]
Alternaria brassicicola [AB06059]
Leptosphaeria maculans [Lm4327]
Stagonospora nodorum [SNU05785]
Septoria populicola [Sep34743]
Septoria musiva [Smu57583]
Dothistroma septosporum [Dos142353]
Mycosphaerella fijiensis [Myfi26563]
Mycosphaerella graminicola [Mygr104028]
Baudoinia compniacensis [Bc81510]
Rhystidhysteron rufulum [Rr4576]
Hysterium pulicare [Hp3887]
Microsporum gypseum [MGYG01010]
Microsporum canis [MCYG00974]
Trichophyton equinum [TEQG01398]
Coccidioides posadasii [CPSG07465]
Coccidioides immitis [CIMG03754]
Uncinocarpus reesii [UREG07526]
Blastomyces dermatitidis [BDBG02910]
Histoplasma capsulatum [HCAG06613]
Paracoccidioides brasiliensis [PABG02959]
Aspergillus terreus [ATEG04602]
Aspergillus carbonarius [Ac40495]
Aspergillus niger [Asni206881]
Aspergillus clavatus [ACLA038620]
Aspergillus oryzae [A003000618]
Aspergillus flavus [AFL02381]
Aspergillus aculeatus [Aa38785]
Aspergillus fumigatus [Afu3g10730]
Neosartorya fischeri [NFIA066560]
Aspergillus nidulans [AN4916]
Schizosaccharomyces octosporus [SOCG04324]
Schizosaccharomyces cryophilus [SPOG00216]
Schizosaccharomyces pombe [19114589]
Schizosaccharomyces japonicus [SJAG02046]
Ashbya gossypii [45185612]
Saccharomyces cerevisiae [6324670]
Candida glabrata [50288429]
Saccharomyces cerevisiae [6324233]
Wickerhamomyces anomalus [Wa25804]
Pichia stipitis [Pist82308]
Spathaspora passalidarum [Sp61849]
Candida albicans SC5314 [C191700]
Candida tenuis [Ct114354]
Debaryomyces hansenii [50407763]
Hansenula polymorpha NCYC 495 leu1.1 [Hp84993]
Pichia membranifaciens [Pm65965]
Yarrowia lipolytica [50543580]
Lipomyces starkeyi [Ls38946]
Coniophora puteana [Cp89918]
Serpula lacrymans [Sl177007]
Laccaria bicolor [Labi186109]
Agaricus bisporus [Ab135379]
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Puccinia graminis [PGTG13681]
Rhodotorula graminis [Rg64343]
Sporobolomyces roseus [Spro10262]
Dacryopinax sp [Ds25066]
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Ganoderma sp [Gs126307]
Trametes versicolor [Tv63130]
Gloeophyllum trabeum [Glt136458]
Punctularia strigosozonata [Pus100026]
Phlebia brevispora [Pb25051]
Wolfiporia cocos [Wc71084]
Coprinus cinereus [CC1G01293]
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Cryptococcus neoformans [CNAG04445]
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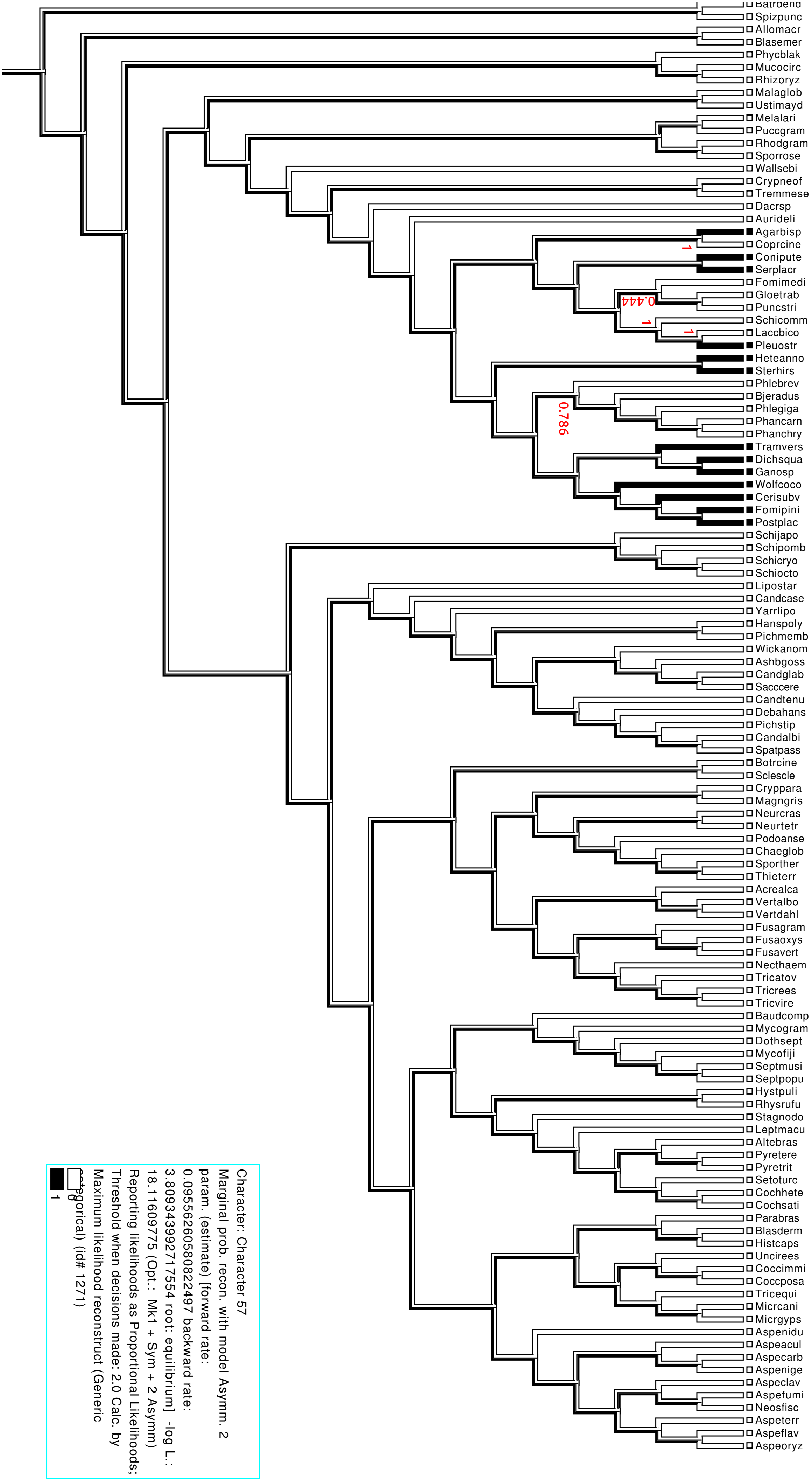
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Ustimayd
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Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
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Agarbisp
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Conipute
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Fomimedi
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Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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0.786
Character: Character 57
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param. (estimate) [forward rate:
0.0955626058082497 backward rate:
3.8093439927717554 root: equilibrium] -log L.:
18.11609775 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 57

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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IDFLDTAADIKSKIKAALCPPGEVENNGVIAFIKTVLIPIQALRIEQAERRGEKAPVGEG
SFVKPGAPEGTIFSISRPEKFGGDIHFKSYEDLEKAYVAGDIHPGDLKTGVQEALIQFLG
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KDICGPELAAKIEKAAIQLYTEAAAYALERGLILADTKFEFGLLPDPSSPNKTTLILIDE
VLTPDSSRYWAAADYVVGQPQPSFDKQYLRDWLIKEGLRGKEDVTLPEHVVSETRSKYEE
ARDRVMGLGEFGKHGQKGKIAGDEVALQTDQATDAIEEEARKQL
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.

Annotation
✓ Presence
Other Fusion
✗ Absence
Aspergillus oryzae [A124000024]
Aspergillus flavus [AFL08018]
Aspergillus aculeatus [Aa56988]
Aspergillus nidulans [AN0057]
Aspergillus carbonarius [Ac151642]
Fusarium oxysporum [FOXG01456]
Fusarium verticillioides [FVEG07820]
Fusarium graminearum [FGSG07436]
Nectria haematococca [Neha71656]
Aspergillus fumigatus [Afu5g10640]
Neosartorya fischeri [NFIA076570]
Aspergillus clavatus [ACLA013660]
Aspergillus carbonarius [Ac203201]
Aspergillus niger [Asni206525]
Aspergillus clavatus [ACLA009490]
Neurospora crassa [NCU07755]
Neurospora tetrasperma [Nm36756]
Acremonium alcalophilum [Aa1073572]
Cryphonectria parasitica [Crpa43941]
Thielavia terrestris [Tt63335]
Chaetomium globosum [CHG08632]
Sporotrichum thermophile [Spt2307473]
Podospora anserina [Pa42350]_
Trichoderma atoviride [Trat145887]
Trichoderma virens [Trvi74788]
Trichoderma reesei [Trre82334]
Magnaporthe grisea [MGG02449]
Pyrenophora tritici-repentis [PTRG02003]
Pyrenophora teres [Pt11058]
Alternaria brassicicola [AB09492]
Cochliobolus heterostrophus [Cohe117378]
Cochliobolus sativus [Cos169247]
Setosphaeria turcica [St163810]
Leptosphaeria maculans [Lm7288]
Stagonospora nodorum [SNU03082]
Microsporum gypseum [MGYG07989]
Trichophyton equinum [TEQG02833]
Microsporum canis [MCYG04877]
Blastomyces dermatitidis [BDBG03326]
Histoplasma capsulatum [HCAG05931]
Paracoccidioides brasiliensis [PABG02016]
Coccidioides immitis [CIMG01100]
Coccidioides posadasii [CPSG02890]
Uncinocarpus reesii [UREG01043]
Hysterium pulicare [Hp2148]
Dothistroma septosporum [Dos73074]
Mycosphaerella fijiensis [Myfi25273]
Mycosphaerella graminicola [Mygr72994]
Septoria populicola [Sep41413]
Septoria musiva [Smu149242]
Baudoinia compniacensis [Bc509803]
Botrytis cinerea [BC1G12069]
Sclerotinia sclerotiorum [SS1G01294]
Candida albicans SC5314 [C192694]
Spathaspora passalidarum [Sp58633]
Pichia stipitis [Pist74631]
Debaryomyces hansenii [50427467]
Candida tenuis [Ct123725]
Candida glabrata [50289549]
Saccharomyces cerevisiae [6321624]
Ashbya gossypii [45184676]
Pichia membranifaciens [Pm79399]
Hansenula polymorpha NCYC 495 leu1.1 [Hp76106]
Wickerhamomyces anomalus [Wa81489]
Yarrowia lipolytica [50548779]
Lipomyces starkeyi [Ls65241]
Candida caseinolytica [Cc57525]
Schizosaccharomyces octosporus [SOCG03850]
Schizosaccharomyces cryophilus [SPOG05459]
Schizosaccharomyces pombe [19075376]
Schizosaccharomyces japonicus [SJAG00243]
Dichomitus squalens [Dis106834]
Ganoderma sp [Gs122027]
Trametes versicolor [Tv61159]
Phanerochaete carnosa [Pc263236]
Phanerochaete chrysosporium [Phch135831]
Bjerkandera adusta [Ba113545]
Phlebiopsis gigantea [Pg16625]
Postia placenta [Popl57749]
Wolfiporia cocos [Wc79026]
Ceriporiopsis subvermispora [Cs84957]
Pleurotus ostreatus PC15 [Plo52426]
Pleurotus ostreatus PC9 [Po96837]
Coprinus cinereus [CC1G02632]
Schizophyllum commune [Scco56595]
Coniophora puteana [Cp109148]
Gloeophyllum trabeum [Glt63898]
Serpula lacrymans [Sl169785]
Stereum hirsutum [Sh142589]
Heterobasidion annosum [Hea389454]
Agaricus bisporus [Ab195951]
Punctularia strigosozonata [Pus55699]
Laccaria bicolor [Labi252456]
Fomitopsis pinicola [Fp156969]
Fomitiporia mediterranea [Fm91196]
Auricularia delicata [Ad116595]
Malassezia globosa [Mg1213]
Ustilago maydis [UM05847]
Rhodotorula graminis [Rg50940]
Sporobolomyces roseus [Spro8404]
Melampsora laricis-populina [Mela34868]
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Cryptococcus neoformans [CNAG00143]
Tremella mesenterica [Tm43367]
Dacryopinax sp [Ds57919]
Wallemia sebi [Ws59655]
Mucor circinelloides [Muci90556]
Rhizopus oryzae [RO3G15910]
Phycomyces blakesleeanus [Phybl29356]
Allomyces macrogynus atcc 38327 [AMAG08524]
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Blastocladiella emersonii [Bes87g02]
Batrachochytrium dendrobatidis [BDEG08038]
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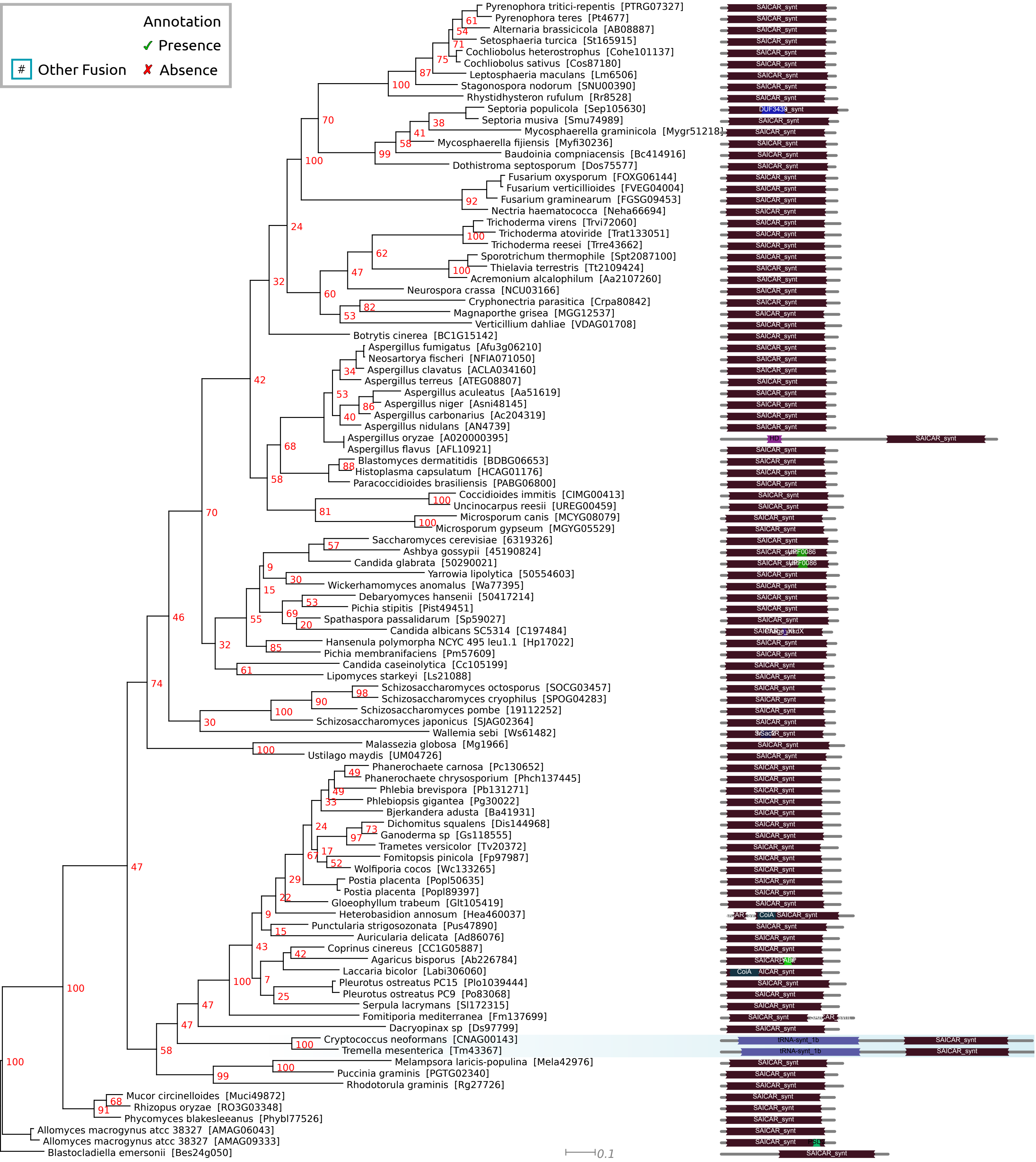
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✗ Absence
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Setosphaeria turcica [St165915]
Cochliobolus heterostrophus [Cohe101137]
Cochliobolus sativus [Cos87180]
Leptosphaeria maculans [Lm6506]
Stagonospora nodorum [SNU00390]
Rhystidhysteron rufulum [Rr8528]
Septoria populicola [Sep105630]
Septoria musiva [Smu74989]
Mycosphaerella graminicola [Mygr51218]
Mycosphaerella fijiensis [Myfi30236]
Baudoinia compniacensis [Bc414916]
Dothistroma septosporum [Dos75577]
Fusarium oxysporum [FOXG06144]
Fusarium verticillioides [FVEG04004]
Fusarium graminearum [FGSG09453]
Nectria haematococca [Neha66694]
Trichoderma virens [Trvi72060]
Trichoderma atoviride [Trat133051]
Trichoderma reesei [Tre43662]
Sporotrichum thermophile [Spt2087100]
Thielavia terrestris [Tt2109424]
Acremonium alcalophilum [Aa2107260]
Neurospora crassa [NCU03166]
Cryphonectria parasitica [Crpa80842]
Magnaporthe grisea [MGG12537]
Verticillium dahliae [VDAG01708]
Botrytis cinerea [BC1G15142]
Aspergillus fumigatus [Afu3g06210]
Neosartorya fischeri [NFIA071050]
Aspergillus clavatus [ACLA034160]
Aspergillus terreus [ATEG08807]
Aspergillus aculeatus [Aa51619]
Aspergillus niger [Asni48145]
Aspergillus carbonarius [Ac204319]
Aspergillus nidulans [AN4739]
Aspergillus oryzae [A020000395]
Aspergillus flavus [AFL10921]
Blastomyces dermatitidis [BDBG06653]
Histoplasma capsulatum [HCAG01176]
Paracoccidioides brasiliensis [PABG06800]
Coccidioides immitis [CIMG00413]
Uncinocarpus reesii [UREG00459]
Microsporum canis [MCYG08079]
Microsporum gypseum [MGYG05529]
Saccharomyces cerevisiae [6319326]
Ashbya gossypii [45190824]
Candida glabrata [50290021]
Yarrowia lipolytica [50554603]
Wickerhamomyces anomalus [Wa77395]
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Pichia stipitis [Pist49451]
Spathaspora passalidarum [Sp59027]
Candida albicans SC5314 [C197484]
Hansenula polymorpha NCYC 495 leu1.1 [Hp17022]
Pichia membranifaciens [Pm57609]
Candida caseinolytica [Cc105199]
Lipomyces starkeyi [Ls21088]
Schizosaccharomyces octosporus [SOCG03457]
Schizosaccharomyces cryophilus [SPOG04283]
Schizosaccharomyces pombe [19112252]
Schizosaccharomyces japonicus [SJAG02364]
Wallemia sebi [Ws61482]
Malassezia globosa [Mg1966]
Ustilago maydis [UM04726]
Phanerochaete carnosa [Pc130652]
Phanerochaete chrysosporium [Phch137445]
Phlebia brevispora [Pb131271]
Phlebiopsis gigantea [Pg30022]
Bjerkandera adusta [Ba41931]
Dichomitus squalens [Dis144968]
Ganoderma sp [Gs118555]
Trametes versicolor [Tv20372]
Fomitopsis pinicola [Fp97987]
Wolfiporia cocos [Wc133265]
Postia placenta [Popl50635]
Postia placenta [Popl89397]
Gloeophyllum trabeum [Glt105419]
Heterobasidion annosum [Hea460037]
Punctularia strigosozonata [Pus47890]
Auricularia delicata [Ad86076]
Coprinus cinereus [CC1G05887]
Agaricus bisporus [Ab226784]
Laccaria bicolor [Labi306060]
Pleurotus ostreatus PC15 [Plo1039444]
Pleurotus ostreatus PC9 [Po83068]
Serpula lacrymans [Sl172315]
Fomitiporia mediterranea [Fm137699]
Dacryopinax sp [Ds97799]
Cryptococcus neoformans [CNAG00143]
Tremella mesenterica [Tm43367]
Melampsora laricis-populina [Mela42976]
Puccinia graminis [PGTG02340]
Rhodotorula graminis [Rg27726]
Mucor circinelloides [Muci49872]
Rhizopus oryzae [RO3G03348]
Phycomyces blakesleeanus [Phybl77526]
Allomyces macrogynus atcc 38327 [AMAG06043]
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Blastocladiella emersonii [Bes24g050]
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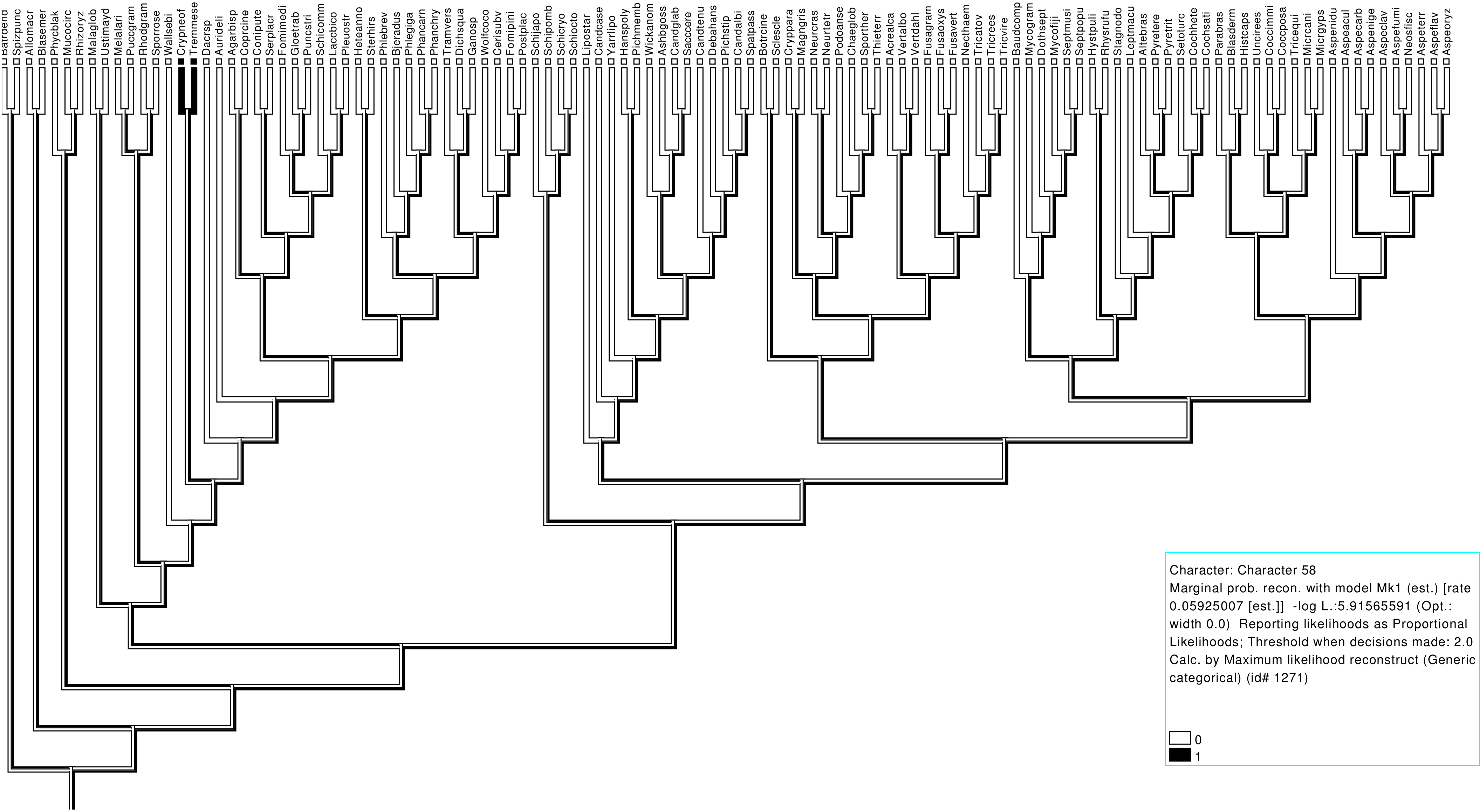
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Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
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Pucgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
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Candtenu
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Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 58
Marginal prob. recon. with model Mk1 (est.) [rate 0.05925007 [est.]] -log L.:5.91565591 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0
Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 58

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>XP_0012200951Chgl_dom1
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RNEISGALSGLTRVRRFHQDDGHIFCRPSQIRDEIAKTLDFVRLTYGVLGLGPYRLVLST
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YVRTREGADKAGGYALQGVGGMVLVDKVEGSVDNVIGLPVRKCLQLCERVVFRQGEEVEG
EDGEGDEE
```

2 Annotated Phylograms

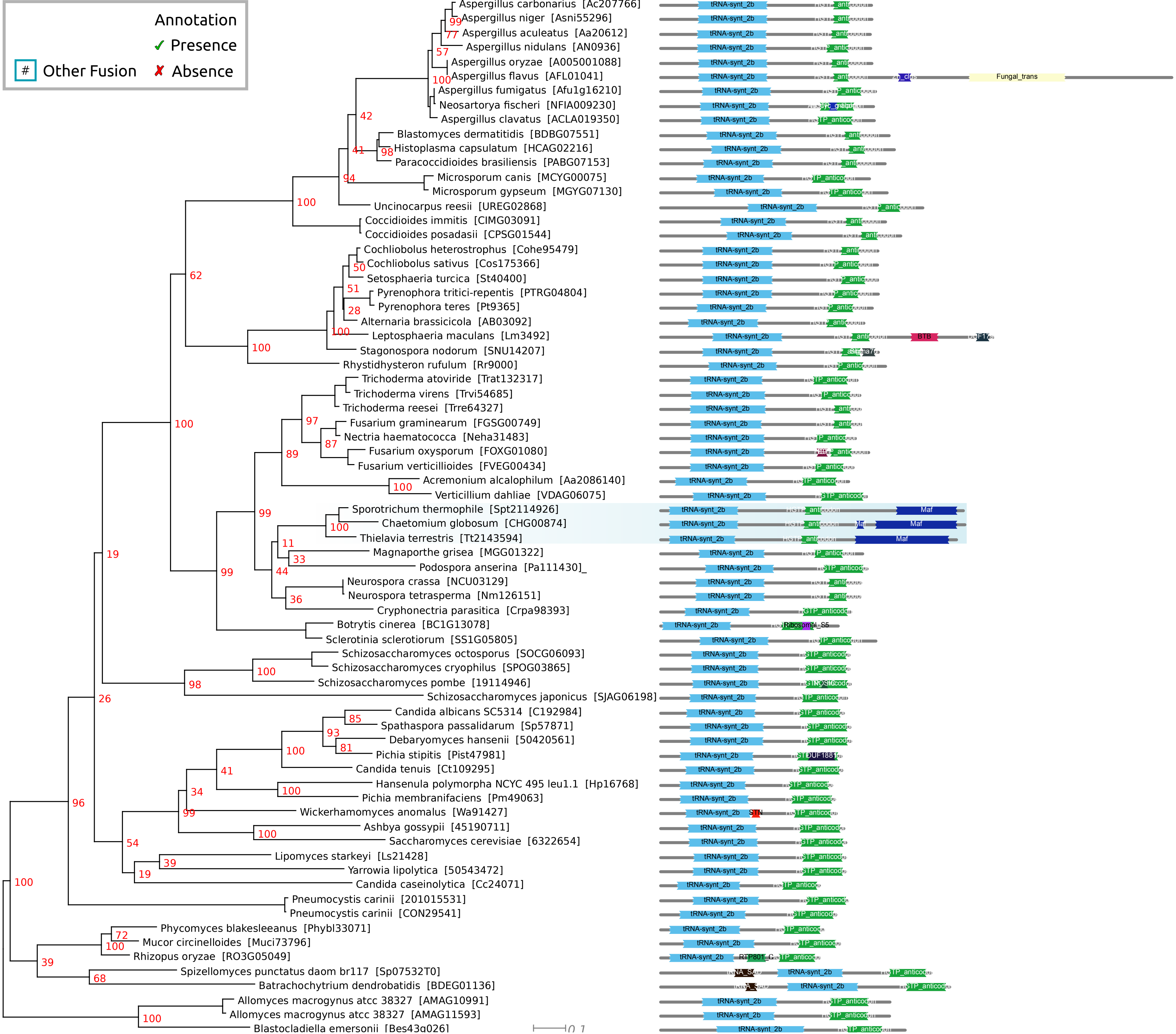
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Aspergillus carbonarius [Ac207766]
Aspergillus niger [Asni55296]
Aspergillus aculeatus [Aa20612]
Aspergillus nidulans [AN0936]
Aspergillus oryzae [A005001088]
Aspergillus flavus [AFL01041]
Aspergillus fumigatus [Afu1g16210]
Neosartorya fischeri [NFIA009230]
Aspergillus clavatus [ACLA019350]
Blastomyces dermatitidis [BDBG07551]
Histoplasma capsulatum [HCAG02216]
Paracoccidioides brasiliensis [PABG07153]
Microsporum canis [MCYG00075]
Microsporum gypseum [MGYG07130]
Uncinocarpus reesii [UREG02868]
Coccidioides immitis [CIMG03091]
Coccidioides posadasii [CPSG01544]
Cochliobolus heterostrophus [Cohe95479]
Cochliobolus sativus [Cos175366]
Setosphaeria turcica [St40400]
Pyrenophora tritici-repentis [PTRG04804]
Pyrenophora teres [Pt9365]
Alternaria brassicicola [AB03092]
Leptosphaeria maculans [Lm3492]
Stagonospora nodorum [SNU14207]
Rhystidhysteron rufulum [Rr9000]
Trichoderma atoviride [Trat132317]
Trichoderma virens [Trvi54685]
Trichoderma reesei [Tre64327]
Fusarium graminearum [FGSG00749]
Nectria haematococca [Neha31483]
Fusarium oxysporum [FOXG01080]
Fusarium verticillioides [FVEG00434]
Acremonium alcalophilum [Aa2086140]
Verticillium dahliae [VDAG06075]
Sporotrichum thermophile [Spt2114926]
Chaetomium globosum [CHG00874]
Thielavia terrestris [Tt2143594]
Magnaporthe grisea [MGG01322]
Podospora anserina [Pa111430]_
Neurospora crassa [NCU03129]
Neurospora tetrasperma [Nm126151]
Cryphonectria parasitica [Crpa98393]
Botrytis cinerea [BC1G13078]
Sclerotinia sclerotiorum [SS1G05805]
Schizosaccharomyces octosporus [SOCG06093]
Schizosaccharomyces cryophilus [SPOG03865]
Schizosaccharomyces pombe [19114946]
Schizosaccharomyces japonicus [SJAG06198]
Candida albicans SC5314 [C192984]
Spathaspora passalidarum [Sp57871]
Debaryomyces hansenii [50420561]
Pichia stipitis [Pist47981]
Candida tenuis [Ct109295]
Hansenula polymorpha NCYC 495 leu1.1 [Hp16768]
Pichia membranifaciens [Pm49063]
Wickerhamomyces anomalus [Wa91427]
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Saccharomyces cerevisiae [6322654]
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Candida caseinolytica [Cc24071]
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Phycomyces blakesleeanus [Phybl33071]
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Allomyces macrogynus atcc 38327 [AMAG10991]
Allomyces macrogynus atcc 38327 [AMAG11593]
Blastocladiella emersonii [Bes43g026]
99
77
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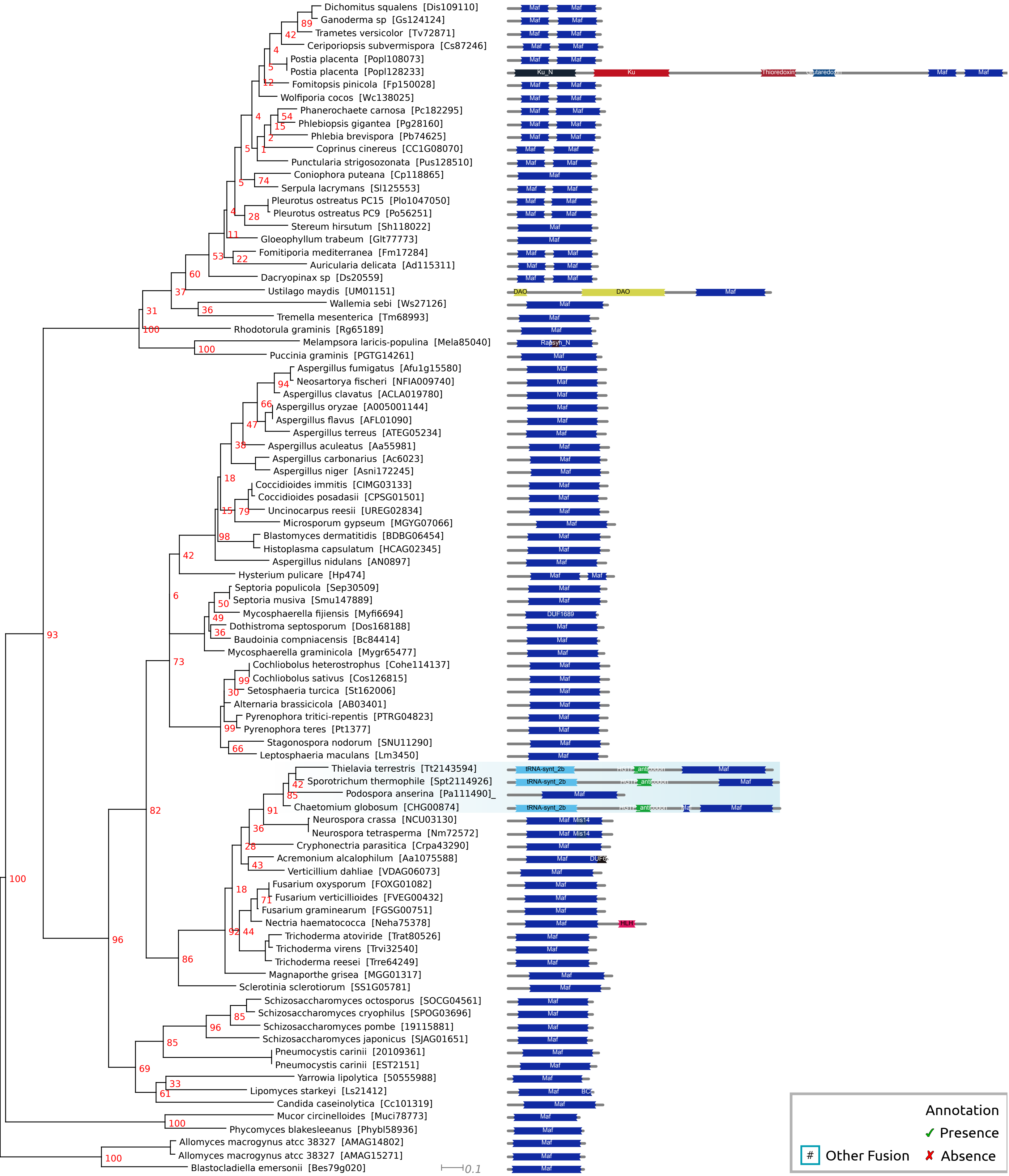Dichomitus squalens [Dis109110] Maf Maf
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Phanerochaete carnosa [Pc182295] Maf Maf
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Serpula lacrymans [Sl125553] Maf Maf
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Pleurotus ostreatus PC9 [Po56251] Maf Maf
Stereum hirsutum [Sh118022] Maf
Gloeophyllum trabeum [Glt77773] Maf
Fomitiporia mediterranea [Fm17284] Maf Maf
Auricularia delicata [Ad115311] Maf Maf
Dacryopinax sp [Ds20559] Maf Maf
Ustilago maydis [UM01151] DAO DAO Maf
Wallemia sebi [Ws27126] Maf
Tremella mesenterica [Tm68993] Maf
Rhodotorula graminis [Rg65189] Maf
Melampsora laricis-populina [Mela85040] Rapsyn_N
Puccinia graminis [PGTG14261] Maf
Aspergillus fumigatus [Afu1g15580] Maf
Neosartorya fischeri [NFIA009740] Maf
Aspergillus clavatus [ACLA019780] Maf
Aspergillus oryzae [A005001144] Maf
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Coccidioides immitis [CIMG03133] Maf
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Uncinocarpus reesii [UREG02834] Maf
Microsporum gypseum [MGYG07066] Maf
Blastomyces dermatitidis [BDBG06454] Maf
Histoplasma capsulatum [HCAG02345] Maf
Aspergillus nidulans [AN0897] Maf
Hysterium pulicare [Hp474] Maf Maf
Septoria populicola [Sep30509] Maf
Septoria musiva [Smu147889] Maf
Mycosphaerella fijiensis [Myfi6694] DUF1689
Dothistroma septosporum [Dos168188] Maf
Baudoinia compniacensis [Bc84414] Maf
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Alternaria brassicicola [AB03401] Maf
Pyrenophora tritici-repentis [PTRG04823] Maf
Pyrenophora teres [Pt1377] Maf
Stagonospora nodorum [SNU11290] Maf
Leptosphaeria maculans [Lm3450] Maf
Thielavia terrestris [Tt2143594] tRNA-synt_2b HGTP_anticodon Maf
Sporotrichum thermophile [Spt2114926] tRNA-synt_2b HGTP_anticodon Maf
Podospora anserina [Pa111490]_ Maf
Chaetomium globosum [CHG00874] tRNA-synt_2b HGTP_anticodon Maf Maf
Neurospora crassa [NCU03130] Maf Mis14
Neurospora tetrasperma [Nm72572] Maf Mis14
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Acremonium alcalophilum [Aa1075588] Maf DUF6
Verticillium dahliae [VDAG06073] Maf
Fusarium oxysporum [FOXG01082] Maf
Fusarium verticillioides [FVEG00432] Maf
Fusarium graminearum [FGSG00751] Maf
Nectria haematococca [Neha75378] Maf HLH
Trichoderma atoviride [Trat80526] Maf
Trichoderma virens [Trvi32540] Maf
Trichoderma reesei [Tre64249] Maf
Magnaporthe grisea [MGG01317] Maf
Sclerotinia sclerotiorum [SS1G05781] Maf
Schizosaccharomyces octosporus [SOCG04561] Maf
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Schizosaccharomyces pombe [19115881] Maf
Schizosaccharomyces japonicus [SJAG01651] Maf
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Pneumocystis carinii [EST2151] Maf
Yarrowia lipolytica [50555988] Maf
Lipomyces starkeyi [Ls21412] Maf BC
Candida caseinolytica [Cc101319] Maf
Mucor circinelloides [Muci78773] Maf
Phycomyces blakesleeanus [Phybl58936] Maf
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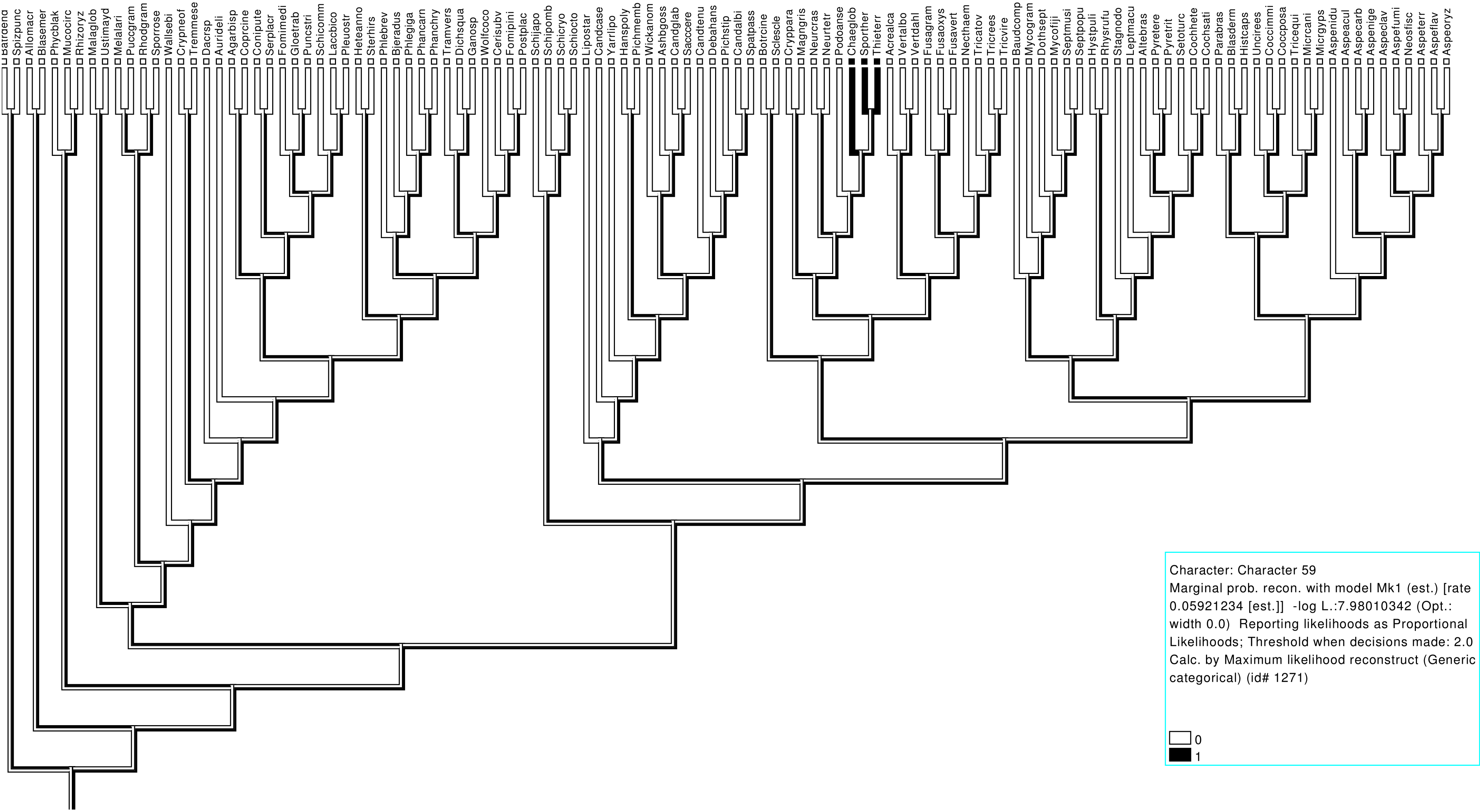
0.1
Annotation
✓ Presence
Other Fusion
✗ Absence

Batrdend
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Melalari
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Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Saccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
Character: Character 59
Marginal prob. recon. with model Mk1 (est.) [rate 0.05921234 [est.]] -log L.:7.98010342 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
☐ 0
■ 1

Putative Fusion 59

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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NFLTWHRYFVHAYEKALRQECGYTGYQPYWNWFTYQDDLRASPIFDGSDTSMGGDGTFVQ
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DLTTYASSTWLTIDNLLNITSGAASLNVGTFQNELQGRFPDGFLGLHAAGHFSINGDAGD
FYSSPNDPVFFLHHTMLDYAYWLWQAFHPDQAGTVMGTRTRFSPTAEKTTLQDVISMNYL
>XP_0032960621Pyte_dom2
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LYEKASSKPRNSYAITLHSSAYRPLLSVLGIDEVTFKRRVAVDSETGGTGTIAQEVPLPN
HNGLYDTSSSFRANRAKFEQVLQQGIDIRWEHTLQSVETTPEGPKLQFHNGDSCSAKLAV
AADGVHSNVRKLLLPSAAVEILPYAVFNGKRKADYKSFGQVYGSAMEESNVIEKKQNDAI
LSASINDKKDDQIYINWIYSRPAREDPDPLYRPNRPLEGAQKIPDELFEEVSSFDNLTTP
FSKVFDSETMRGDRMLHWLMRTTSAPLPSLQNVLTKSGVCFVGDAIHAEPIVGGNGANAA
ILDGLTLAEAIERGGLGGISTWYAGRYATWTLGVEESQQAIANMHHPSKQLHGNL
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Aspergillus fumigatus [Afu3g01070]
Neosartorya fischeri [NFIA001930]
Aspergillus terreus [ATEG01191]
Aspergillus clavatus [ACLA063650]
Aspergillus flavus [AFL03478]
Aspergillus nidulans [AN1318]
Aspergillus nidulans [AN5311]
Aspergillus terreus [ATEG10088]
Aspergillus carbonarius [Ac209256]
Aspergillus niger [Asni45815]
Aspergillus aculeatus [Aa26267]
Sporotrichum thermophile [Spt2297253]
Chaetomium globosum [CHG06137]
Thielavia terrestris [Tt2046868]
Neurospora tetrasperma [Nm118745]
Alternaria brassicicola [AB06326]
Setosphaeria turcica [St33740]
Hysterium pulicare [Hp5004]
Rhystidhysteron rufulum [Rr5101]
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Paracoccidioides brasiliensis [PABG04178]
Podospora anserina [Pa63730]_
Fusarium graminearum [FGSG03348]
Fusarium verticillioides [FVEG01614]
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Fusarium graminearum [FGSG11450]
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Cochliobolus heterostrophus [Cohe59870]
Cochliobolus sativus [Cos195395]
Stagonospora nodorum [SNU04287]
Setosphaeria turcica [St19381]
Chaetomium globosum [CHG06094]
Cochliobolus heterostrophus [Cohe71662]
Cochliobolus sativus [Cos107681]
Setosphaeria turcica [St149938]
Pyrenophora tritici-repentis [PTRG02343]
Pyrenophora teres [Pt266]
Alternaria brassicicola [AB06916]
Alternaria brassicicola [AB07077]
Stagonospora nodorum [SNU13474]
Botrytis cinerea [BC1G15830]
Hysterium pulicare [Hp3725]
Magnaporthe grisea [MGG14157]
Cochliobolus heterostrophus [Cohe80792]
Cochliobolus sativus [Cos195337]
Pyrenophora tritici-repentis [PTRG08897]
Pyrenophora teres [Pt9212]
Leptosphaeria maculans [Lm8784]
Rhystidhysteron rufulum [Rr195]
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Leptosphaeria maculans [Lm4216]
Septoria populicola [Sep106462]
Septoria musiva [Smu165411]
Mycosphaerella graminicola [Mygr51282]
Mycosphaerella graminicola [Mygr77890]
Mycosphaerella fijiensis [Myfi57308]
Septoria musiva [Smu148263]
Dothistroma septosporum [Dos169077]
Cryphonectria parasitica [Crpa36019]
Aspergillus carbonarius [Ac207645]
Aspergillus carbonarius [Ac49446]
Aspergillus niger [Asni55324]
Aspergillus aculeatus [Aa64045]
Aspergillus oryzae [A001000383]
Aspergillus flavus [AFL07599]
Coccidioides immitis [CIMG07314]
Coccidioides posadasii [CPSG09890]
Uncinocarpus reesii [UREG07862]
Pyrenophora tritici-repentis [PTRG02374]
Pyrenophora teres [Pt11337]
Hysterium pulicare [Hp5396]
Leptosphaeria maculans [Lm1660]
Fusarium oxysporum [FOXG04315]
Fusarium verticillioides [FVEG07441]
Nectria haematococca [Neha85924]
Magnaporthe grisea [MGG06169]
Neurospora crassa [NCU11382]
Neurospora tetrasperma [Nm103253]
Fusarium oxysporum [FOXG07401]
Thielavia terrestris [Tt2118068]
Septoria populicola [Sep49612]
Septoria musiva [Smu147120]
Dothistroma septosporum [Dos166790]
Mycosphaerella fijiensis [Myfi56342]
Baudoinia compniacensis [Bc139295]
Aspergillus oryzae [A701000859]
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Neosartorya fischeri [NFIA102590]
Aspergillus aculeatus [Aa45024]
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Coccidioides immitis [CIMG09471]
Coccidioides posadasii [CPSG08163]
Uncinocarpus reesii [UREG04846]
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Acremonium alcalophilum [Aa1083776]
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Verticillium albo-atrum [VDBG01849]
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Glyco_hydro
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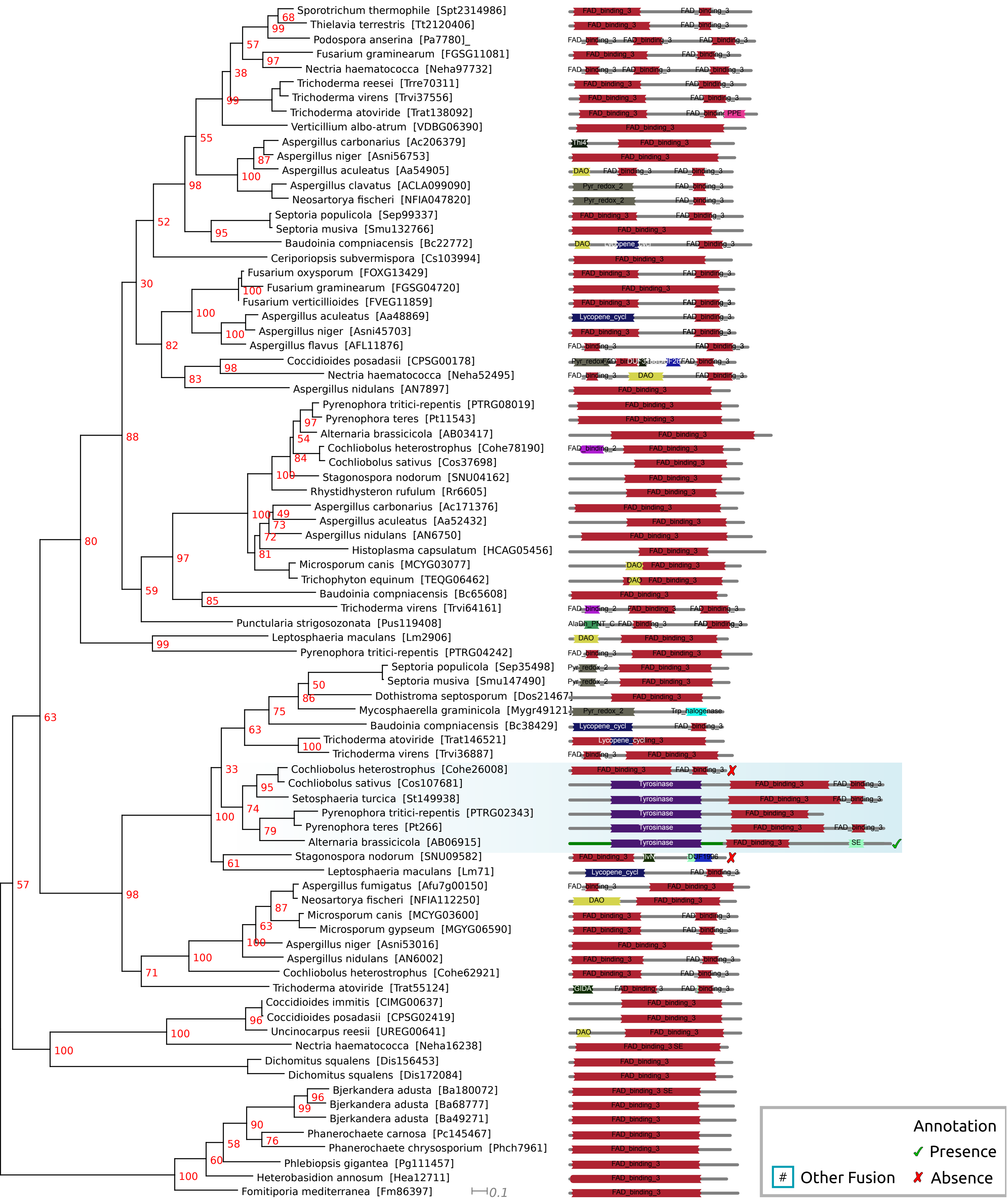
Other Fusion
✗ Absence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Verticillium albo-atrum [VDBG06390]
Aspergillus carbonarius [Ac206379]
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Aspergillus clavatus [ACLA099090]
Neosartorya fischeri [NFIA047820]
Septoria populicola [Sep99337]
Septoria musiva [Smu132766]
Baudoinia compniacensis [Bc22772]
Ceriporiopsis subvermispora [Cs103994]
Fusarium oxysporum [FOXG13429]
Fusarium graminearum [FGSG04720]
Fusarium verticillioides [FVEG11859]
Aspergillus aculeatus [Aa48869]
Aspergillus niger [Asni45703]
Aspergillus flavus [AFL11876]
Coccidioides posadasii [CPSG00178]
Nectria haematococca [Neha52495]
Aspergillus nidulans [AN7897]
Pyrenophora tritici-repentis [PTRG08019]
Pyrenophora teres [Pt11543]
Alternaria brassicicola [AB03417]
Cochliobolus heterostrophus [Cohe78190]
Cochliobolus sativus [Cos37698]
Stagonospora nodorum [SNU04162]
Rhystidhysteron rufulum [Rr6605]
Aspergillus carbonarius [Ac171376]
Aspergillus aculeatus [Aa52432]
Aspergillus nidulans [AN6750]
Histoplasma capsulatum [HCAG05456]
Microsporum canis [MCYG03077]
Trichophyton equinum [TEQG06462]
Baudoinia compniacensis [Bc65608]
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Septoria musiva [Smu147490]
Dothistroma septosporum [Dos21467]
Mycosphaerella graminicola [Mygr49121]
Baudoinia compniacensis [Bc38429]
Trichoderma atoviride [Trat146521]
Trichoderma virens [Trvi36887]
Cochliobolus heterostrophus [Cohe26008]
Cochliobolus sativus [Cos107681]
Setosphaeria turcica [St149938]
Pyrenophora tritici-repentis [PTRG02343]
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Alternaria brassicicola [AB06915]
Stagonospora nodorum [SNU09582]
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Pyr_redox_2
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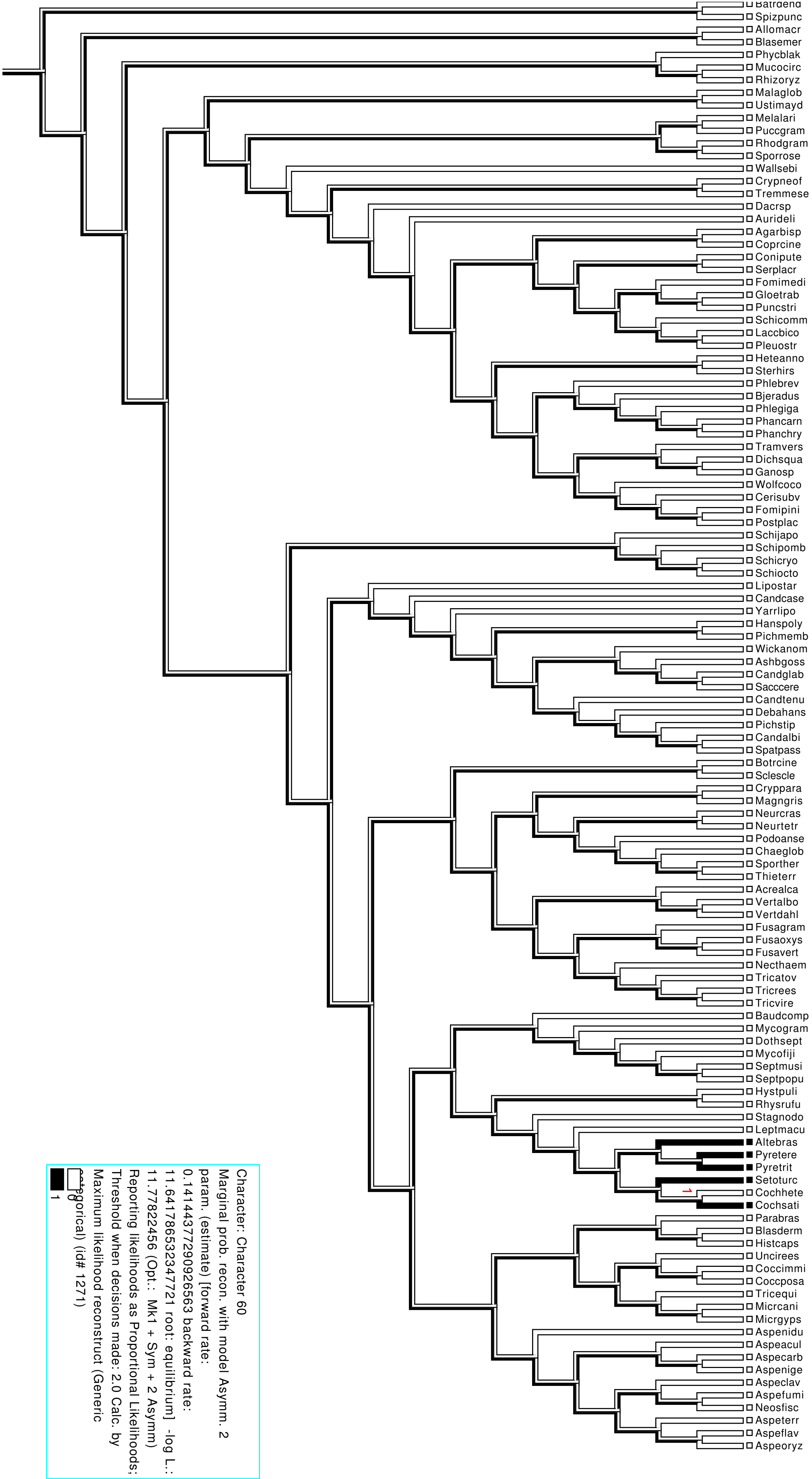
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Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
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Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
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param. (estimate) [forward rate:
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11.77822456 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1

Putative Fusion 60

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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>XP_0018066581Phno_dom1
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KRYTRLQVFSVAILTAGVMVSAWADAQSKGKLANSSKVDMTSGSFEAGLVILLIAQLLSA
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>XP_0018066581Phno_dom2
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QSRPVRERMATTSQMGSWIATGVILAATLWSFLFFAPLTYGSPGLDVAQVQARKWLGYDL
HFAK
```

2 Annotated Phylograms

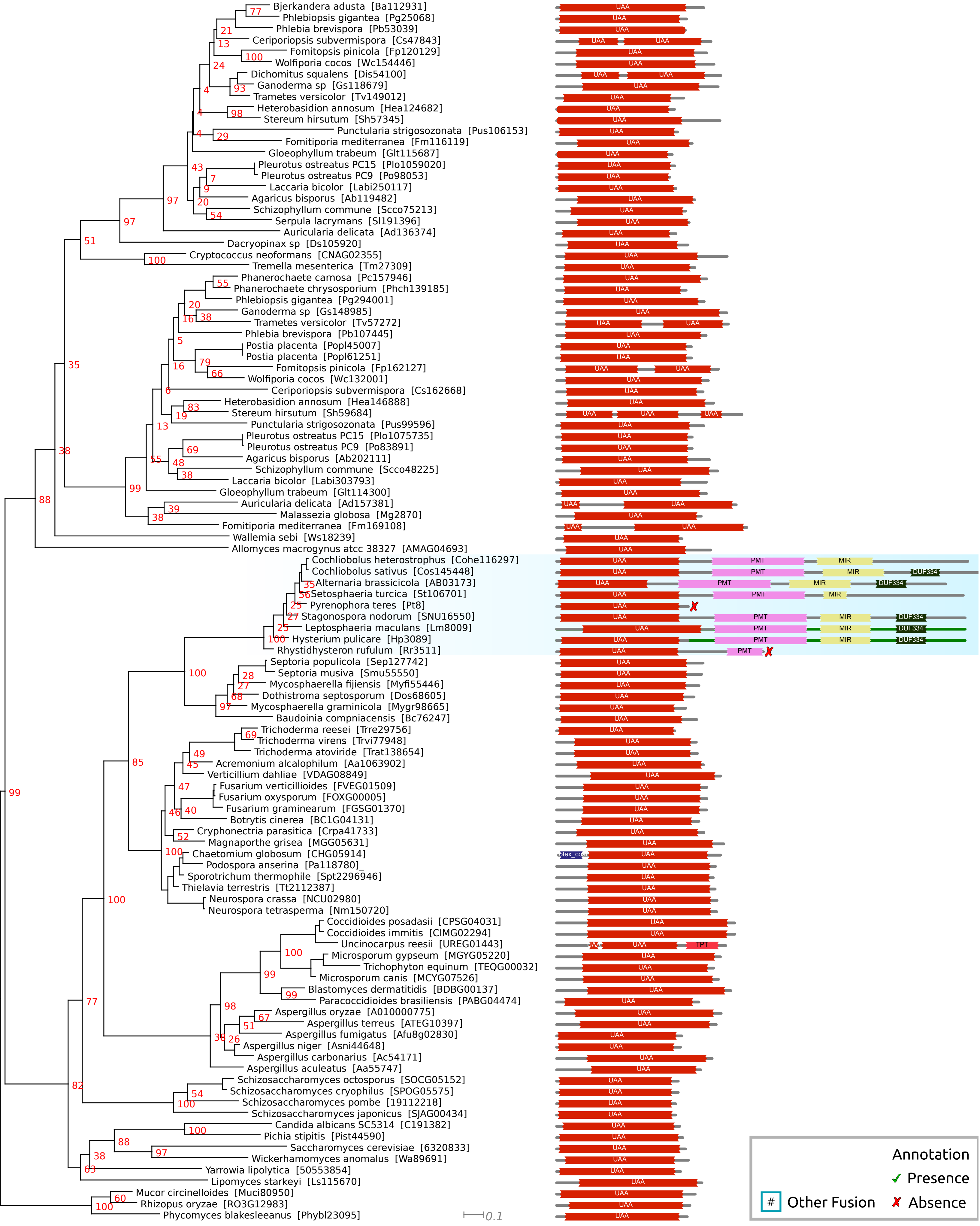
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml -i alignment_file -d aa -b 100 -m model -c 8 -v invariant_sites -s BEST --quiet -a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Phlebiopsis gigantea [Pg25068]
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Wolfiporia cocos [Wc154446]
Dichomitus squalens [Dis54100]
Ganoderma sp [Gs118679]
Trametes versicolor [Tv149012]
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Stereum hirsutum [Sh57345]
Punctularia strigosozonata [Pus106153]
Fomitiporia mediterranea [Fm116119]
Gloeophyllum trabeum [Glt115687]
Pleurotus ostreatus PC15 [Plo1059020]
Pleurotus ostreatus PC9 [Po98053]
Laccaria bicolor [Labi250117]
Agaricus bisporus [Ab119482]
Schizophyllum commune [Scco75213]
Serpula lacrymans [Sl191396]
Auricularia delicata [Ad136374]
Dacryopinax sp [Ds105920]
Cryptococcus neoformans [CNAG02355]
Tremella mesenterica [Tm27309]
Phanerochaete carnosa [Pc157946]
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Ganoderma sp [Gs148985]
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Pleurotus ostreatus PC15 [Plo1075735]
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Agaricus bisporus [Ab202111]
Schizophyllum commune [Scco48225]
Laccaria bicolor [Labi303793]
Gloeophyllum trabeum [Glt114300]
Auricularia delicata [Ad157381]
Malassezia globosa [Mg2870]
Fomitiporia mediterranea [Fm169108]
Wallemia sebi [Ws18239]
Allomyces macrogynus atcc 38327 [AMAG04693]
Cochliobolus heterostrophus [Cohe116297]
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Setosphaeria turcica [St106701]
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Dothistroma septosporum [Dos68605]
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Baudoinia compniacensis [Bc76247]
Trichoderma reesei [Tre29756]
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Acremonium alcalophilum [Aa1063902]
Verticillium dahliae [VDAG08849]
Fusarium verticillioides [FVEG01509]
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Botrytis cinerea [BC1G04131]
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Magnaporthe grisea [MGG05631]
Chaetomium globosum [CHG05914]
Podospora anserina [Pa118780]_
Sporotrichum thermophile [Spt2296946]
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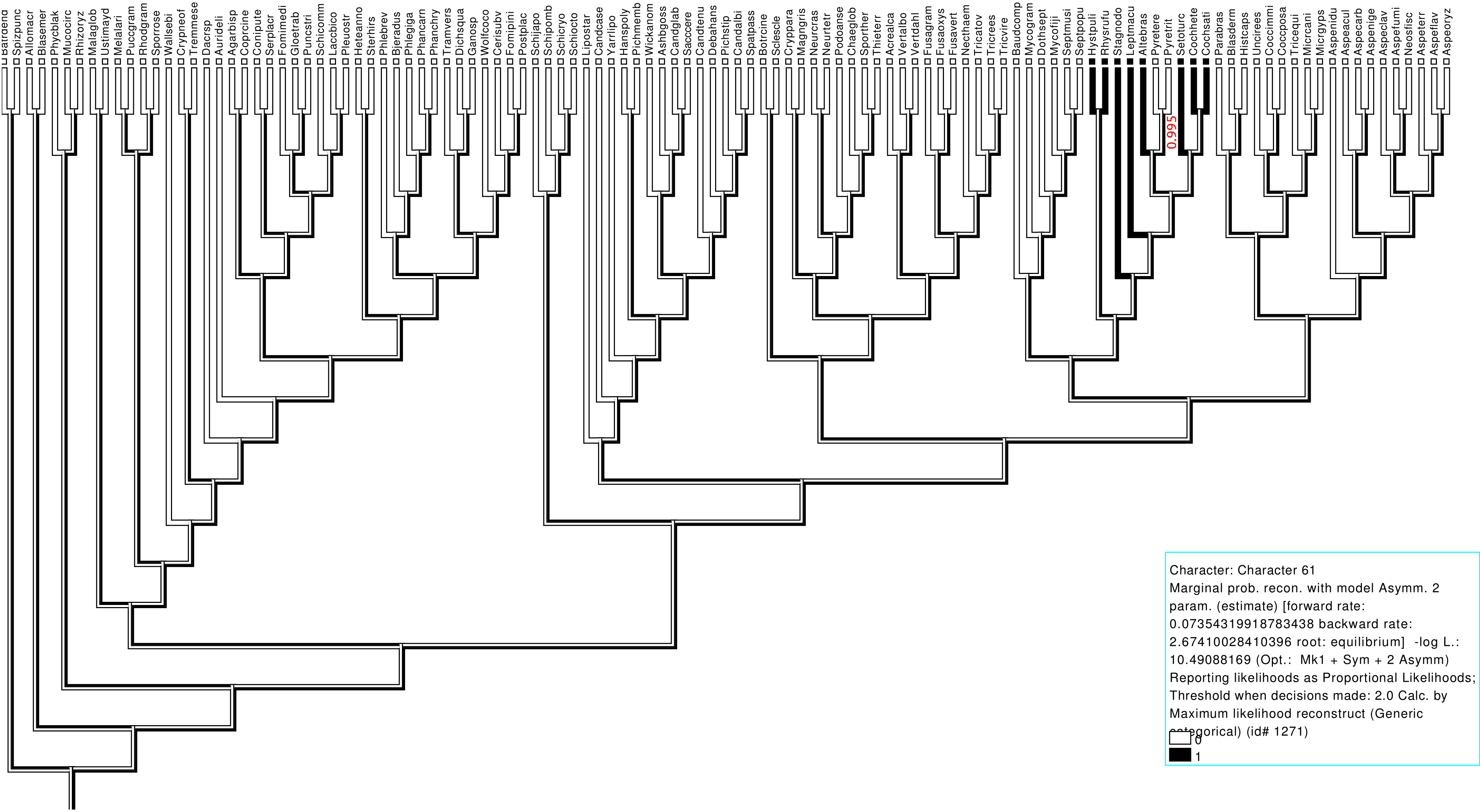

Character: Character 61
Marginal prob. recon. with model Asymm. 2 param. (estimate) [forward rate: 0.07354319918783438 backward rate: 2.67410028410396 root: equilibrium] -log L.: 10.49088169 (Opt.: Mk1 + Sym + 2 Asymm) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)

☐ 0
■ 1

Putative Fusion 61

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

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2 Annotated Phylograms

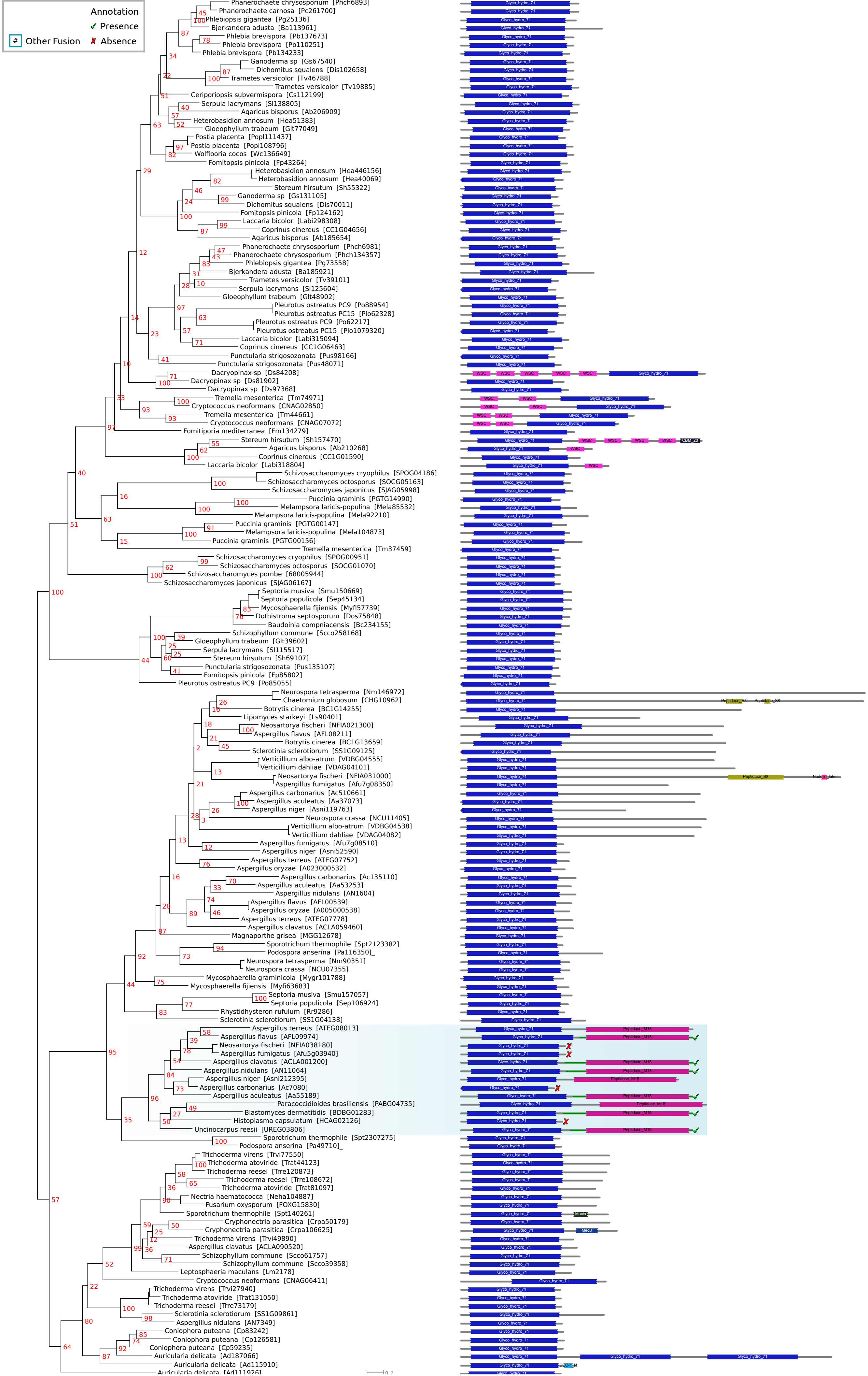
All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

Styling and annotation was made possible by Dendroscope and Inkscape.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.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Other Fusion
✗ Absence
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Ceriporiopsis subvermispora [Cs112199]
Serpula lacrymans [Sl138805]
Agaricus bisporus [Ab206909]
Heterobasidion annosum [Hea51383]
Gloeophyllum trabeum [Glt77049]
Postia placenta [Popl111437]
Postia placenta [Popl108796]
Wolfiporia cocos [Wc136649]
Fomitopsis pinicola [Fp43264]
Heterobasidion annosum [Hea446156]
Heterobasidion annosum [Hea40069]
Stereum hirsutum [Sh55322]
Ganoderma sp [Gs131105]
Dichomitus squalens [Dis70011]
Fomitopsis pinicola [Fp124162]
Laccaria bicolor [Labi298308]
Coprinus cinereus [CC1G04656]
Agaricus bisporus [Ab185654]
Phanerochaete chrysosporium [Phch6981]
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Phlebiopsis gigantea [Pg73558]
Bjerkandera adusta [Ba185921]
Trametes versicolor [Tv39101]
Serpula lacrymans [Sl125604]
Gloeophyllum trabeum [Glt48902]
Pleurotus ostreatus PC9 [Po88954]
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Pleurotus ostreatus PC9 [Po62217]
Pleurotus ostreatus PC15 [Plo1079320]
Laccaria bicolor [Labi315094]
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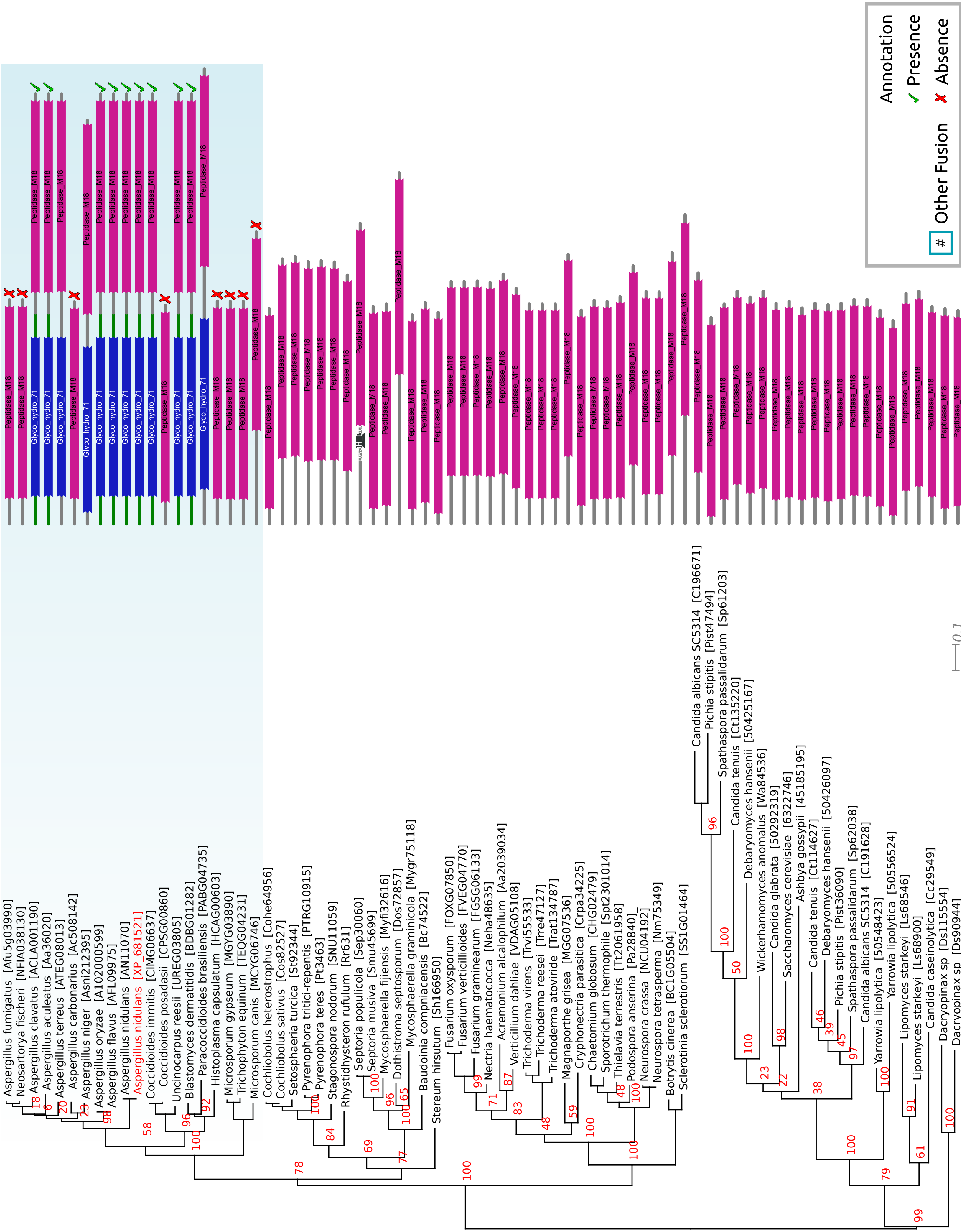
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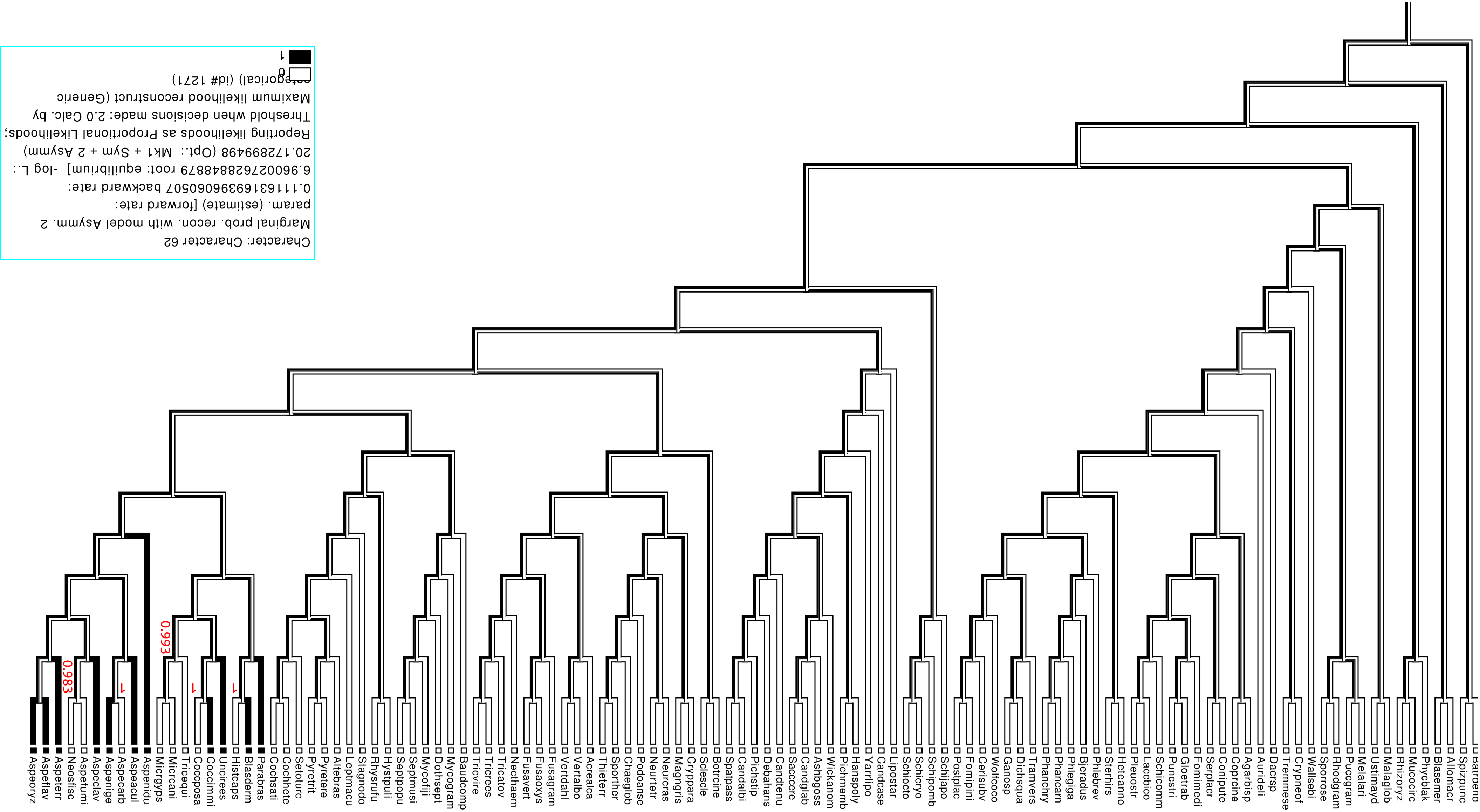
100
99


Character: Character 62
Marginal prob. recon. with model Asymm. 2
param. (estimate) [forward rate:
0.11163169396060507 backward rate:
6.960027628848879 root: equilibrium] -log L.:
20.172899498 (Opt.: Mk1 + Sym + 2 Asymm)
Reporting likelihoods as Proportional Likelihoods;
Threshold when decisions made: 2.0 Calc. by
Maximum likelihood reconstruct (Generic
categorical) (id# 1271)
0
1
0.983
1
0.993
1
1
Asperoryz
Aspeflav
Aspeterr
Neosfisc
Aspefumi
Aspeclav
Aspenige
Aspecarb
Aspeacul
Aspenidu
Micrgyps
Micrcani
Tricequi
Coccposa
Coccimmi
Uncirees
Histcaps
Blasderm
Parabras
Cochsati
Cochhete
Setoturc
Pyretrit
Pyretere
Altebras
Leptmacu
Stagnodo
Rhysrufu
Hystpuli
Septpopu
Septmusi
Mycofiji
Dothsept
Mycogram
Baudcomp
Tricvire
Tricrees
Tricatov
Necthaem
Fusavert
Fusaoxys
Fusagram
Vertdahl
Vertalbo
Acrealca
Thieterr
Sporther
Chaeglob
Podoanse
Neurtetr
Neurcras
Magngris
Cryppara
Sclescle
Botrcine
Spatpass
Candalbi
Pichstip
Debahans
Candtenu
Sacccere
Candglab
Ashbgoss
Wickanom
Pichmemb
Hanspoly
Yarrlipo
Candcase
Lipostar
Schiocto
Schicryo
Schipomb
Schijapo
Postplac
Fomipini
Cerisubv
Wolfcoco
Ganosp
Dichsqua
Tramvers
Phanchry
Phancarn
Phlegiga
Bjeradus
Phlebrev
Sterhirs
Heteanno
Pleuostr
Laccbico
Schicomm
Puncstri
Gloetrab
Fomimedi
Serplacr
Conipute
Coprcine
Agarbisp
Aurideli
Dacrsp
Tremmese
Crypneof
Wallsebi
Sporrose
Rhodgram
Puccgram
Melalari
Ustimayd
Malaglob
Rhizoryz
Mucocirc
Phycblak
Blasemer
Allomacr
Spizpunc
Batrdend

Putative Fusion 62

September 27, 2012

1 Fasta Sequences

These are the unfused sequences identified by fdfBLAST belonging to the putative gene fusion in FASTA format. Accessions may be shortened, but belong to either the taxons individual genome project or NCBIs accession numbering.

```
>BDEG_08038_dom_1
MTDSPFNCIQRFELITRNLQEHLGGDKIKEVLATRDLKVYWGTAPTGKPHIGYFVPMTKV
ADFLKAGCEVTILFADMHAFLDNQKAPWDLLKLRTSYYEATIKSMLTSIGVPIEKLKFVV
GTSYQLSKEYSLDVYRLLSMTTEHAAKKAGAEVVKQVESPLLSGLVYPLLQALDEEYLGV
DAQFGGVDQRKIFTFAEKFLPQLGYAKRAHLMNVMVGGLSGSKMSSSDPDSKVDLLDEPD
SVVAKLKKAFCEEGNVDDNPILAFIKAVVFPVNSLTNPSYTFTIERPEKYGGNAEYSTYT
HLEEAFREKLVHPGDLKSAAAKAINSLLEPIRANFHNSPELKQMAIDAYPTPKAKVEAEI
>BDEG_08038_dom_2
SRVDIRVGKVIEVTAHPERDNLYVEKIDLGEATGPRTIVSGLAKYLTKEEFTGRLVLVVA
NLKASKFAGVLSEGMVLAASNADKSVVELLEPNEDSKIGEQVTFDGFTFSPDQTLNPKHK
VFEKCAVDFLTTEECVATYKNIPFKTSQGQVTVHSLRKATIS
```

2 Annotated Phylograms

All trees were generated from an initial run of Darren's Orchard pipeline against 139 taxa (Table S1), using the above corresponding un-fused sequences as BLAST seeds. The alignments were then checked for any missing taxa, manually masked and then ProtTest3 was run, please see the Methods section for detail. The final trees were generated by the following command:

```
phyml −i alignment_file −d aa −b 100 −m model −c 8 −v invariant_sites −s BEST −−quiet −a gamma
```

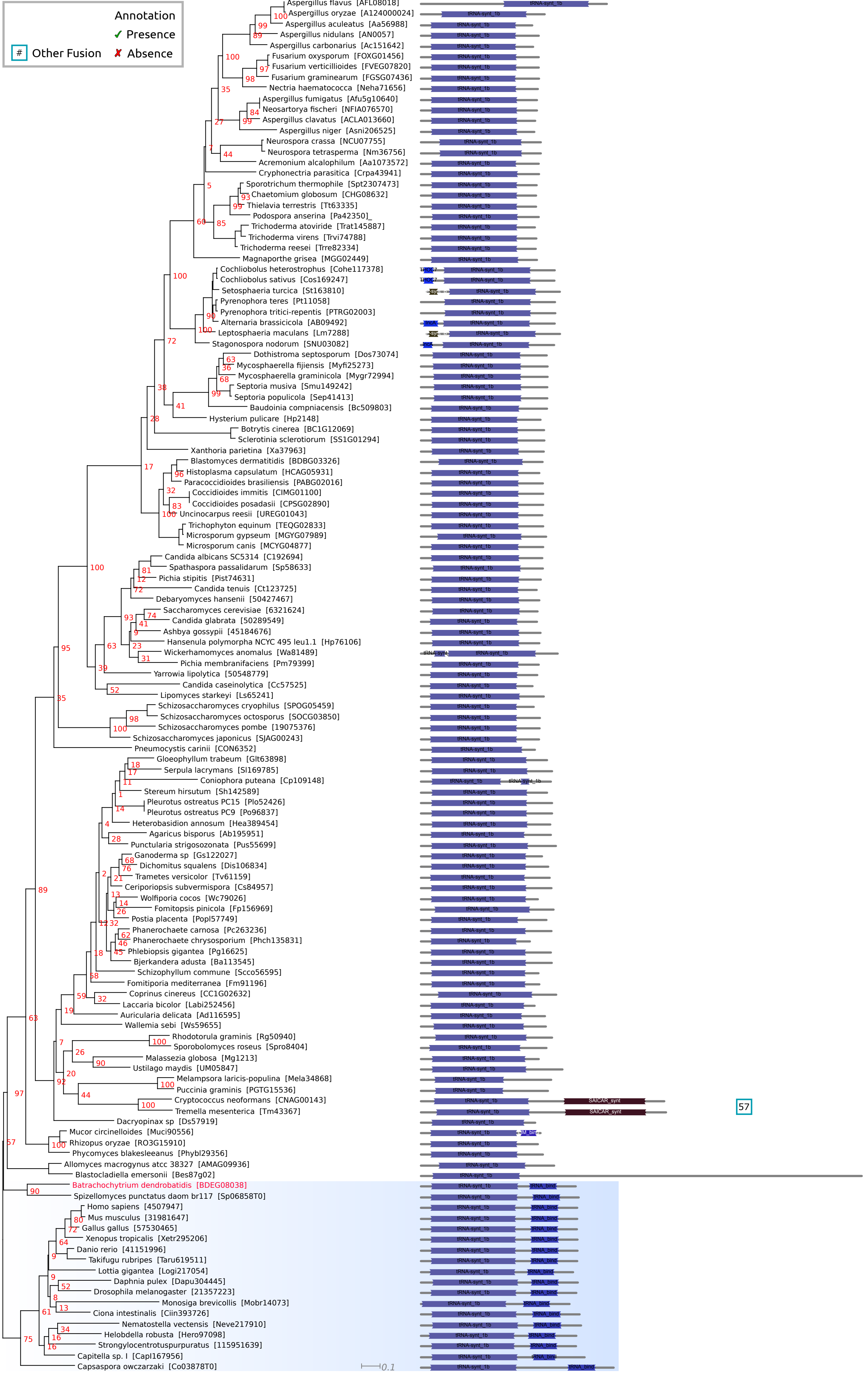
Styling and annotation was made possible by Dendroscope and Inkscape.

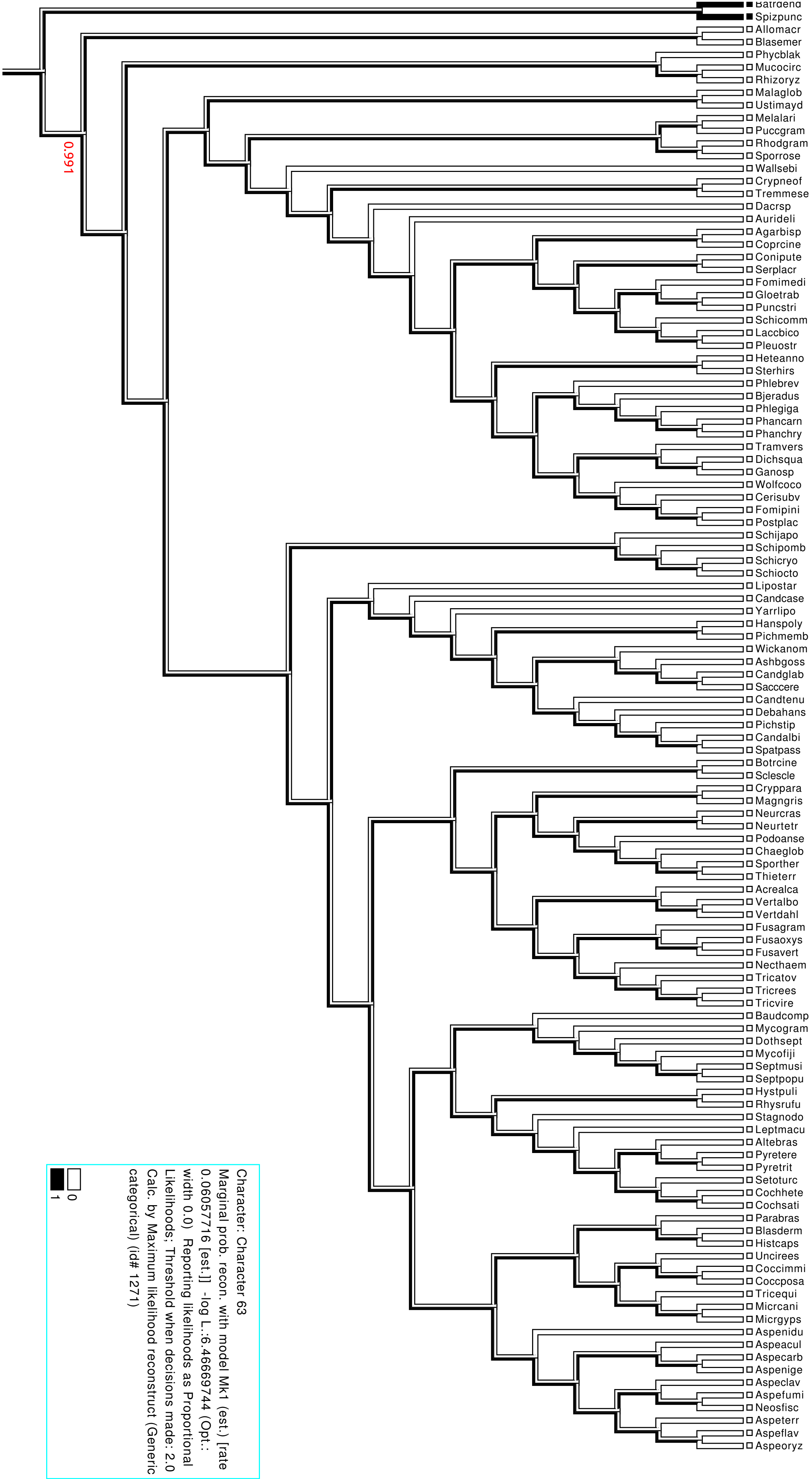
2.1 Important Notes

There is only one phylogeny shown here as the second domain is quite samll and so the resulting alignment and phylogeny were mostly unresolved.

3 Mesquite Cladogram

This tree is the 68-gene concatenated phylogeny (Fig. 1), with the presence of a fusion (black), presence of a fission (white), and absent/undetermined (grey) status of gene fusion characters plotted on to it using a "1/0/-" nexus-style data matrix. We used the program 'Mesquite' to calculate proportional likelihoods based on either an "Mk1" or "Assym. 2 param model." (see Table S4) of character change across the fungal phylogeny (Fig. 1). This allowed for a proportional likelihood of the position of the fusion/fission to be calculated.


Annotation
✓ Presence
Other Fusion
✗ Absence
Aspergillus flavus [AFL08018]
Aspergillus oryzae [A124000024]
Aspergillus aculeatus [Aa56988]
Aspergillus nidulans [AN0057]
Aspergillus carbonarius [Ac151642]
Fusarium oxysporum [FOXG01456]
Fusarium verticillioides [FVEG07820]
Fusarium graminearum [FGSG07436]
Nectria haematococca [Neha71656]
Aspergillus fumigatus [Afu5g10640]
Neosartorya fischeri [NFIA076570]
Aspergillus clavatus [ACLA013660]
Aspergillus niger [Asni206525]
Neurospora crassa [NCU07755]
Neurospora tetrasperma [Nm36756]
Acremonium alcalophilum [Aa1073572]
Cryphonectria parasitica [Crpa43941]
Sporotrichum thermophile [Spt2307473]
Chaetomium globosum [CHG08632]
Thielavia terrestris [Tt63335]
Podospora anserina [Pa42350]
Trichoderma atoviride [Trat145887]
Trichoderma virens [Trvi74788]
Trichoderma reesei [Trre82334]
Magnaporthe grisea [MGG02449]
Cochliobolus heterostrophus [Cohe117378]
Cochliobolus sativus [Cos169247]
Setosphaeria turcica [St163810]
Pyrenophora teres [Pt11058]
Pyrenophora tritici-repentis [PTRG02003]
Alternaria brassicicola [AB09492]
Leptosphaeria maculans [Lm7288]
Stagonospora nodorum [SNU03082]
Dothistroma septosporum [Dos73074]
Mycosphaerella fijiensis [Myfi25273]
Mycosphaerella graminicola [Mygr72994]
Septoria musiva [Smu149242]
Septoria populicola [Sep41413]
Baudoinia compniacensis [Bc509803]
Hysterium pulicare [Hp2148]
Botrytis cinerea [BC1G12069]
Sclerotinia sclerotiorum [SS1G01294]
Xanthoria parietina [Xa37963]
Blastomyces dermatitidis [BDBG03326]
Histoplasma capsulatum [HCAG05931]
Paracoccidioides brasiliensis [PABG02016]
Coccidioides immitis [CIMG01100]
Coccidioides posadasii [CPSG02890]
Uncinocarpus reesii [UREG01043]
Trichophyton equinum [TEQG02833]
Microsporum gypseum [MGYG07989]
Microsporum canis [MCYG04877]
Candida albicans SC5314 [C192694]
Spathaspora passalidarum [Sp58633]
Pichia stipitis [Pist74631]
Candida tenuis [Ct123725]
Debaryomyces hansenii [50427467]
Saccharomyces cerevisiae [6321624]
Candida glabrata [50289549]
Ashbya gossypii [45184676]
Hansenula polymorpha NCYC 495 leu1.1 [Hp76106]
Wickerhamomyces anomalus [Wa81489]
Pichia membranifaciens [Pm79399]
Yarrowia lipolytica [50548779]
Candida caseinolytica [Cc57525]
Lipomyces starkeyi [Ls65241]
Schizosaccharomyces cryophilus [SPOG05459]
Schizosaccharomyces octosporus [SOCG03850]
Schizosaccharomyces pombe [19075376]
Schizosaccharomyces japonicus [SJAG00243]
Pneumocystis carinii [CON6352]
Gloeophyllum trabeum [Glt63898]
Serpula lacrymans [Sl169785]
Coniophora puteana [Cp109148]
Stereum hirsutum [Sh142589]
Pleurotus ostreatus PC15 [Plo52426]
Pleurotus ostreatus PC9 [Po96837]
Heterobasidion annosum [Hea389454]
Agaricus bisporus [Ab195951]
Punctularia strigosozonata [Pus55699]
Ganoderma sp [Gs122027]
Dichomitus squalens [Dis106834]
Trametes versicolor [Tv61159]
Ceriporiopsis subvermispora [Cs84957]
Wolfiporia cocos [Wc79026]
Fomitopsis pinicola [Fp156969]
Postia placenta [Popl57749]
Phanerochaete carnosa [Pc263236]
Phanerochaete chrysosporium [Phch135831]
Phlebiopsis gigantea [Pg16625]
Bjerkandera adusta [Ba113545]
Schizophyllum commune [Scco56595]
Fomitiporia mediterranea [Fm91196]
Coprinus cinereus [CC1G02632]
Laccaria bicolor [Labi252456]
Auricularia delicata [Ad116595]
Wallemia sebi [Ws59655]
Rhodotorula graminis [Rg50940]
Sporobolomyces roseus [Spro8404]
Malassezia globosa [Mg1213]
Ustilago maydis [UM05847]
Melampsora laricis-populina [Mela34868]
Puccinia graminis [PGTG15536]
Cryptococcus neoformans [CNAG00143]
Tremella mesenterica [Tm43367]
Dacryopinax sp [Ds57919]
Mucor circinelloides [Muci90556]
Rhizopus oryzae [RO3G15910]
Phycomyces blakesleeanus [Phybl29356]
Allomyces macrogynus atcc 38327 [AMAG09936]
Blastocladiella emersonii [Bes87g02]
Batrachochytrium dendrobatidis [BDEG08038]
Spizellomyces punctatus daom br117 [Sp06858T0]
Homo sapiens [4507947]
Mus musculus [31981647]
Gallus gallus [57530465]
Xenopus tropicalis [Xetr295206]
Danio rerio [41151996]
Takifugu rubripes [Taru619511]
Lottia gigantea [Logi217054]
Daphnia pulex [Dapu304445]
Drosophila melanogaster [21357223]
Monosiga brevicollis [Mobr14073]
Ciona intestinalis [Ciin393726]
Nematostella vectensis [Neve217910]
Helobdella robusta [Hero97098]
Strongylocentrotuspurpuratus [115951639]
Capitella sp. I [Capl167956]
Capsaspora owczarzaki [Co03878T0]
tRNA-synt_1b
tRNA_bind
SAICAR_synt
57
0.1


Batrdend
Spizpunc
Allomacr
Blasemer
Phycblak
Mucocirc
Rhizoryz
Malaglob
Ustimayd
Melalari
Puccgram
Rhodgram
Sporrose
Wallsebi
Crypneof
Tremmese
Dacrsp
Aurideli
Agarbisp
Coprcine
Conipute
Serplacr
Fomimedi
Gloetrab
Puncstri
Schicomm
Laccbico
Pleuostr
Heteanno
Sterhirs
Phlebrev
Bjeradus
Phlegiga
Phancarn
Phanchry
Tramvers
Dichsqua
Ganosp
Wolfcoco
Cerisubv
Fomipini
Postplac
Schijapo
Schipomb
Schicryo
Schiocto
Lipostar
Candcase
Yarrlipo
Hanspoly
Pichmemb
Wickanom
Ashbgoss
Candglab
Sacccere
Candtenu
Debahans
Pichstip
Candalbi
Spatpass
Botrcine
Sclescle
Cryppara
Magngris
Neurcras
Neurtetr
Podoanse
Chaeglob
Sporther
Thieterr
Acrealca
Vertalbo
Vertdahl
Fusagram
Fusaoxys
Fusavert
Necthaem
Tricatov
Tricrees
Tricvire
Baudcomp
Mycogram
Dothsept
Mycofiji
Septmusi
Septpopu
Hystpuli
Rhysrufu
Stagnodo
Leptmacu
Altebras
Pyretere
Pyretrit
Setoturc
Cochhete
Cochsati
Parabras
Blasderm
Histcaps
Uncirees
Coccimmi
Coccposa
Tricequi
Micrcani
Micrgyps
Aspenidu
Aspeacul
Aspecarb
Aspenige
Aspeclav
Aspefumi
Neosfisc
Aspeterr
Aspeflav
Aspeoryz
0.991
Character: Character 63
Marginal prob. recon. with model Mk1 (est.) [rate 0.06057716 [est.]] -log L.:6.46669744 (Opt.: width 0.0) Reporting likelihoods as Proportional Likelihoods; Threshold when decisions made: 2.0 Calc. by Maximum likelihood reconstruct (Generic categorical) (id# 1271)
0
1