

Table S1: Organisms and accession numbers of the proteins used in this study.

| Species | Accession numbers | | |
|---------------------------------|----------------------------|--------------------|--------------------|
| | Fusion | α | β |
| Pezizomycotina | | | |
| <i>Ajellomyces capsulatus</i> | gbIEEH08294.1 | gbIEEH06102.1 | gbIEEH03354.1 |
| <i>Ajellomyces dermatitidis</i> | gbIEEQ69414.1 | gbIEEQ77311.1 | gbIEEQ76061.1 |
| <i>Aspergillus clavatus</i> | gbIEAW07752.1 | gbIEAW12523.1 | gbIEAW13338.1 |
| | | | gbIEAW09110.1 |
| <i>Aspergillus flavus</i> | gbIEED50054.1 | gbIEED46808.1 | gbIEED44815.1 |
| | | | gbIEED53391.1 |
| <i>Aspergillus fumigatus</i> | gbIEAL90410.2 | gbIEAL91981.1 | gbIEAL84600.1 |
| | | | gbIEAL84389.2 |
| <i>Aspergillus nidulans</i> | gbIEAA65786.1 | gbIEAA64406.1 | gbIEAA61646.1 |
| <i>Aspergillus niger</i> | reflXP_001392414.1 | reflXP_001398396.1 | reflXP_001400660.1 |
| | reflXP_001392415.1 | | |
| | 1 | 1 | |
| <i>Aspergillus terreus</i> | gbIEAU38921.1 | gbIEAU30552.1 | gbIEAU37706.1 |
| | | | gbIEAU31032.1 |
| <i>Botryotinia fuckeliana</i> | gbIEDN22743.1 | gbIEDN24969.1 | gbIEDN23758.1 |
| <i>Chaetomium globosum</i> | gbIEAQ92530.1 | gbIEAQ86176.1 | gbIEAQ86581.1 |
| <i>Coccidioides immitis</i> | gbIEAS31442.1 | gbIEAS30565.1 | gbIEAS29800.1 |
| | gbIEAS31443.1 ¹ | | |
| <i>Coccidioides posadasii</i> | gbIEER27972.1 | gbIEER27280.1 | gbIEER28332.1 |

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|--------------------------------------|---|------------------------------------|------------------------------|
| <i>Gibberella zeae</i> | reflXP_388074.1 reflXP_388076.1 ¹ | reflXP_382206.1 reflXP_391661.1 | reflXP_391061.1 |
| <i>Magnaporthe grisea</i> | gbLEDK06465.1 | gbLEDK06157.1 | gbLEDJ98088.1 |
| <i>Microsporum canis</i> | gbLEEQ28748.1 | gbLEEQ34080.1 | gbLEEQ29517.1 |
| <i>Neosartorya fischeri</i> | gbEAW22789.1 | gbEAW24125.1 | gbEAW20453.1 gbEAW25715.1 |
| <i>Neurospora crassa</i> | gbEAA34834.1 | gbEAA32357.1 | gbEAA34077.1 |
| <i>Paracoccidioides brasiliensis</i> | gbEEH17930.1 | gbEEH16608.1 | gbEEH19675.1 |
| <i>Penicillium marneffei</i> | gbEEA20408.1 | gbEEA24495.1 | gbEEA24589.1 |
| <i>Phaeosphaeria nodorum</i> | gbEAT83662.2 | gbEAT77317.1 | gbEAT84267.1 |
| <i>Podospora anserina</i> | reflXP_001908936.1 | reflXP_001911226. 1 | reflXP_001909573.1 |
| <i>Pyrenophora tritici-repentis</i> | gbLEDU41918.1 | gbLEDU40695.1 | gbLEDU51437.1 |
| <i>Sclerotinia sclerotiorum</i> | gbEDO04371.1 | gbEDO05039.1 | gbEDN91995.1 |
| <i>Talaromyces stipitatus</i> | gbEED24140.1 | gbEED18241.1 | gbEED18353.1 |
| <i>Uncinocarpus reesii</i> | gbEEP81085.1 | gbEEP79486.1 | gbEEP77760.1 |
| Saccharomycotina | | | |
| <i>Ashbya gossypii</i> | | reflNP_985681.1 | reflNP_984650.1 |
| <i>Candida albicans</i> | | gbLEEQ42982.1 | gbLEEQ43728.1 |
| <i>Candida dubliniensis</i> | | reflXP_002416832. 1 | reflXP_002422190.1 |
| <i>Candida glabrata</i> | | reflXP_447560.1 | reflXP_446321.1 |

| | | |
|--------------------------------------|------------------------|--------------------|
| <i>Candida tropicalis</i> | gbIEER31682.1 | gbIEER35932.1 |
| <i>Clavispora lusitaniae</i> | gbIEEQ39475.1 | gbIEEQ38347.1 |
| <i>Debaryomyces hansenii</i> | reflXP_461997.1 | reflXP_462565.1 |
| <i>Kluyveromyces lactis</i> | reflXP_454091.1 | reflXP_451242.1 |
| <i>Lodderomyces elongisporus</i> | gbIEDK43263.1 | gbIEDK45048.1 |
| <i>Pichia guilliermondii</i> | gbIEDK38689.2 | gbIEDK39982.2 |
| <i>Pichia pastoris</i> | reflXP_002493061. 1 | reflXP_002491782.1 |
| <i>Pichia stipitis</i> | reflXP_001387359. 1 | reflXP_001382488.1 |
| <i>Saccharomyces cerevisiae</i> | reflNP_014785.1 | reflNP_011760.1 |
| <i>Vanderwaltozyma polyspora</i> | gbIEDO15166.1 | gbIEDO19215.1 |
| <i>Yarrowia lipolytica</i> | reflXP_504333.2 | reflXP_502415.2 |
| Taphrinomycotina | | |
| <i>Schizosaccharomyces japonicus</i> | gbIEEB06483.1 | gbIEEB08651.1 |
| <i>Schizosaccharomyces pombe</i> | reflNP_594230.1 | reflNP_588466.1 |
| Basidiomycota | | |
| <i>Coprinopsis cinerea</i> | gbIEAU93204.1 | gbIEAU93446.1 |
| <i>Filobasidiella neoformans</i> | reflXP_571914.1 | reflXP_567043.1 |
| <i>Laccaria bicolor</i> | gbIEDR15553.1 | gbIEDR15438.1 |
| <i>Malassezia globosa</i> | gbIEDP43341.1 | gbIEDP42407.1 |

| | | |
|-------------------------------------|-------------------|-------------------|
| <i>Moniliophthora perniciosa</i> | gblEEB89615.1 | gblEEB90675.1 |
| <i>Postia placenta</i> ² | jgilPosp11 128778 | jgilPosp11 120437 |
| <i>Ustilago maydis</i> | gblEAK82784.1 | gblEAK81186.1 |
| | gblEAK82289.1 | gblEAK82785.1 |
| Neocallimastigomycota | | |
| <i>Neocallmastix frontalis</i> | gblAAP13544.1 | splP53587.2 |
| <i>Neocallimastix patriciarum</i> | gblAAP83350.1 | gblAAP83351.1 |
| Metazoa - Outgroup | | |
| <i>Homo sapiens</i> | gblAAH00504.1 | dbjlBAA91939.1 |
| <i>Mus musculus</i> | dbjlBAB22331.1 | dbjlBAE29687.1 |
| <i>Canis familiaris</i> | reflXP_532985.2 | reflXP_542566.2 |

¹ Even though these two genes are annotated as independent genes, they are consecutive and in the same strand in the genome and group with the fusion genes in the phylogenetic trees, indicating that they might be fused. See text for a discussion.

² Although both genes seem to be absent from this genome in NCBI, further search in the organism's genome webpage at JGI (<http://genomeportal.jgi-psf.org/Posp11/Posp11.home.html>) revealed that the genes are present. The accession numbers given in the table correspond to the JGI accession numbers.