

**Table S1.** Accession Numbers of proteins shown in Figures 2-5<sup>1</sup>

Name on the Figures	Species	Phylum	NCBI Accession No.
<b>Figure 2</b>			
Allomyces	<i>Allomyces macrogynus</i>	Blastocladiomycota	KNE68590
Amoeboaphelidium	<i>Amoeboaphelidium protococcarum</i>	Aphelidiomycota	KAI3631655
Batrachochytrium	<i>Batrachochytrium dendrobatidis</i>	Chytridiomycota	XP_006680205
Blyttiomycetes	<i>Blyttiomycetes helicus</i>	Chytridiomycota	RKO89614
Catenaria	<i>Catenaria anguillulae</i>	Blastocladiomycota	ORZ33943
Chytridium1	<i>Chytridium lagenaria</i>	Chytridiomycota	KAI8852913
Chytridium2	<i>Chytridium lagenaria</i>	Chytridiomycota	KAI8846486
Chytriomyces1	<i>Chytriomyces confervae</i>	Chytridiomycota	TPX65886
Chytriomyces2	<i>Chytriomyces confervae</i>	Chytridiomycota	TPX72533
Cladochytrium	<i>Cladochytrium replicatum</i>	Chytridiomycota	KAI8806435
Entophlyctis	<i>Entophlyctis helioformis</i>	Chytridiomycota	KAI8924042
Fimicolochytrium	<i>Fimicolochytrium jonesii</i>	Chytridiomycota	XP_052926454
Gaertneriomyces	<i>Gaertneriomyces semiglobifer</i>	Chytridiomycota	KAI9004733
Globomyces	<i>Globomyces pollinis-pini</i>	Chytridiomycota	KAI8893030
Gorgonomycetes	<i>Gorgonomycetes haynaldii</i>	Chytridiomycota	KAI8912588
Obelidium1	<i>Obelidium mucronatum</i>	Chytridiomycota	KAI9351240
Obelidium2	<i>Obelidium mucronatum</i>	Chytridiomycota	KAI9342285
Olpidium	<i>Olpidium bornovanus</i>	Olpidiomycota	KAG5460860+ KAG5458366
Paraphelidium	<i>Paraphelidium tribonemae</i>	Aphelidiomycota	TRINITY_DN24782 <sup>2</sup>
Paraphysoderma	<i>Paraphysoderma sedebokerense</i>	Blastocladiomycota	KAI9140125
Phlyctochytrium	<i>Phlyctochytrium arcticum</i>	Chytridiomycota	KAI9095929
Rhizoclosmatium	<i>Rhizoclosmatium globosum</i>	Chytridiomycota	ORY45507
Synchytrium	<i>Synchytrium microbalum</i>	Chytridiomycota	XP_031024160
Zopfochytrium1	<i>Zopfochytrium polystomum</i>	Chytridiomycota	KAI9357369
Zopfochytrium2	<i>Zopfochytrium polystomum</i>	Chytridiomycota	KAI9325442
<b>Figure 3</b>			
Amoeboaphelidium	<i>Amoeboaphelidium protococcorum</i>	Aphelidiomycota	KAI3631655
Amphimedon	<i>Amphimedon queenslandica</i>	Porifera	XP_003384590
Branchiostoma	<i>Branchiostoma floridae</i>	Chordata	XP_002215000
Caenorhabditis	<i>Caenorhabditis elegans</i>	Nematode	NP_491219
Ciona	<i>Ciona intestinalis</i>	Chordata	XP_002124388
Drosophila	<i>Drosophila melanogaster</i>	Arthropoda	NP_648881
Helobdella	<i>Helobdella robusta</i>	Annelida	XP_009008741
Homo	<i>Homo sapiens</i>	Chordata	NP_776245
Globomyces	<i>Globomyces pollinis-pini</i>	Chytridiomycota	KAI8895260
Gorgonomycetes	<i>Gorgonomycetes haynaldii</i>	Chytridiomycota	KAI8912823
Monosiga	<i>Monosiga brevicollis</i>	Choanoflagellata	XP_001743131
Nematostella	<i>Nematostella vectensis</i>	Cnidaria	XP_001628751
Strongylocentrotus	<i>Strongylocentrotus purpuratus</i>	Echinodermata	XP_782492
<b>Figure 4</b>			
Babesia	<i>Babesia bovis</i>	Apicomplexa	XP_001610770
Chlamydomonas	<i>Chlamydomonas reinhardtii</i>	Chlorophyta	XP_001695016
Chlorella	<i>Chlorella variabilis</i>	Chlorophyta	XP_005848932
Ichthyophthirius	<i>Ichthyophthirius multifiliis</i>	Ciliata	XP_004035172

Leishmania	<i>Leishmania major</i>	Euglenozoa	XP_001686248
Perkinsus	<i>Perkinsus marinus</i>	Perkinsozoa	XP_002773110
Plasmodium	<i>Plasmodium falciparum</i>	Apicomplexa	XP_001350760
Strigomonas	<i>Strigomonas culicis</i>	Euglenozoa	EPY21771
Toxoplasma	<i>Toxoplasma gondii</i>	Apicomplexa	XP_002369913.
Trebouxia	<i>Trebouxia</i> sp. A1-2	Chlorophyta	KAA6422911
Vitrella	<i>Vitrella brassicaformis</i>	Chromerida	CEM02660
Volvox	<i>Volvox carteri</i>	Chlorophyta	XP_002946668
<b>Figure 5</b>			
Babesia	<i>Babesia bovis</i>	Apicomplexa	XP_001609847
Chromera1	<i>Chromera velia</i>	Chromerida	HBKZ010163093 <sup>3</sup>
Chromera2	<i>Chromera velia</i>	Chromerida	JO8100183 <sup>3</sup>
Cladochytrium	<i>Cladochytrium replicatum</i>	Chytridiomycota	KAI8808662
Cryptosporidium	<i>Cryptosporidium parvum</i>	Apicomplexa	XP_001388280
Eimeria	<i>Eimeria tenella</i>	Apicomplexa	XP_013231224
Gonapodya	<i>Gonapodya prolifera</i>	Monoblepharomycota	KXS19308
Gorgonomyces	<i>Gorgonomyces haynaldii</i>	Chytridiomycota	KAI8914275
Gregarina	<i>Gregarina niphandrodes</i>	Apicomplexa	XP_011128898
Neocallimastix	<i>Neocallimastix californiae</i>	Neocallimastigomycota	ORY36261
Perkinsus	<i>Perkinsus olseni</i>	Perkinsozoa	KAF4750811
Piromyces	<i>Piromyces finnis</i>	Neocallimastigomycota	ORX59328
Plasmodiumf	<i>Plasmodium falciparum</i>	Apicomplexa	XP_002808695
Plasmodiumg	<i>Plasmodium gallinaceum</i>	Apicomplexa	XP_028530755
Powellomyces	<i>Powellomyces hirtus</i>	Chytridiomycota	TPX59886
Spizellomyces	<i>Spyzellomyces punctatus</i>	Chytridiomycota	XP_016606225
Theileria	<i>Theileria annulat</i>	Apicomplexa	XP_952938
Toxoplasma	<i>Toxoplasma gondii</i>	Apicomplexa	XP_002364910
Vitrella1	<i>Vitrella brassicaformis</i>	Chromerida	CEM12737

<sup>1</sup>Accession Numbers listed in Table 1 are not shown here.

<sup>2</sup>Taken from [https://figshare.com/articles/dataset/Commun\\_Biol\\_aphelid\\_datasets/7339469/1](https://figshare.com/articles/dataset/Commun_Biol_aphelid_datasets/7339469/1).

<sup>3</sup>TSA

**Table S2.** Nucleotide sequences containing short p25alpha domain in seed plants (Cf. Table 1). The best protein hits of each of these nucleotides in Oomycota are given.

Plant species	Order	Accession Number <sup>1</sup>	Species	Accession Number	Query cover, %	Identity, %	(Query cover, %) <sup>3</sup>	(Identity, %) <sup>3</sup>
<i>Panax ginseng</i> 1	Apiales <sup>2</sup>	GDQW01019137	<i>Albugo laibachii</i>	CCA17632	31	47.37	(98)	70.27
			<i>Aphanomyces astaci</i>	XP_009825419	51	33.93		
<i>Panax ginseng</i> 2	Apiales	GDQW01005616	No hit in Oomycota				(95)	(62.50)
<i>Betula papyrifera</i>	Fagales	GEIC01017558	<i>Pythium oligandrum</i>	TMW64959	43	41.10		
			<i>Aphanomyces euteiches</i>	KAF0741241	65	31.62	(90)	(73.57)
<i>Nicotiana. tabacum</i>	Solanales	AM817762*	<i>Saprolegnia parasitica</i>	XP_012194823	59	25.89		
			<i>Thraustotheca clavata</i>	OQR96327	18	51.43	(100)	(47.24)
<i>Nicotiana. tabacum</i>	Solanales	AM824543*	<i>Saprolegnia parasitica</i>	XP_012194823	66	25.89		
			<i>Thraustotheca clavata</i>	OQR96327	20	51.43	(100)	(47.24)
<i>Colobanthus quitensis</i>	Caryophyllales	GCIB01125581	<i>Thraustotheca clavata</i>	OQR96327	41	43.75		
			<i>Pythium oligandrum</i>	TMW64959	45	37.14	(98)	(68.03)
<i>Persicaria minor</i>	Caryophyllales	GALN01112310	No hit in Oomycota				(79)	(58.62)
<i>Chromolaena odorata</i>	Asterales	GACH01135300	<i>Peronosclerospora sorghi</i>	KAI9911451	64	50.00		
			<i>Lagenidium giganteum</i>	DBA04893	86	42.50	(100)	(60.34)
<i>Oryza sativa</i>	Poales	CT850609*	No hit in Oomycota				(92)	(58.11)
<i>Triticum aestivum</i>	Poales	CD868723*	No hit in Oomycota				(96)	(61.22)

The best hits were searched by BLASTX program [18] in NCBI protein database using the nucleotids listed in the third column as queries. Search in NCBI nucleotide databases by BLASTN program [18] did not result in better hits. <sup>1</sup>Accession Numbers in the third column refer to TSAs or ESTs\*. <sup>2</sup>Color code: blue, Magnoliopsida class, eudicotyledons; green, Magnoliopsida class, monocotyledons (Liliopsida). <sup>3</sup>Numbers in parenthesis are the values of the best hits in Table 1 (i.e., the absolute best hits, not only in Oomycota).