

1                           **SUPPLEMENTARY INFORMATION**

2                           **for**

3                           **Analysis of *Arabidopsis thaliana* Redox Gene Network Indicates Evolutionary**  
4                           **Expansion of Class III Peroxidase in Plants**

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27 **1. SUPPLEMENTARY RESULTS AND DISCUSSION**

28 **1.1. Network clusters connectivity**

29      Supplementary Figure S1 shows the node degree distribution of the network clusters.  
30 In (a) is depicted node degree distribution of all proteins from *class III peroxidase* cluster  
31 (red continuous line) *versus* the node degree distribution of all proteins in the network  
32 (black dotted line), disregarding chemical compounds; In (b) is depicted node degree  
33 distribution of all proteins from *general* cluster (blue continuous line) *versus* the node  
34 degree distribution of all proteins in the network (black dotted line), disregarding chemical  
35 compounds. This result shows that connectivity is higher in the *general* cluster than *class*  
36 *III peroxidase* cluster; the latter cluster is composed solely by class III peroxidases, which  
37 have few connections between each other, whilst proteins of *general* cluster are well  
38 connected.

39

40 **1.2. Evolutionary roots of all network nodes**

41      In order to assess evolutionary roots of every gene present in the network, the  
42 *geneplast* R/Bioconductor was used. As described in Methods, it calculates the  
43 evolutionary root based on orthology information. Supplementary Figure S2 shows the  
44 eukaryote species tree from STRINGdb (a), and the redox network of *A. thaliana* (b). This  
45 figure is like the one presented in Figure 3, but with evolutionary root information about  
46 every gene in the analysis. Colored diamonds on root labels are linked to node color in the  
47 network: color code range from blue (more ancient root) to orange (more recent root). It is  
48 noteworthy that almost all proteins that emerged in root 9 (which represents the last  
49 common ancestor of land plants) belong to the *class III peroxidase* cluster. Supplementary  
50 Figure S3 depicts a projection of the network, showing the emergence of new nodes at  
51 each root of the species tree. Most of the *general* cluster emerged at the roots of  
52 eukaryotes.

53

54 **1.3. Class III peroxidase orthologs abundance**

55      The following analysis were made to verify the abundance of class III peroxidases in  
56 the 20 species of land plants (present on STRINGdb v10). Supplementary Figure S4  
57 shows a boxplot of class III peroxidase orthologs abundance, which was calculated by the  
58 mean of:

$$\frac{\text{Number of CIII Prx orthologs}}{\text{Total gene count}}$$

59

60 for each species. In (a) is depicted the abundance of class III peroxidase orthologs using  
61 *A. thaliana* orthologs, and (b) the abundance using *O. sativa* orthologs. The results obtained  
62 indicates that the same pattern is present, using different sources of orthologous groups,  
63 which corroborates with the established hypothesis.

64

65 **1.4. *Marchantia polymorpha* orthologs**

66 Data regarding annotation of *M. polymorpha* class III peroxidases were obtained from  
67 PeroxiBase. Orthogroup annotation from PeroxiBase was used to obtain orthology  
68 information of *M. polymorpha*. We identified 8 orthogroups shared by *M. polymorpha*, *A.*  
69 *thaliana*, and *O. sativa*, containing 22 *M. polymorpha* orthologs; 1 orthogroup shared by *M.*  
70 *polymorpha* and *A. thaliana* (without any *O. sativa* ortholog), containing 1 *M. polymorpha*  
71 ortholog; and 1 orthogroup shared by *M. polymorpha* and *O. sativa* (without any *A.*  
72 *thaliana* ortholog), containing 2 *M. polymorpha* orthologs. The results are shown in  
73 Supplementary Figure S5.

74

75 **1.5. Evolutionary trees of orthologous groups**

76 Finally, Supplementary Figures S6-S125 shows the most parsimonious scenario for  
77 the 119 orthologous groups obtained in the analysis. Each tree represents an orthologous  
78 group, which contains one or more genes present in the network. All but PER68  
79 (AT5G58400) were in the analysis.

80 **2. SUPPLEMENTARY FIGURES LEGENDS**

81 **Supplementary Figure S1:** Degree distribution of the network clusters, taking into  
82 account only protein-protein interaction. (a) Degree distribution of proteins from *class III*  
83 peroxidase cluster (red). Dotted lines shows degree distribution of whole network,  
84 disregarding chemical compounds. (B) Degree distribution (blue line) of proteins from  
85 *general* cluster. Dotted lines shows degree distribution of whole network, disregarding  
86 chemical compounds.

87

88 **Supplementary Figure S2:** Evolutionary scenario of *Arabidopsis thaliana* redox network.  
89 In (a) is depicted the eukaryote species tree from STRING v10.5. Each leaf node denotes  
90 an species and their phylogeny is drawn in the tree. Root nodes represents the last  
91 common ancestor (LCA) for each taxon. Colored diamonds aside each root node assign  
92 color for the network in (b). Supplementary Figure S2 (b) shows the same redox network,  
93 but with evolution scenario for all network nodes. Colors range from dark blue (more  
94 ancient) to dark orange (more recent). Red nodes have no annotation for evolutionary root.  
95

96 **Supplementary Figure S3:** Projection of evolutionary roots in the network. This figure  
97 shows how the redox network of *A. thaliana* have arised and organized its connections.  
98 Network organization ranging from more ancient proteins (dark blue, root 19) to more  
99 recent proteins (root 3, dark orange). Red nodes have no annotation for evolutionary root,  
100 and therefore accounted for root 0.

101

102 **Supplementary Figure S4:** Class III peroxidase abundance. (a) Shows a boxplot of the  
103 class III peroxidase abundance in each taxon analyzed. Eudicots were analyzed using  
104 orthologous groups obtained from STRING v10, using *A. thaliana* class III peroxidases as  
105 query. (b) Shows a boxplot of the class III peroxidase abundance in each taxon analyzed.  
106 Monocots were analyzed using orthologous groups obtained from STRING v10, using *O.*  
107 *sativa* class III peroxidases as query.

108

109 **Supplementary Figure S5:** Class III peroxidase orthologs abundance. Bars indicate the  
110 abundance of class III peroxidase isozymes by species of each taxonomic group  
111 (*Marchantia polymorpha*, *Physcomitrella patens*, *Selaginella moellendorffii*, Eudicots - 8  
112 species, and Monocots - 10 species). Colors indicate whether the OG have *A. thaliana*  
113 orthologs (AT orthologous groups - pink), *O. sativa* orthologs (OS orthologous groups -  
114 green) or orthologs from both species (Common to AT and OS - blue). Dendrogram at the

115 bottom shows the evolutionary relationship among the groups, and its estimated  
116 divergence times (in millions of years – Mya). Abundance is calculated as the mean of  
117 number of class III peroxidase orthologs divided by the gene count of each species.

118

119 **Supplementary Figures S6-125:** The figures S6 to S125 shows the evolutionary roots for  
120 the 119 COGs obtained in our analysis, built using package *geneplast*. In all figures, green  
121 circles represents COG present in that species, and gray circles, absence. Red-hollow  
122 diamond represents inferred root for a given COG and the D-score, which estimates  
123 stability of the inferred root. P-values are generated by permutation analysis.

124 **3. SUPPLEMENTARY TABLES LEGENDS**

125 **Supplementary Table S1:** This table brings description of all genes used in our analysis.  
126 First column indicates STRING ID for each protein; the second column indicates the locus  
127 ID for each protein; third column shows the alias obtained from STRING v10; fourth  
128 column shows alias obtained from PeroxiBase; fifth column shows the defined name  
129 shown in the networks; sixth column indicates protein class (whether is a peroxidase  
130 (PRX), thiol-redox (TR), SOD or other oxido-reductase); the seventh column indicates  
131 protein annotation obtained from STRING v10; eighth column indicates the orthologous  
132 group that each gene is part of; ninth column indicates the inferred evolutionary root  
133 calculated by *geneplast* for each orthologous group; tenth column shows the D-score for  
134 each root; eleventh column shows the adjusted P-value of the *geneplast* analysis, and the  
135 twelfth column shows whether the gene was found only in the GO search (our), PeroxiBase  
136 search (peroxibase), or in both (intersect).

137

138 **Supplementary Table S2:** This table describes the 15 chemical compounds used in our  
139 network analysis. The first column indicates the chemical element name, followed in the  
140 second column by its formula. The third and fourth columns show identifiers for different  
141 databases: KEGG and PubChem. Hydride and Ozone did not have entries in KEGG  
142 database, therefore have empty values.

143

144 **Supplementary Table S3:** This table shows information regarding the 77 genes that not  
145 connect with the network main component. The first column indicates STRING ID for each  
146 protein; the second column indicates the locus ID for each protein; third column shows the  
147 alias obtained from STRING v10; fourth column shows alias obtained from PeroxiBase;  
148 fifth column shows the defined name shown in the networks; sixth column indicates protein  
149 class (whether is a peroxidase (PRX), thiol-redox (TR), SOD or other oxido-reductase);  
150 the seventh column indicates protein annotation obtained from STRING v10; eighth  
151 column indicates the orthologous group that each gene is part of; ninth column indicates  
152 the inferred evolutionary root calculated by *geneplast* for each orthologous group; tenth  
153 column shows the D-score for each root; eleventh column shows the adjusted P-value of  
154 the *geneplast* analysis, and the twelfth column shows whether the gene was found only in  
155 the GO search (our), PeroxiBase search (peroxibase), or in both (intersect).

156

157 **Supplementary Table S4:** This table provides information about gene abundance of the  
158 whole network, using orthology information obtained from *A. thaliana* OGs. The OGs were

159 divided according to the function related to. In total, 44 COGs class III peroxidase-related;  
160 8 peroxidase-related; 4 SOD-related, 28 thiol-redox related, and 35 COGs related to other  
161 oxido-reductases. Each column represents one of the 20 land plant species. The STRING  
162 identifier for each species is provided above its name.

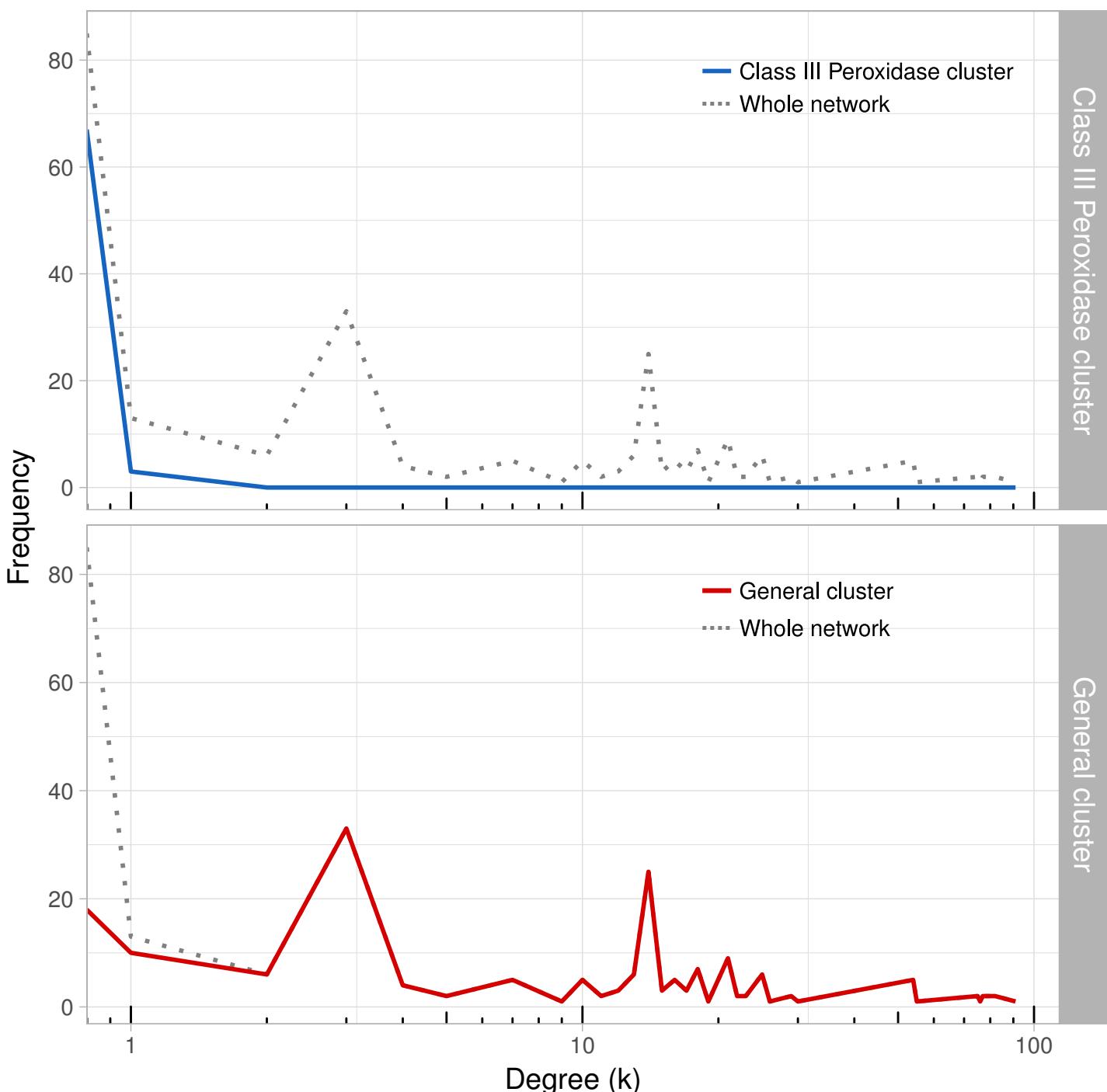
163

164 **Supplementary Table S5:** This table provides information of class III protein abundance,  
165 using orthology information obtained from *O. sativa* COGs. 44 COGs were used in this  
166 table. Each column represents one of the 20 land plant species, which are divided based  
167 on its taxonomic group. The STRING identifier for each species is provided above its  
168 name. The ortholog count, total of genes and the class III genes ratio is provided for each  
169 species in the last lines. This ratio is the total amount of class III orthologs divided by the  
170 total number of genes for each species.

# Supplementary Figure S1

## Network degree distribution

No chemicals

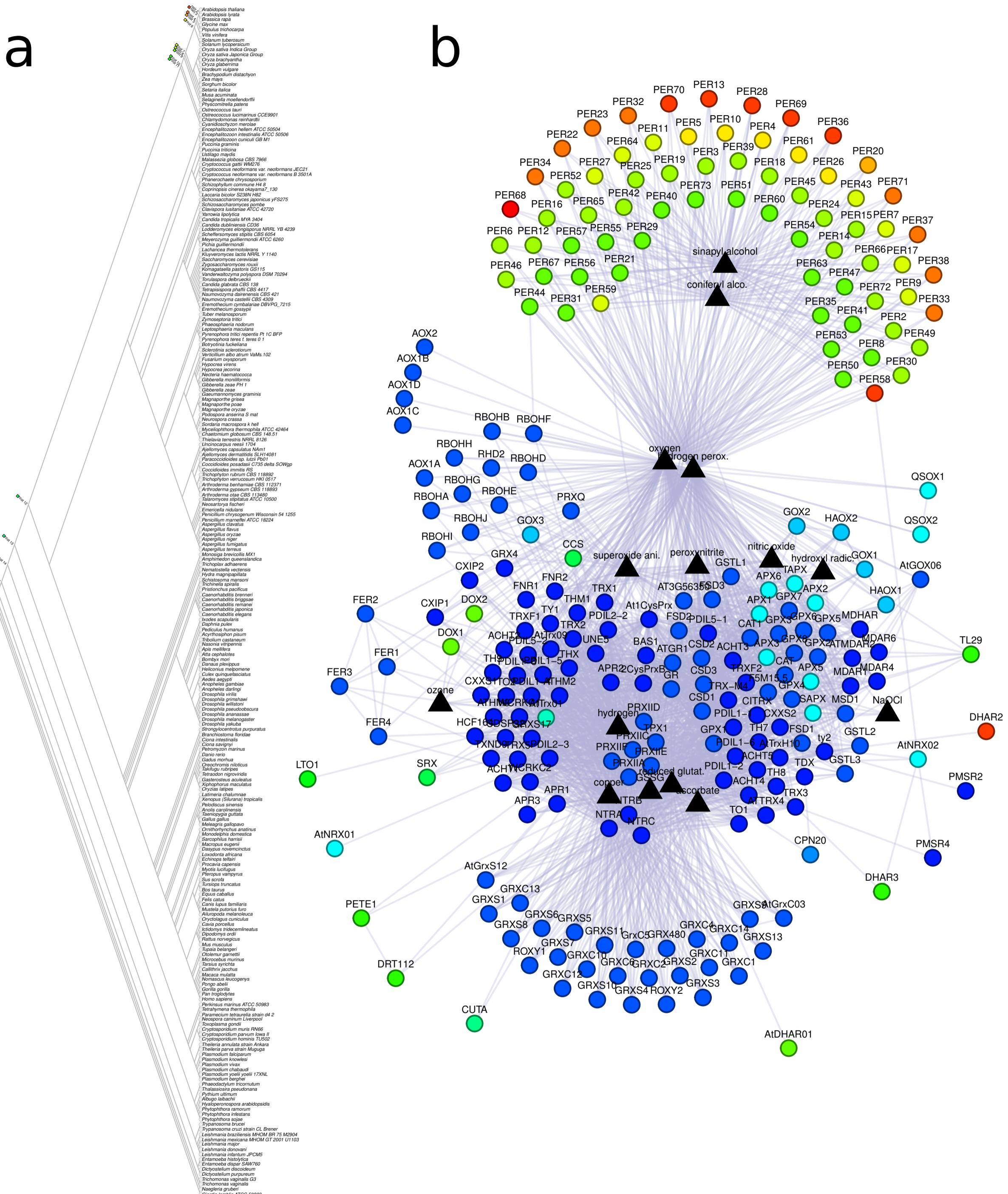


Class III Peroxidase cluster

General cluster

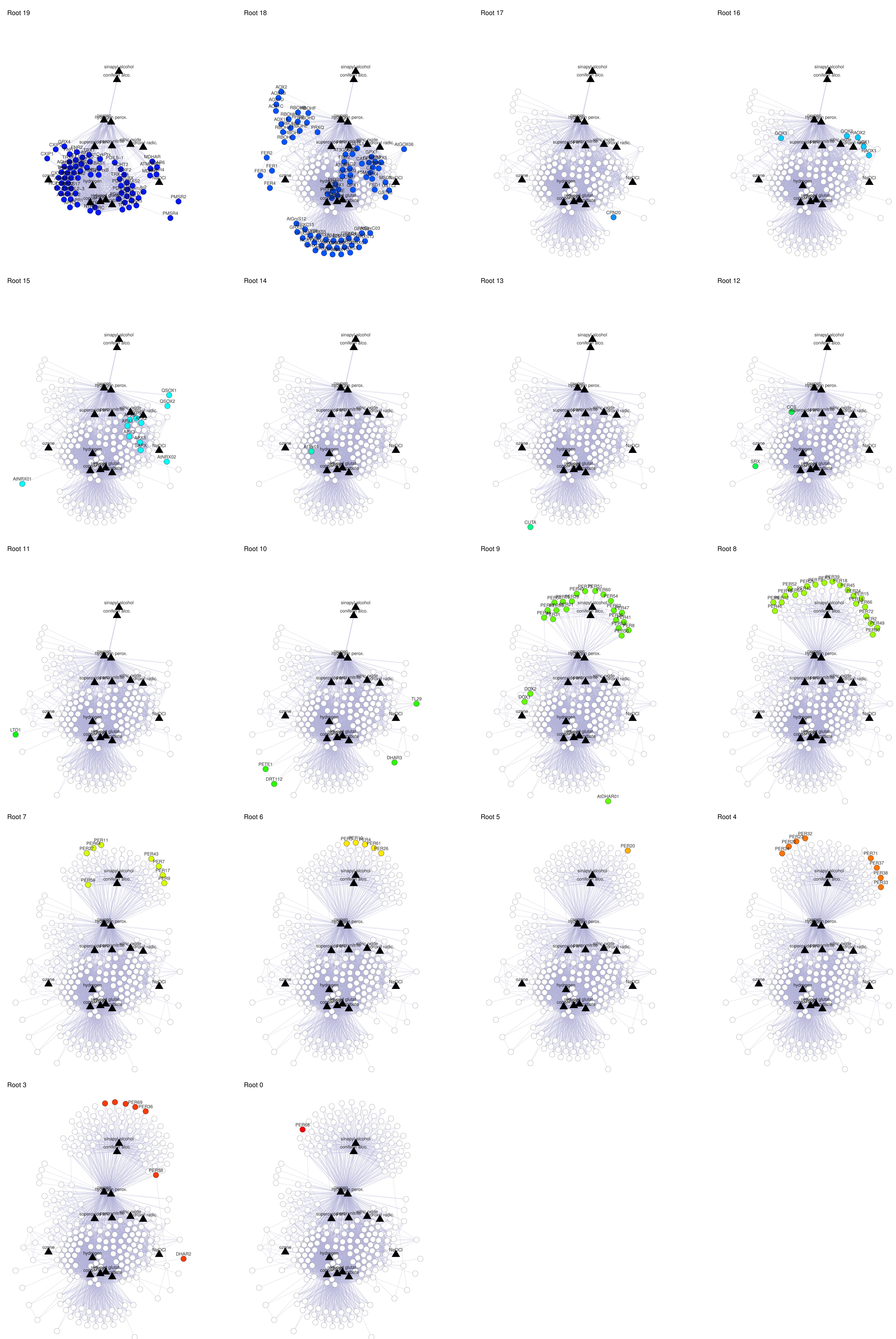
**Supplementary Figure S1:** Degree distribution of the network clusters, taking into account only protein-protein interaction. (a) Degree distribution of proteins from class III peroxidase cluster (red). Dotted lines shows degree distribution of whole network, disregarding chemical compounds. (b) Degree distribution (blue line) of proteins from general cluster. Dotted lines shows degree distribution of whole network, disregarding chemical compounds.

# Supplementary Figure S2



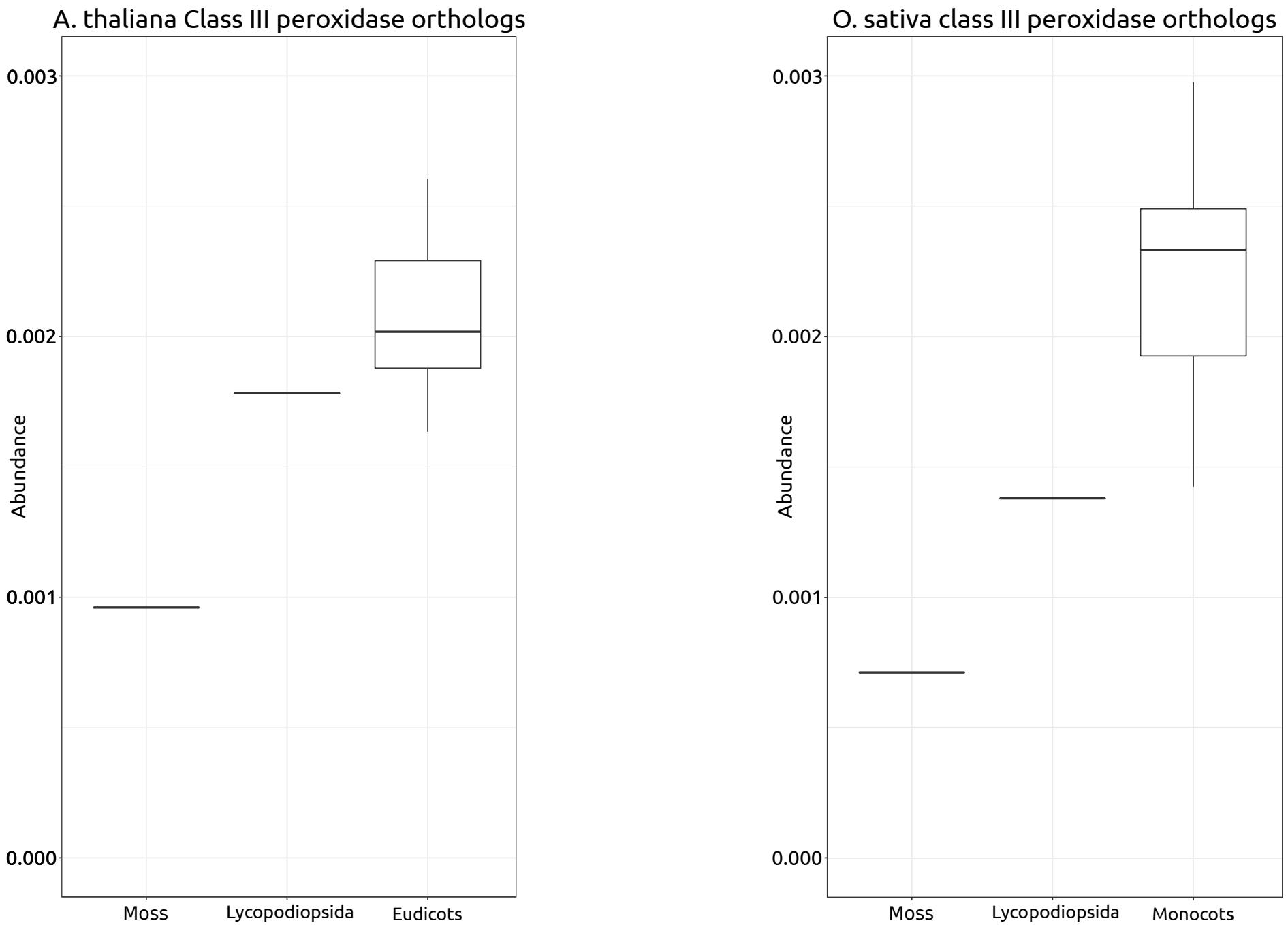
**Supplementary Figure S2:** Evolutionary scenario of *Arabidopsis thaliana* redox network. In (a) is depicted the eukaryote species tree from STRING v10.5. Each leaf node denotes a species and their phylogeny is drawn in the tree. Root nodes represent the last common ancestor (LCA) for each taxon. Colored diamonds aside each root node assign color for the network in (b). Supplementary Figure S2 (b) shows the same redox network, but with evolution scenario for all network nodes. Colors range from dark blue (more ancient) to dark orange (more recent). Red nodes have no annotation for evolutionary root.

# Supplementary Figure S3



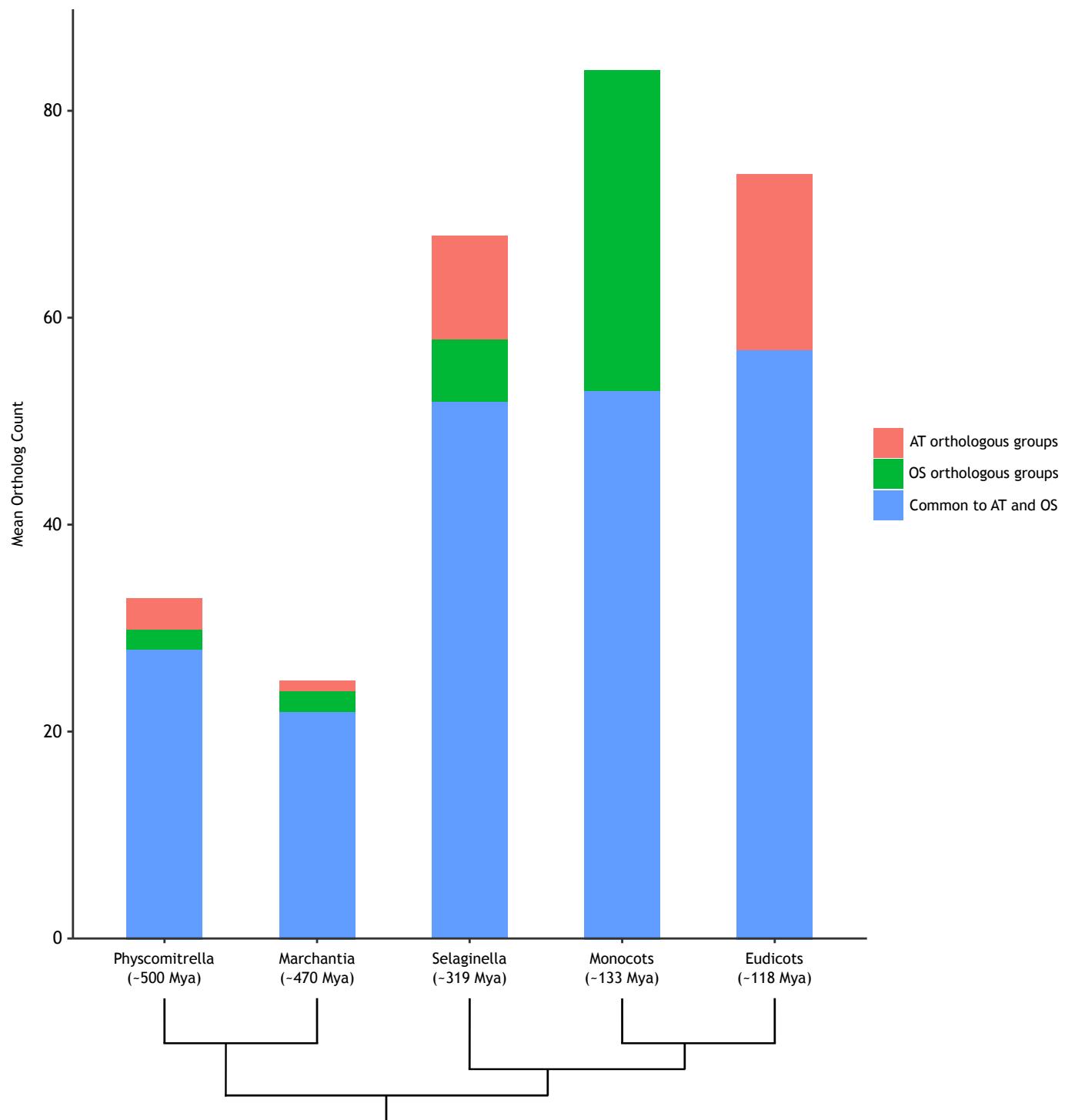
**Supplementary Figure S3:** Projection of evolutionary roots in the network. This figure shows how the redox network of *A. thaliana* have arised and organized its connections. Network organization ranging from more ancient proteins (dark blue, root 19) to more recent proteins (root 3, dark orange). Red nodes have no annotation for evolutionary root, and therefore accounted for root 0.

# Supplementary Figure S4



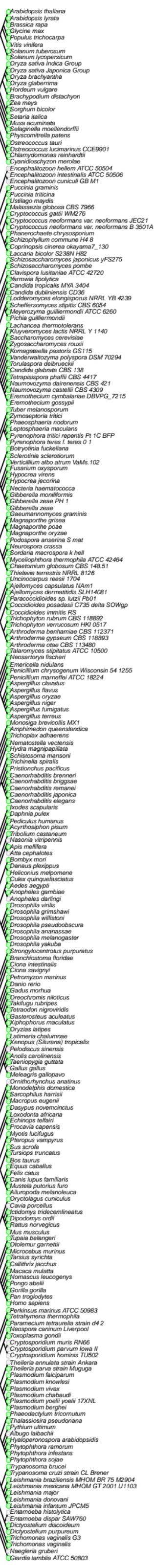
**Supplementary Figure S4:** Class III peroxidase abundance. (a) Shows a boxplot of the class III peroxidase abundance in each taxon analyzed. Eudicots were analyzed using orthologous groups obtained from STRING v10, using *A. thaliana* class III peroxidases as query. (b) Shows a boxplot of the class III peroxidase abundance in each taxon analyzed. Monocots were analyzed using orthologous groups obtained from STRING v10, using *O. sativa* class III peroxidases as query.

# Supplementary Figure S5

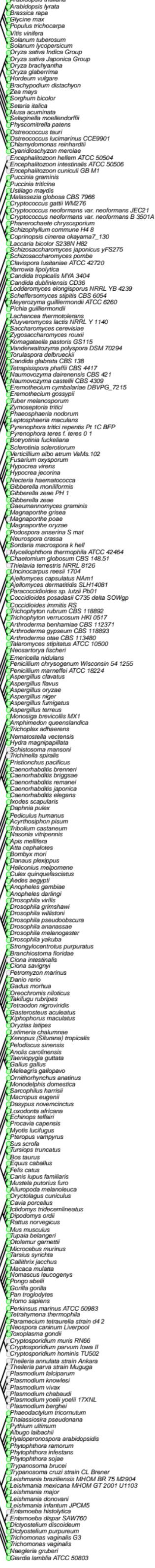


**Supplementary Figure S5:** Class III peroxidase orthologs abundance. Bars indicate the abundance of class III peroxidase isozymes by species of each taxonomic group (Marchantia polymorpha, Physcomitrella patens, Selaginella moellendorffii, Eudicots - 8 species, and Monocots - 10 species). Colors indicate whether the OG have *A. thaliana* orthologs (AT orthologous groups - pink), *O. sativa* orthologs (OS orthologous groups - green) or orthologs from both species (Common to AT and OS - blue). Dendrogram at the bottom shows the evolutionary relationship among the groups, and its estimated divergence times (in millions of years - Mya). Abundance is calculated as the mean of number of class III peroxidase orthologs divided by the gene count of each species.

# COG0175



# COG0225



OG presence

OG absence

Inferred root

Dscore = 0.953

Pvalue = 1.41e-08

AdjPvalue = 1.68e-06

# COG0234

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.976  
 Pvalue = 2.91e-07  
 AdjPValue = 3.46e-05

# COG0278

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.982  
 Pvalue = 1.56e-09  
 AdjPValue = 1.86e-07

*Giardia lamblia* ATCC 50803

# COG0369

● OG presence  
○ OG absence  
◆ Inferred root

OG presence

OG absence

Inferred root

Dscore = 0.982

Pvalue = 1.70e-09

AdjPValue = 2.02e-07

# COG0376

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.918  
 Pvalue = 1.69e-05  
 AdjPValue = 2.02e-03

# COG0386

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.883  
 Pvalue = 1.14e-05  
 AdjPValue = 1.36e-03

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Polygonum patens*
- *Ostreococcus tauri*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia triticina*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Clavispora lusitaniae ATCC 42720*
- *Aspergillus sydowii*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Loedderomyces elongisporus NRRRL YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRRRL Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetraplospora phaffii CBS 4417*
- *Naumovozyma dairensensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynifissypilum*
- *Tuber melanosporum*
- *Zymesporidium tritici*
- *Paesphaeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocreë virens*
- *Hypocreë jecorina*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Neurospora crassa*
- *Neurospora k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 148.51*
- *Thielavia terrestris NRRRL 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderra benhamiae CBS 112371*
- *Arthroderra gypseum CBS 118893*
- *Arthroderra otiae CBS 113480*
- *Galaromyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emerickella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemoproteus plasmodium*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petrosynopsis marinus*
- *Darwiniella reticulata*
- *Gedea morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodorus anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Cynips longiventris*
- *Locusta migratoria*
- *Echinops tellinii*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus idahoensis*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setiferus*
- *Microtus marmotinus*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iowa II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium vivax*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hyalellamorosa arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dictyostelium discoideum*
- *Dictyostelium purpureum*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

# COG0446

● OG presence  
○ OG absence  
◆ Inferred root

● *Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
● *Brassica rapa*  
● *Glycine max*  
● *Populus trichocarpa*  
● *Vitis vinifera*  
● *Solanum tuberosum*  
● *Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
● *Oryza brachyantha*  
● *Oryza glaberrima*  
● *Hordeum vulgare*  
● *Brachypodium distachyon*  
● *Zea mays*  
● *Sorghum bicolor*  
● *Setaria italica*  
● *Musa acuminata*  
● *Selaginella moellendorffii*  
● *Polygonum patens*  
● *Ostreococcus tauri*  
● *Ostreococcus lucimarinus CCE9901*  
● *Chlamydomonas reinhardtii*  
● *Cyanidioschyzon merolae*  
● *Encephalitozoon hellem ATCC 50504*  
● *Encephalitozoon intestinalis ATCC 50506*  
● *Encephalitozoon cuniculi GB M1*  
● *Puccinia graminis*  
● *Puccinia tritici*  
● *Ustilago maydis*  
● *Malassezia globosa CBS 7966*  
● *Cryptococcus gattii WM276*  
● *Cryptococcus neoformans var. neoformans JEC21*  
● *Cryptococcus neoformans var. neoformans B 3501A*  
● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Clavispora lusitaniae ATCC 42720*  
● *Yarrowia lipolytica*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Loedderomyces elongisporus NRR YB 4239*  
● *Schaffersomyces stipitis CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
● *Pichia guilliermondii*  
● *Lachancea thermotolerans*  
● *Kluyveromyces lactis NRR Y 1140*  
● *Saccharomyces cerevisiae*  
● *Zygosaccharomyces rouxii*  
● *Komagataella pastoris GS115*  
● *Vanderwaltozyma polyspora DSM 70294*  
● *Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetrapispora phaffii CBS 4417*  
● *Naumovozyma dairensis CBS 421*  
● *Naumovozyma castellii CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium corynephilum*  
● *Tuber melanosporum*  
● *Zymesporangia tritici*  
● *Paesophaenia nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocreë virens*  
● *Hypocreë jecorina*  
● *Nectria haematococca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gibberella zeae*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Neurospora crassa*  
● *Neurospora crassa k hell*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestris NRRL 8126*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderma benhamiae CBS 112371*  
● *Arthroderma gypseum CBS 118893*  
● *Arthroderma otiae CBS 113480*  
● *Calcaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emerickella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Xodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Haemaphysalis plumbea*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petrosynopsis marinus*  
● *Darwiniella reticulata*  
● *Gedea morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taenioptynx guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithodorus anatinus*  
● *Monodelphis domestica*  
● *Sarcophila harrisii*  
● *Macropus eugenii*  
● *Cynips longiventris*  
● *Locusta migratoria*  
● *Echinops tellima*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Alliropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Citellus tridecemlineatus*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Dolichorhynchus garnettii*  
● *Microtus caninus*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iwao II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium vivax*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylum tricoronatum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Alticus labachii*  
● *Hyalellaperonopsara arabiopisida*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania donovani*  
● *Entamoeba infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Dicytostelium discoideum*  
● *Dicytostelium purpureum*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

Dscore = 0.939

Pvalue = 1.10e-07

AdjPValue = 1.31e-05

OG presence

OG absence

Inferred root

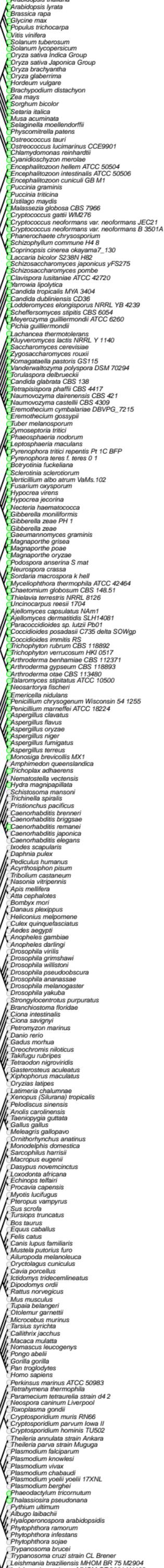
# COG0450

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 8.65e-10  
 AdjPValue = 1.03e-07

● OG presence  
○ OG absence  
◆ Inferred root

# COG0492



OG presence (green circle)

OG absence (grey circle)

Inferred root (red diamond)

Dscore = 0.846

Pvalue = 1.85e-05

AdjPValue = 2.20e-03

# COG0526



# COG0605

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Polygonum patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Claviceps fusiformis ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRRL YB 4239*  
*Schefersomyces stipitis CBS 6054*  
*Meyeromyza guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRRL Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetraplospora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castellii CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium corynifissypil*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Paesphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocreë virens*  
*Hypocreë jecorina*  
*Neecteria haematozocca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Aspergillus versicolor k hell*  
*Myceliophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRRL 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Calaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Xodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Homarus americanus*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petrosynopsis marinus*  
*Danae retic.*  
*Gedea morhua*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Oryzopsis cinerea*  
*Locusta africana*  
*Echinops tellmeri*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Alliropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Citellus tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Delocephalus garnettii*  
*Microtus caninus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iwao II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabiopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dicyostelium discoideum*  
*Dicyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

OG presence

OG absence

Inferred root

Dscore = 1

Pvalue = 1.80e-08

AdjPValue = 2.15e-06

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Osteosporascus suavei  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
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 Schizosaccharomyces pombe  
 Claviceps fusiformis ATCC 42720  
 Aspergillus fumigatus  
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 Candida dubliniensis CD36  
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 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetraplospora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
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 Eremothecium corynanthii  
 Tuber melanosporum  
 Zymoseptoria tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
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 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales jeckerina  
 Neclecta haematozucca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Galaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Hippocampus plum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananasae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Onychomys ozenicinctus  
 Loxodontia africana  
 Echinops telfairii  
 Procavia capensis  
 Myotis lucifugus  
 Peropus vampyrus  
 Sus scrofa  
 Turdus truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Alliropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Cidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Deltoptilus garnettii  
 Microtus arcticus  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.817  
 Pvalue = 8.13e-05  
 AdjPValue = 9.68e-03

# COG0695

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.894

Pvalue = 1.12e-05

AdjPValue = 1.34e-03

# COG0753

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.805  
 Pvalue = 2.61e-04  
 AdjPValue = 3.11e-02

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psathyrotes ramosissima*
- *Osteosarcocystis tauri*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia triticina*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Claviceps fusiformis ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Loedderomyces elongisporus NRRRL YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRRRL Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetraplospora phaffii CBS 4417*
- *Naumovozyma dairensensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynomyces*
- *Tuber melanosporum*
- *Zymesporangia tritici*
- *Paesphaeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocreë virens*
- *Hypocreë jecorina*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Neurospora crassa*
- *Neurospora crassa k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 148.51*
- *Thielavia terrestris NRRL 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderra benhamiae CBS 112371*
- *Arthroderra gypseum CBS 118893*
- *Arthroderra otiae CBS 113480*
- *Galaromyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emerickella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemaphysalis plumbea*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petrosynopsis marinus*
- *Danae reticulata*
- *Gedea morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodoros anatinus*
- *Monodelphis domestica*
- *Sarcophila harrisii*
- *Macropus eugenii*
- *Onychoprion anaemicus*
- *Locusta migratoria*
- *Echinops tellinii*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus tridecemlineatus*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus garnettii*
- *Microtus arcticus*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iwao II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hyalellaperonopsara arribidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dicyostelium discoideum*
- *Dicyostelium purpureum*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.825  
Pvalue = 1.51e-04  
AdjPvalue = 1.79e-02

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Polygonum patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
● *Puccinia graminis*  
● *Puccinia triticina*  
● *Ustilago maydis*  
● *Malassezia globosa CBS 7966*  
● *Cryptococcus gattii WM276*  
● *Cryptococcus neoformans var. neoformans JEC21*  
● *Cryptococcus neoformans var. neoformans B 3501A*  
● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_ 130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Claviceps fusiformis ATCC 42720*  
● *Aspergillus fumigatus*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Didymosphaeria elongisporus NRR YB 4239*  
● *Schaffersomyces stipitis CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
● *Pichia guilliermondii*  
● *Lachancea thermotolerans*  
● *Kluyveromyces lactis NRR Y 1140*  
● *Saccharomyces cerevisiae*  
● *Zygosaccharomyces rouxii*  
● *Komagataella pastoris GS115*  
● *Vanderwaltozyma polyspora DSM 70294*  
● *Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetraplospora phaffii CBS 4417*  
● *Naumovozyma dairensensis CBS 421*  
● *Naumovozyma castelli CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium corynifissypilum*  
● *Tuber melanosporum*  
● *Zymesporangia tritici*  
● *Phaeosphaeria nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocreë viridis*  
● *Hypocreë jecorina*  
● *Nectria haematococca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gibberella zeae*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Aspergillus versicolor k hell*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestris NRR 8126*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderra benhamiae CBS 112371*  
● *Arthroderra gypseum CBS 118893*  
● *Arthroderra otiae CBS 113480*  
● *Galaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emerickella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Ixodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Haemaphysalis plumbea*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petromyzon marinus*  
● *Danio rerio*  
● *Gadus morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithorhynchus anatinus*  
● *Monodelphis domestica*  
● *Sarcophilus harrisii*  
● *Macropus eugenii*  
● *Lagostoma lagostomus*  
● *Loxodontidae incinctus*  
● *Loxodonta africana*  
● *Echinops tellinii*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Ailuropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Ictidomys tridecemlineatus*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Odocoileus hemionus*  
● *Microtus marmotinus*  
● *Tarsus syrichta*  
● *Calithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iwao II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium vivax*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylus tricinctum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Altugia labachii*  
● *Hyalellaperonospira arabiopodis*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania donovani*  
● *Leishmania infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Dicyostelium discoideum*  
● *Dicyostelium purpureum*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

# COG1249

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Polygonum patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Claviceps fusiformis ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipitis CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetraplospora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castellii CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium corynifissypilum*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Paesphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocreë virens*  
*Hypocreë jecorina*  
*Neecteria haematozucca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora kuhnei*  
*Myceliophthora thermaphila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRRL 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Calcaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Xodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Haematopinus suis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petrosynurus marinus*  
*Danae rerio*  
*Gadus morhua*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Oryzopsis tridentata*  
*Locusta africana*  
*Echinops tellmeri*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Alliropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Citellus tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichorhynchus garnettii*  
*Microtus arcticus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iwao II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricinctum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dityostopium diodoidum*  
*Dityostopium surprium*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

Dscore = 0.981

Pvalue = 5.01e-08

AdjPValue = 5.96e-06



OG presence

OG absence

Inferred root

Dscore = 0.956

Pvalue = 2.14e-06

AdjPValue = 2.55e-04

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.71  
 Pvalue = 4.58e-04  
 AdjPValue = 5.46e-02

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Dyscophus antongilii*  
*Osteocephalus taurinus*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
● *Encephalitozoon hellem ATCC 50504*  
● *Encephalitozoon intestinalis ATCC 50506*  
● *Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
● *Puccinia tritici*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
● *Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Clavispora lusitaniae ATCC 42720*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Lodderomyces elongisporus NRR YB 4239*  
● *Schaffersomyces stipitis CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR Y 1140*  
● *Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetrapispora phaffii CBS 4417*  
● *Naumovozyma dairensensis CBS 421*  
● *Naumovozyma castelli CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium corynifissypilum*  
● *Tuber melanosporum*  
● *Zymesporidium tritici*  
● *Phaeosphaeria nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocrea virens*  
● *Hypocrejeconina*  
● *Nectria haematococca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gibberella zeae*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Aspergillus terreus k hell*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestrial NRR Y 1826*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderra benhamiae CBS 112371*  
● *Arthroderra gypsum CBS 118893*  
● *Arthroderra otiae CBS 113480*  
● *Talaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emmericella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Xodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Haemoproteus plasmodium*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petromyzon marinus*  
● *Danio rerio*  
● *Gadus morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithodorus anatinus*  
● *Monodelphis domestica*  
● *Sarcophila harrisii*  
● *Macropus eugenii*  
● *Cercopithecus cebus*  
● *Colobus polykomos*  
● *Colobus africanus*  
● *Echinops telfairii*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Alliropoda melanoleuca*  
● *Cryctolagus cuniculus*  
● *Cavia porcellus*  
● *Citellus idahoensis*  
● *Citellus idahoensis*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Dolichorhynchus garnettii*  
● *Microtus canadensis*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iowa II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium vivax*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylus tricinctum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Alticus labachii*  
● *Hydroperonospora arabidopsis*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania donovani*  
● *Entamoeba infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Dictyostelium discoideum*  
● *Dictyostelium purpureum*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.722  
Pvalue = 3.39e-03  
AdjPValue = 4.04e-01

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psathyrotes ramosissima*
- *Ostreococcus tauri*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia tritici*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Clavispora lusitaniae ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Lodderomyces elongisporus NRRRL YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRRRL Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetrapispora phaffii CBS 4417*
- *Naumovozyma dairensensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynifissypilum*
- *Tuber melanosporum*
- *Zymoseptoria tritici*
- *Phaeosphaeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocreë virens*
- *Hypocreë jeckerina*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Aspergillus terreus k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 148.51*
- *Thielavia terrestris NRRRL 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderma benhamiae CBS 112371*
- *Arthroderma gypseum CBS 118893*
- *Arthroderma otiae CBS 113480*
- *Talaromyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emmericella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemoproteus canis plumbi*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petrosynopsis marinus*
- *Danae reticulata*
- *Gedea morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodoros anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Onychoprion anaemicus*
- *Locusta migratoria*
- *Echinops tellima*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus idahoensis*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setifrons*
- *Microtus marmotinus*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iowa II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylum tricoronatum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hydroperonospora arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Entamoeba infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dictyostelium discoideum*
- *Ditylum fulgens*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

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 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Psathyrotes ramosissima  
 Osteospermum ecklonis  
 Osteococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Claviceps fusiformis ATCC 42720  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castellii CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium corynanthii  
 Tuber melanosporum  
 Zymoseptoria tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocreë virens  
 Hypocreë jecorina  
 Neclecta haematozucca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Monascus ruber sp. k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Ocularomyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emericella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Xodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Hippocampus sp.  
 Tribolium castaneum  
 Nasonia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taenioptynx guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Onychomys oçincinctus  
 Loxodontia africana  
 Echinops telfairii  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Turdus truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Alliropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Cidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Delphinus delphis  
 Microtus arcticus  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
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 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.76  
 Pvalue = 1.46e-03  
 AdjPValue = 1.73e-01

Dscore = 0.76  
 Pvalue = 1.46e-03  
 AdjPValue = 1.73e-01

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.826  
 Pvalue = 1.18e-04  
 AdjPvalue = 1.41e-02

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Psathyrotes ramosissima*  
*Ostreococcus tauri*  
● *Ostreococcus lucimarinus CCE9901*  
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● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_ 130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces pombe*  
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● *Aspergillus fumigatus*  
● *Candida tropicalis MYA 3404*  
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● *Schefersomyces stipitis CBS 6054*  
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● *Pichia guilliermondii*  
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● *Kluyveromyces lactis NRR Y 1140*  
● *Saccharomyces cerevisiae*  
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● *Zygosporangium tritici*  
● *Phaeosphaeria nodorum*  
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● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
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● *Sclerotinia sclerotiorum*  
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● *Fusarium oxysporum*  
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● *Hypocreë jecorina*  
● *Nectria haematococca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Neurospora kuhnei*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestris NRRL 8126*  
● *Uncinocarpus reesii 1704*  
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● *Ajellomyces dermatitidis SLH14081*  
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● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderra benhamiae CBS 112371*  
● *Arthroderra gypseum CBS 118893*  
● *Arthroderra otiae CBS 113480*  
● *Galaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emerickella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Ixodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Anthonomus grandis*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petromyzon marinus*  
● *Danio rerio*  
● *Gadus morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Galus galus*  
● *Meleagris gallopavo*  
● *Ornithorhynchus anatinus*  
● *Monodelphis domestica*  
● *Sarcophilus harrisii*  
● *Macropus eugenii*  
● *Lagostoma cinctum*  
● *Locusta migratoria*  
● *Echinops tellinii*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Ailuropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Ictidomys tridecemlineatus*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Odocoileus hemionus*  
● *Microtus canadensis*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iowa II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylum tricoronatum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Alticus labachii*  
● *Hydroperonospora arabidopsis*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Dityostilium diatomoides*  
● *Dityostilium surpense*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
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 Oryza glaberrima  
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 Aedes aegypti  
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Dscore = 0.844  
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 AdjPValue = 1.51e-02

# COG3794

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*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Physcomitrella patens*  
*Osmunda cinnamomea*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematozoecca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus arcticus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowia II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence

◆ Inferred root

Dscore = 0.989

Pvalue = 1.03e-05

AdjPValue = 1.22e-03

# COG4243

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Osteosporascus suavei  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus sydowii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRRL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus terreus k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Cedrus morhuza  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Dipodomys cinctus  
 Loxodonta africana  
 Echinops tellinii  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium yoelii  
 Phaeodactylum tricornutum  
 Phalaenopsis pseudonana  
 Python ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.956  
 Pvalue = 2.11e-05  
 AdjPValue = 2.51e-03

# COG5119

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.793  
 Pvalue = 6.78e-04  
 AdjPValue = 8.07e-02

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Oryzopsis matthaei  
 Osteosarcocystis tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia tritici  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Claviceps fusiformis ATCC 42720  
 Aspergillus fumigatus  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRR Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetraplospora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium corynifilum  
 Tuber melanosporum  
 Zymoseptoria tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea virens  
 Hypocrejeccinina  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus terreus k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 114.51  
 Thielavia terrestrial NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
● Nematorella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
● xodes scapularis  
● Daphnia pulex  
 Pediculus humanus  
 Hippocampus plum  
● Tribolium castaneum  
 Nasonia vitripennis  
 Apis mellifera  
● Atta cephalotes  
● Bombyx mori  
● Danaus plexippus  
● Heliconius melpomene  
● Culex quinquefasciatus  
● Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
● Drosophila virilis  
● Drosophila grimshawi  
● Drosophila willistoni  
● Drosophila pseudoobscura  
● Drosophila ananassae  
● Drosophila melanogaster  
● Drosophila yakuba  
● Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
● Oreochromis niloticus  
● Takifugu rubripes  
● Tetraodon nigroviridis  
● Gasterosteus aculeatus  
● Xiphophorus maculatus  
● Oryzias latipes  
● Latimeria chalumnae  
● Xenopus (Silurana) tropicalis  
● Pelodiscus sinensis  
● Anolis carolinensis  
● Taeniopygia guttata  
● Gallus gallus  
● Meleagris gallopavo  
● Ornithodoros anatinus  
● Monodelphis domestica  
● Sarcophilus harrisii  
● Macropus eugenii  
● Dasypus neglectus  
● Dasypoda australis  
● Echinops tellinii  
● Procavia capensis  
● Myotis lucifugus  
● Pteropus vampyrus  
● Sus scrofa  
● Turcicus truncatus  
● Bos taurus  
● Equus caballus  
● Felis catus  
● Canis lupus familiaris  
● Mustela putorius furo  
● Alliropoda melanoleuca  
● Oryctolagus cuniculus  
● Cavia porcellus  
● Cidomys tridecemlineatus  
● Dipodomys ordii  
● Rattus norvegicus  
● Mus musculus  
● Tupaia belangeri  
● Deltoptilus garnettii  
● Microtus caninus  
● Tarsius syrichta  
● Callithrix jacchus  
● Macaca mulatta  
● Nomascus leucogenys  
● Pongo abelii  
● Gorilla gorilla  
● Pan troglodytes  
● Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iwao II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
● Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

# COG5601

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.913  
 Pvalue = 3.07e-06  
 AdjPValue = 3.65e-04

● *Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
● *Brassica rapa*  
● *Glycine max*  
● *Populus trichocarpa*  
● *Vitis vinifera*  
● *Solanum tuberosum*  
● *Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
● *Oryza brachyantha*  
● *Oryza glaberrima*  
● *Hordeum vulgare*  
● *Brachypodium distachyon*  
● *Zea mays*  
● *Sorghum bicolor*  
● *Setaria italica*  
● *Musa acuminata*  
● *Selaginella moellendorffii*  
● *Ptychosperma patens*  
● *Osteosporascus suave*  
● *Ostreococcus lucimarinus CCE9901*  
● *Chlamydomonas reinhardtii*  
● *Cyanidioschyzon merolae*  
● *Encephalitozoon hellem ATCC 50504*  
● *Encephalitozoon intestinalis ATCC 50506*  
● *Encephalitozoon cuniculi GB M1*  
● *Puccinia graminis*  
● *Puccinia triticina*  
● *Ustilago maydis*  
● *Malassezia globosa CBS 7966*  
● *Cryptococcus gattii WM276*  
● *Cryptococcus neoformans var. neoformans JEC21*  
● *Cryptococcus neoformans var. neoformans B 3501A*  
● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Clavispora lusitaniae ATCC 42720*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Loedderomyces elongisporus NRRL YB 4239*  
● *Schaffersomyces stipitis CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
● *Pichia guilliermondii*  
● *Lachancea thermotolerans*  
● *Kluyveromyces lactis NRRL Y 1140*  
● *Saccharomyces cerevisiae*  
● *Zygosaccharomyces rouxii*  
● *Komagataella pastoris GS115*  
● *Vanderwaltozyma polyspora DSM 70294*  
● *Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetraplospora phaffii CBS 4417*  
● *Naumovozyma dairensensis CBS 421*  
● *Naumovozyma castellii CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium corynifissypil*  
● *Tuber melanosporum*  
● *Zymoseptoria tritici*  
● *Phaeosphaeria nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocreë virens*  
● *Hypocreë jecorina*  
● *Nectria haematozucca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Monilia fructigena k hell*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestris NRRL 8126*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderra benhamiae CBS 112371*  
● *Arthroderra gypseum CBS 118893*  
● *Arthroderra otiae CBS 113480*  
● *Galaromyces stipitatis ATCC 10500*  
● *Neosartorya fischeri*  
● *Emmericella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Xodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Haematopinus suis*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petrosynopsis marinus*  
● *Darwiniella reticulata*  
● *Gedea morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithodorus anatinus*  
● *Monodelphis domestica*  
● *Sarcophila harrisii*  
● *Macropus eugenii*  
● *Cynips longiventris*  
● *Locusta migratoria*  
● *Echinops tellima*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Alliropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Citellus tridecemlineatus*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Dolichorhynchus garnettii*  
● *Microtus caninus*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iowa II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium vivax*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylum tricinctum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Alticus labachii*  
● *Hyalellaperonospira arabiopisida*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SWA760*  
● *Ditylomyces ditylomoides*  
● *Ditylomyces surinamense*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

# NOG00684

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.932  
 Pvalue = 6.40e-07  
 AdjPValue = 7.62e-05

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Polygonum patens*  
*Osteospermum eckloniae*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Claviceps fusiformis ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipitis CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetraplospora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castellii CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium corynifissypil*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Paesphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocreë virens*  
*Hypocreë jecorina*  
*Neecteria haematozocca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora kuhnei*  
*Myceliophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRRL 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Galaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Xodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Haematopinus suis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petrosynurus marinus*  
*Danae retic.*  
*Gadus morhua*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Oryzopsis tridentata*  
*Locusta africana*  
*Echinops tellmeri*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Alliropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Citellus idiomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus arcticus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dicyostelium discoideum*  
*Dicyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG01122

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.97  
 Pvalue = 7.42e-08  
 AdjPValue = 8.83e-06

# NOG02511

Phylogenetic tree illustrating the distribution of OG presence (green) and OG absence (grey) across various organisms. The tree is rooted at a red diamond. A legend indicates: OG presence (green circle), OG absence (grey circle), and Inferred root (red diamond).

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomyces reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavicipitaria lausitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Ustilago melanocephala*
- Zymesporangium spissipilum*
- Zymesporangium tritici*
- Phaeospheeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocrea viridis*
- Hypocreales jeckeriae*
- Neecteria haematozocca*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Aspergillus terreus k hell*
- Mycelopitho thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestrial NRRL 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Xodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Deinococcus roseum*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Darwinula reticulata*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Locusta migratoria*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Alliropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Citellus tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Galago senegalensis*
- Microtus arcticus*
- Tarsius syrichta*
- Calithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Hallassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dicyostelium disjunctum*
- Dicyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence (green circle)

OG absence (grey circle)

Inferred root (red diamond)

Dscore = 0.73

Pvalue = 1.36e-03

AdjPValue = 1.62e-01

# NOG04600

● OG presence  
○ OG absence  
◆ Inferred root

● *Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
● *Brassica rapa*  
● *Glycine max*  
● *Populus trichocarpa*  
● *Vitis vinifera*  
● *Solanum tuberosum*  
● *Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
● *Oryza brachyantha*  
● *Oryza glaberrima*  
● *Hordeum vulgare*  
● *Brachypodium distachyon*  
● *Zea mays*  
● *Sorghum bicolor*  
● *Setaria italica*  
● *Musa acuminata*  
● *Selaginella moellendorffii*  
● *Ptychosperma patens*  
● *Osteospermum eury*  
● *Ostreococcus lucimarinus CCE9901*  
● *Chlamydomonas reinhardtii*  
● *Cyanidioschyzon merolae*  
● *Encephalitozoon hellem ATCC 50504*  
● *Encephalitozoon intestinalis ATCC 50506*  
● *Encephalitozoon cuniculi GB M1*  
● *Puccinia graminis*  
● *Puccinia triticina*  
● *Ustilago maydis*  
● *Malassezia globosa CBS 7966*  
● *Cryptococcus gattii WM276*  
● *Cryptococcus neoforms var. neoforms JEC21*  
● *Cryptococcus neoforms var. neoforms B 3501A*  
● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Claviceps fusiformis ATCC 42720*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Lodderomyces elongisporus NRR YB 4239*  
● *Schaffersomyces stipitis CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
● *Pichia guilliermondii*  
● *Lachancea thermotolerans*  
● *Kluyveromyces lactis NRR Y 1140*  
● *Saccharomyces cerevisiae*  
● *Zygosaccharomyces rouxii*  
● *Komagataella pastoris GS115*  
● *Vanderwaltozyma polyspora DSM 70294*  
● *Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetrapispora phaffii CBS 4417*  
● *Naumovozyma dairensensis CBS 421*  
● *Naumovozyma castellii CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium corynomyces*  
● *Tuber melanosporum*  
● *Zymoseptoria tritici*  
● *Phaeosphaeria nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocrea virens*  
● *Hypocrejeconina*  
● *Nectria haematozoe*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gibberella zeae*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Aspergillus terreus k hell*  
● *Myceliophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 8126*  
● *Thielavia terrestris NRR Y 148.51*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderra benhamiae CBS 112371*  
● *Arthroderra gypseum CBS 118893*  
● *Arthroderra otiae CBS 113480*  
● *Talaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emmericella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Xodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Haematopinus suis*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petromyzon marinus*  
● *Darwiniella reticulata*  
● *Gedea morhua*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithodorus anatinus*  
● *Monodelphis domestica*  
● *Sarcophilus harrisii*  
● *Macropus eugenii*  
● *Onychoprion anaemicus*  
● *Locusta migratoria*  
● *Echinops telfairii*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Alliropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Citellus idahoensis*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Dolichorhynchus setifrons*  
● *Microtus canadensis*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iowa II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium vivax*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylus tricinctum*  
● *Thalassiosira pseudonana*  
● *Pythium ultimum*  
● *Altigo labachii*  
● *Hydroperonospora arabidopsis*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania donovani*  
● *Leishmania infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Ditylomyces ditylomycetum*  
● *Trichomonas muris*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

Dscore = 0.807

Pvalue = 1.05e-04

AdjPValue = 1.25e-02

OG presence

OG absence

Inferred root

# NOG06748

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.828  
 Pvalue = 1.31e-04  
 AdjPValue = 1.56e-02

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psathyrotes ramosissima*
- *Osteospermum ecklonis*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia tritici*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_ 130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Clavispora lusitaniae ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Lodderomyces elongisporus NRR YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRR Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetrapispora phaffii CBS 4417*
- *Naumovozyma dairensensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynephilum*
- *Tuber melanosporum*
- *Zymoseptoria tritici*
- *Phaeosphaeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocrea virens*
- *Hypocrejeconina*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gibberella zeae*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Aspergillus terreus k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 148.51*
- *Thielavia terrestris NRR Y 1826*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderra benhamiae CBS 112371*
- *Arthroderra gypseum CBS 118893*
- *Arthroderra otiae CBS 113480*
- *Talaromyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emmericella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus carbonarius*
- *Aspergillus ochraceo*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemoproteus plasmodium*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petrotrichon marinus*
- *Darevskia reticulata*
- *Gadus morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodorus anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Onychoprion anaemicus*
- *Condylura africana*
- *Echinops telfairi*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus tridecemlineatus*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setifrons*
- *Microtus arcticus*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iwao II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hyalellamorosa arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dictyostelium discoideum*
- *Didymosphaera eupora*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

# NOG07211

Phylogenetic tree illustrating the distribution of Organellar Genes (OG) across various species. The tree is rooted at a red diamond. Nodes are colored green for OG presence and grey for OG absence. A legend at the bottom left defines the colors.

- OG presence
- OG absence
- ◆ Inferred root

Detailed list of species included in the tree:

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osmunda cinnamomea*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisporina phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporidium tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowia II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence (green dot)

OG absence (grey dot)

Inferred root (red diamond)

Dscore = 1

Pvalue = 5.48e-06

AdjPValue = 6.52e-04

# NOG07766

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.741  
 Pvalue = 2.46e-03  
 AdjPValue = 2.93e-01

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psilotum nudum*
- *Psilotum polystachys*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia tritici*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces pombe*
- *Schizosaccharomyces japonicus yFS275*
- *Clavispora lusitaniae ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Lodderomyces elongisporus NRRRL YB 4239*
- *Schefersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRRRL Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetrapispora phaffii CBS 4417*
- *Naumovozyma dairensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynifissypilum*
- *Tuber melanosporum*
- *Zygosporina tritici*
- *Phaeospheeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocreë virens*
- *Hypocreë jeckeriae*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gibberella zeae*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Neurospora crassa*
- *Neurospora crassa*
- *Mycelopeltis thermophila ATCC 42464*
- *Chaetomium globosum CBS 148.51*
- *Thielavia terrestris NRRRL 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderra benhamiae CBS 112371*
- *Arthroderra gypseum CBS 118893*
- *Arthroderra otiae CBS 113480*
- *Ocularomyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emmericella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemaphysalis plumbea*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petrosynopsis marinus*
- *Danae reticulata*
- *Gedea morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodorus anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Onychoprion anaemicus*
- *Locusta migratoria*
- *Echinops telfairii*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus idahoensis*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setifrons*
- *Microtus canadensis*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iwao II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hyalellamorosa arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dictyostelium discoideum*
- *Dictyostelium purpureum*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

# NOG101992

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade on the left and a more diverse group on the right.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporascus suave*
- Ostreococcus lucimarinus* CCE9901
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem* ATCC 50504
- Encephalitozoon intestinalis* ATCC 50506
- Encephalitozoon cuniculi* GB M1
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa* CBS 7966
- Cryptococcus gattii* WM276
- Cryptococcus neoformans* var. *neoformans* JEC21
- Cryptococcus neoformans* var. *neoformans* B 3501A
- Phanerochaete chrysosporium*
- Schizophyllum commune* H4 8
- Coprinopsis cinerea* okayama7\_130
- Laccaria bicolor* S238N H82
- Schizosaccharomyces japonicus* yFS275
- Schizosaccharomyces pombe*
- Clavispora lusitaniae* ATCC 42720
- Candida tropicalis* MYA 3404
- Candida dubliniensis* CD36
- Lodderomyces elongisporus* NRR L YB 4239
- Schefersomyces stipiti* CBS 6054
- Meyeromyza guilliermondii* ATCC 6260
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis* NRR L Y 1140
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris* GS115
- Vanderwaltozyma polyspora* DSM 70294
- Torulaspora delbrueckii*
- Candida glabrata* CBS 138
- Tetrapispora phaffii* CBS 4417
- Naumovozyma dairensensis* CBS 421
- Naumovozyma castelli* CBS 4309
- Eremothecium cymbalariae* DBVPG\_7215
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens* Pt 1C BFP
- Pyrenophora teres* f. *teres* 0 1
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum* VaMs.102
- Fusarium oxysporum*
- Hypocrea viridis*
- Hypocreales*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae* PH 1
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina* S mat
- Neurospora crassa*
- Aspergillus terreus* k hell
- Mycelopithophora thermophila* ATCC 42464
- Chaetomium globosum* CBS 148.51
- Thielavia terrestris* NRR L 8126
- Uncinocarpus reesii* 1704
- Ajellomyces capsulatus* NAm1
- Ajellomyces dermatitidis* SLH14081
- Paracoccidioides* sp. lutzi Pb01
- Coccidioides posadasii* C735 delta SOWgp
- Coccidioides immitis* RS
- Trichophyton rubrum* CBS 118892
- Trichophyton verrucosum* HKI 0517
- Arthroderma benhamiae* CBS 112371
- Arthroderma gypseum* CBS 118893
- Arthroderma otiae* CBS 113480
- Talaromyces stipitatus* ATCC 10500
- Neosartorya fischeri*
- Emmericella nidulans*
- Penicillium chrysogenum* Wisconsin 54 1255
- Penicillium marneffei* ATCC 18224
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis* MX1
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus* ATCC 50983
- Tetrahymena thermophila*
- Paramecium tetraurelia* strain d4 2
- Neospora caninum* Liverpool
- Toxoplasma gondii*
- Cryptosporidium muris* RN66
- Cryptosporidium parvum* Iowa II
- Cryptosporidium hominis* TU502
- Theileria annulata* strain Ankara
- Theileria parva* strain Muguga
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii* yoelii 17XNL
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi* strain CL Brener
- Leishmania brasiliensis* MHOM BR 75 M2904
- Leishmania mexicana* MHOM GT 2001 U1103
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum* JPCM5
- Entamoeba histolytica*
- Entamoeba dispar* SAW760
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis* G3
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia* ATCC 50803

OG presence

OG absence

Inferred root

Dscore = 0.889

Pvalue = 1.03e-04

AdjPValue = 1.22e-02

# NOG10297

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.839  
 Pvalue = 2.16e-04  
 AdjPValue = 2.57e-02

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psathyrotes ramosissima*
- *Osteospermum ecklonis*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia tritici*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_ 130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Clavispora lusitaniae ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Lodderomyces elongisporus NRRRL YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRRRL Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetraplospora phaffii CBS 4417*
- *Naumovozyma dairensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynomyces*
- *Tuber melanosporum*
- *Zymoseptoria tritici*
- *Phaeosphaeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocrea virens*
- *Hypocrejeconina*
- *Nectria haematococca*
- *Gibberella moniliiformis*
- *Gibberella zeae PH 1*
- *Gibberella zeae*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Aspergillus terreus k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 8126*
- *Thielavia terrestris NRRRL 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderra benhamiae CBS 112371*
- *Arthroderra gypsum CBS 118893*
- *Arthroderra otiae CBS 113480*
- *Talaromyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emmericella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Xodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemoproteus plasmodium*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petromyzon marinus*
- *Danio rerio*
- *Gadus morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodorus anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Cercopithecus cebus*
- *Colobus polykomos*
- *Colobus africanus*
- *Echinops telfairii*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus idahoensis*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setifrons*
- *Microtus canadensis*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iwao II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Alticus labachii*
- *Hyalellamorosa arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dityostopla discoidium*
- *Dicyostelium purpureum*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

# NOG11768



OG presence  
OG absence  
Inferred root

Dscore = 0.658  
Pvalue = 7.58e-04  
AdjPValue = 9.02e-02

# NOG121808

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.944  
 Pvalue = 1.56e-05  
 AdjPvalue = 1.86e-03

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Thlaspiella moellendorffii*
- Physcomitrium patens*
- Ostreococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowia II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricornutum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

- OG presence
  - OG absence
  - ◆ Inferred root
- Dscore = 0.944  
 Pvalue = 1.56e-05  
 AdjPvalue = 1.86e-03

# NOG122617

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent organisms where the Outgroup (OG) was present, while grey circles represent where it was absent. The tree shows a dense cluster of eukaryotes, with a prominent clade on the left containing plants like Arabidopsis thaliana, Brassica rapa, and Oryza sativa. Another large clade on the right includes fungi such as Aspergillus fumigatus, Trichophyton rubrum, and various species of Candida. The tree also branches into protists and bacteria. A legend at the bottom defines the symbols: a green circle for OG presence, a grey circle for OG absence, and a red diamond for the inferred root.

- OG presence
- OG absence
- Inferred root

Dscore = 1  
Pvalue = 6.42e-06  
AdjPvalue = 7.63e-04

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Thlaspiella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisporra phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium corynifissypilum  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turkiops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hyaloperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 6.42e-06  
AdjPvalue = 7.63e-04

# NOG123237

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagnicella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora intermedia k hell  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonta africana  
Echinops tellmeri  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogaster  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
Pvalue = 1.26e-05  
AdjPValue = 1.50e-03

# NOG123538

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade on the left and a more diverse group on the right.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Thlaspiella moellendorffii*
- Physcomitrium patens*
- Osteosporus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
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- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
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- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L 1140*
- Saccharomyces cerevisiae*
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- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
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- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
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- Coccidioides posadasii C735 delta SOWgp*
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- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microcebus murinus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence  
Inferred root

Dscore = 0.993  
Pvalue = 9.81e-06  
AdjPValue = 1.17e-03

# NOG123647

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Setaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavispora lusitaniae ATCC 42720  
 Debaryomyces hansenii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR L YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRR L Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus terreus k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRR L 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
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 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Cedrus morhuza  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Dasyurus maculatus  
 Loxodontia africana  
 Echinops tellinii  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
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 Perkinsus marinus ATCC 50983  
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 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
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 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.952  
 Pvalue = 2.01e-05  
 AdjPValue = 2.39e-03

# NOG124136

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
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 Chlamydomonas reinhardtii  
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 Schizosaccharomyces pombe  
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 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor K hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Cedrus morhuza  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Dasyurus maculatus  
 Loxodontia africana  
 Echinops tellinii  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.889  
 Pvalue = 4.43e-05  
 AdjPValue = 5.27e-03

# NOG124919

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent organisms where the Outgroup (OG) was present, while grey circles represent where it was absent. The tree shows a dense cluster of eukaryotes, with a prominent clade on the right side.

- OG presence (green circles):**
  - Arabidopsis thaliana
  - Arabidopsis lyrata
  - Brassica rapa
  - Glycine max
  - Populus trichocarpa
  - Vitis vinifera
  - Solanum tuberosum
  - Solanum lycopersicum
  - Oryza sativa Indica Group
  - Oryza sativa Japonica Group
  - Oryza brachyantha
  - Oryza glaberrima
  - Hordeum vulgare
  - Brachypodium distachyon
  - Zea mays
  - Sorghum bicolor
  - Setaria italica
  - Musa acuminata
  - Selaginella moellendorffii
  - Physcomitrium patens
  - Ostreococcus tauri
  - Ostreococcus lucimarinus CCE9901
  - Chlamydomonas reinhardtii
  - Cyanidioschyzon merolae
  - Encephalitozoon hellem ATCC 50504
  - Encephalitozoon intestinalis ATCC 50506
  - Encephalitozoon cuniculi GB M1
  - Puccinia graminis
  - Puccinia triticina
  - Ustilago maydis
  - Malassezia globosa CBS 7966
  - Cryptococcus gattii WM276
  - Cryptococcus neoformans var. neoformans JEC21
  - Cryptococcus neoformans var. neoformans B 3501A
  - Phanerochaete chrysosporium
  - Schizophyllum commune H4 8
  - Coprinopsis cinerea okayama7\_130
  - Laccaria bicolor S238N H82
  - Schizosaccharomyces japonicus yFS275
  - Schizosaccharomyces pombe
  - Clavispora lusitaniae ATCC 42720
  - Candida tropicalis MYA 3404
  - Candida dubliniensis CD36
  - Lodderomyces elongisporus NRR L YB 4239
  - Schefersomyces stipiti CBS 6054
  - Meyerozyma guilliermondii ATCC 6260
  - Pichia guilliermondii
  - Lachancea thermotolerans
  - Kluyveromyces lactis NRR L Y 1140
  - Saccharomyces cerevisiae
  - Zygosaccharomyces rouxii
  - Komagataella pastoris GS115
  - Vanderwaltozyma polyspora DSM 70294
  - Torulaspora delbrueckii
  - Candida glabrata CBS 138
  - Tetrapisispora phaffii CBS 4417
  - Naumovozyma dairensensis CBS 421
  - Naumovozyma castelli CBS 4309
  - Eremothecium cymbalariae DBVPG\_7215
  - Eremothecium coryniforme
  - Tuber melanosporum
  - Zymesporangia tritici
  - Phaeosphaeria nodorum
  - Leptosphaeria maculans
  - Pyrenophora tritici repens Pt 1C BFP
  - Pyrenophora teres f. teres 0 1
  - Botryotinia fuckeliana
  - Sclerotinia sclerotiorum
  - Verticillium albo atrum VaMs.102
  - Fusarium oxysporum
  - Hypocrea viridis
  - Hypocrea jecorina
  - Nectria haematococca
  - Gibberella moniliiformis
  - Gibberella zeae PH 1
  - Gibberella zeae
  - Gaeumannomyces graminis
  - Magnaporthe grisea
  - Magnaporthe poae
  - Magnaporthe oryzae
  - Podospora anserina S mat
  - Neurospora crassa
  - Neurospora crassa k hell
  - Mycelopithophora thermophila ATCC 42464
  - Chaetomium globosum CBS 148.51
  - Thielavia terrestris NRR L 8126
  - Uncinocarpus reesii 1704
  - Ajellomyces capsulatus NAm1
  - Ajellomyces dermatitidis SLH14081
  - Paracoccidioides sp. lutzi Pb01
  - Coccidioides posadasii C735 delta SOWgp
  - Coccidioides immitis RS
  - Trichophyton rubrum CBS 118892
  - Trichophyton verrucosum HKI 0517
  - Arthroderma benhamiae CBS 112371
  - Arthroderma gypseum CBS 118893
  - Arthroderma otiae CBS 113480
  - Talaromyces stipitatus ATCC 10500
  - Neosartorya fischeri
  - Emericella nidulans
  - Penicillium chrysogenum Wisconsin 54 1255
  - Penicillium marneffei ATCC 18224
  - Aspergillus clavatus
  - Aspergillus flavus
  - Aspergillus oryzae
  - Aspergillus niger
  - Aspergillus fumigatus
  - Aspergillus terreus
  - Monosiga brevicollis MX1
  - Amphimedon queenslandica
  - Trichoplax adhaerens
  - Nematostella vectensis
  - Hydra magnipapillata
  - Schistosoma mansoni
  - Trichinella spiralis
  - Pristionchus pacificus
  - Caenorhabditis brenneri
  - Caenorhabditis briggsae
  - Caenorhabditis remanei
  - Caenorhabditis japonica
  - Caenorhabditis elegans
  - Ixodes scapularis
  - Daphnia pulex
  - Pediculus humanus
  - Apion elongatum pilosum
  - Tribolium castaneum
  - Nasonia vitripennis
  - Apis mellifera
  - Atta cephalotes
  - Bombyx mori
  - Danaus plexippus
  - Heliconius melpomene
  - Culex quinquefasciatus
  - Aedes aegypti
  - Anopheles gambiae
  - Anopheles darlingi
  - Drosophila virilis
  - Drosophila grimshawi
  - Drosophila willistoni
  - Drosophila pseudoobscura
  - Drosophila ananassae
  - Drosophila melanogaster
  - Drosophila yakuba
  - Strongylocentrotus purpuratus
  - Branchiostoma floridae
  - Ciona intestinalis
  - Ciona savignyi
  - Petromyzon marinus
  - Danio rerio
  - Cedrus morhuza
  - Oreochromis niloticus
  - Takifugu rubripes
  - Tetraodon nigroviridis
  - Gasterosteus aculeatus
  - Xiphophorus maculatus
  - Oryzias latipes
  - Latimeria chalumnae
  - Xenopus (Silurana) tropicalis
  - Pelodiscus sinensis
  - Anolis carolinensis
  - Taeniopygia guttata
  - Gallus gallus
  - Meleagris gallopavo
  - Ornithodorus anatinus
  - Monodelphis domestica
  - Sarcophilus harrisii
  - Macropus eugenii
  - Dasyurus maculatus
  - Lorcinia africana
  - Echinops tellinii
  - Procavia capensis
  - Myotis lucifugus
  - Pteropus vampyrus
  - Sus scrofa
  - Tursiops truncatus
  - Bos taurus
  - Equus caballus
  - Felis catus
  - Canis lupus familiaris
  - Mustela putorius furo
  - Ailuropoda melanoleuca
  - Oryctolagus cuniculus
  - Cavia porcellus
  - Ictidomys tridecemlineatus
  - Dipodomys ordii
  - Rattus norvegicus
  - Mus musculus
  - Tupaia belangeri
  - Dolichur garnettii
  - Microtus leucogaster
  - Tarsius syrichta
  - Callithrix jacchus
  - Macaca mulatta
  - Nomascus leucogenys
  - Pongo abelii
  - Gorilla gorilla
  - Pan troglodytes
  - Homo sapiens
  - Perkinsus marinus ATCC 50983
  - Tetrahymena thermophila
  - Paramecium tetraurelia strain d4 2
  - Neospora caninum Liverpool
  - Toxoplasma gondii
  - Cryptosporidium muris RN66
  - Cryptosporidium parvum Iwao II
  - Cryptosporidium hominis TU502
  - Theileria annulata strain Ankara
  - Theileria parva strain Muguga
  - Plasmodium falciparum
  - Plasmodium knowlesi
  - Plasmodium vivax
  - Plasmodium chabaudi
  - Plasmodium yoelii yoelii 17XNL
  - Plasmodium berghei
  - Phaeodactylum tricornutum
  - Thalassiosira pseudonana
  - Pythium ultimum
  - Alticus labachii
  - Hydroperonospora arabidopsis
  - Phytophthora ramorum
  - Phytophthora infestans
  - Phytophthora sojae
  - Trypanosoma brucei
  - Trypanosoma cruzi strain CL Brener
  - Leishmania brasiliensis MHOM BR 75 M2904
  - Leishmania mexicana MHOM GT 2001 U1103
  - Leishmania major
  - Leishmania donovani
  - Leishmania infantum JPCM5
  - Entamoeba histolytica
  - Entamoeba dispar SAW760
  - Dictyostelium discoideum
  - Dictyostelium purpureum
  - Trichomonas vaginalis G3
  - Trichomonas vaginalis
  - Naegleria gruberi
  - Giardia lamblia ATCC 50803

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.952  
Pvalue = 1.06e-05  
AdjPValue = 1.26e-03

# NOG125285

● OG presence  
○ OG absence  
◊ Inferred root

Dscore = 1  
Pvalue = 1.55e-05  
AdjPValue = 1.85e-03

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporascus suave*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavicipitaria lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
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- Vanderwaltozyma polyspora DSM 70294*
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- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporidium tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
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- Sclerotinia sclerotiorum*
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- Fusarium oxysporum*
- Hypocrea viridis*
- Hypocreales jeckerina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
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- Neurospora crassa k hell*
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- Trichophyton verrucosum HKI 0517*
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- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
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- Neosartorya fischeri*
- Emerickella nidulans*
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- Penicillium marneffei ATCC 18224*
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- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis plumbum*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus cinctus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
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- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iwao II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
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- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
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- Trypanosoma brucei*
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- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

# NOG126611

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, including plants, fungi, and animals, with a clear separation from prokaryotes like bacteria and archaea.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Schagrinella moellendorffii*
- Physcomitrium patens*
- Ostreococcus tauri*
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- Chlamydomonas reinhardtii*
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- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricornutum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence

Inferred root

Dscore = 1

Pvalue = 6.74e-06

AdjPValue = 8.03e-04

# NOG126859

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
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*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.819  
 Pvalue = 1.63e-04  
 AdjPValue = 1.94e-02

Leishmania major

Leishmania donovani

Leishmania infantum JPCM5

Entamoeba histolytica

Entamoeba dispar SAW760

Dictyostelium discoideum

Dictyostelium purpureum

Trichomonas vaginalis G3

Trichomonas vaginalis

Naegleria gruberi

Giardia lamblia ATCC 50803

NOG126963



Dscore = 0.9  
Pvalue = 1.31

AdjPvalue =

# NOG128070

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade of plants (green circles) at the top right. Other major groups include fungi, protists, and animals.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Ostreococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
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- Malassezia globosa CBS 7966*
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- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
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- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emerickella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
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- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
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- Cryptosporidium muris RN66*
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- Theileria annulata strain Ankara*
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- Plasmodium falciparum*
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- Plasmodium yoelii yoelii 17XNL*
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- Phaeodactylum tricornutum*
- Thalassiosira pseudonana*
- Pythium ultimum*
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- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
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- Trypanosoma brucei*
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- Entamoeba histolytica*
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- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence

Inferred root

Dscore = 0.984

Pvalue = 4.85e-06

AdjPValue = 5.77e-04

# NOG128539

OG presence

OG absence

Inferred root

Dscore = 0.852

Pvalue = 1.34e-04

AdjPValue = 1.60e-02

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosarcococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iwao II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

# NOG129341

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Selaginella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
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Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
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Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR Y 1140  
Saccharomyces cerevisiae  
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Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
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Pyrenophora tritici repens Pt 1C BFP  
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Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoides  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
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Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
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Penicillium chrysogenum Wisconsin 54 1255  
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Aspergillus niger  
Aspergillus fumigatus  
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Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodoros anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellima  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turkiops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus amoenus  
Tarsus syrichta  
Calithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricoronatum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 1.27e-05  
AdjPValue = 1.51e-03

# NOG129430

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.788  
Pvalue = 2.13e-05  
AdjPValue = 2.53e-03

# NOG129978

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade of plants (green circles) at the top right. Other major groups include fungi, protists, and animals.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Schagrinella moellendorffii*
- Physcomitrium patens*
- Ostreococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
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- Lodderomyces elongisporus NRR L YB 4239*
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- Lachancea thermotolerans*
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- Candida glabrata CBS 138*
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- Naumovozyma castelli CBS 4309*
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- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
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- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
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- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
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- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
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- Magnaporthe grisea*
- Magnaporthe poae*
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- Podospora anserina S mat*
- Neurospora crassa*
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- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
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- Aspergillus clavatus*
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- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
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- Pediculus humanus*
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- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
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- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
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- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
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- Ciona savignyi*
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- Danio rerio*
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- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
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- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
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- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
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- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
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- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence

OG absence

Inferred root

Dscore = 0.992

Pvalue = 4.34e-06

AdjPValue = 5.16e-04

# NOG130232

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
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Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyerozyma guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoides  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsus syrichta  
Calithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 0.987  
Pvalue = 9.37e-06  
AdjPValue = 1.12e-03

# NOG130428

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Selaginella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyerozyma guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogaster  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 0.988  
Pvalue = 1.08e-05  
AdjPValue = 1.28e-03

# NOG13059

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Selaginella moellendorffii  
Ptychosperma patens  
Osteosporus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Leucopaxillus gentianeus  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyerozyma guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellmeri  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turriops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogaster  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Phalaenopsis pseudonana  
Pythium ultimum  
Alticus labachii  
Hyaloperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 0.956  
Pvalue = 1.23e-05  
AdjPValue = 1.47e-03

# NOG130945

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrella patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisporra phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence

◆ Inferred root

Dscore = 1

Pvalue = 4.63e-06

AdjPValue = 5.52e-04

# NOG131107

*Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
◆ *Brassica rapa*  
○ *Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
● *Physcomitrium patens*  
*Osteosporascus suave*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
○ *Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRRL Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
○ *Eremothecium corynifsporum*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematoxocca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
○ *Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRRL 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhu*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowia II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.854  
 Pvalue = 3.2e-05  
 AdjPValue = 3.8e-03

# NOG131444

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagninella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus fumigatus MYA 3404  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.992  
Pvalue = 7.34e-06  
AdjPValue = 8.74e-04

# NOG131641

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhu*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.978  
 Pvalue = 1.02e-05  
 AdjPValue = 1.22e-03

# NOG131772

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a significant number of plant species (green circles) and a smaller number of fungi and protists (grey circles). The inferred root is positioned near the base of the tree, with a red diamond marking its location.

- OG presence (green circles): Arabidopsis thaliana, Arabidopsis lyrata, Brassica rapa, Glycine max, Populus trichocarpa, Vitis vinifera, Solanum tuberosum, Solanum lycopersicum, Oryza sativa Indica Group, Oryza sativa Japonica Group, Oryza brachyantha, Oryza glaberrima, Hordeum vulgare, Brachypodium distachyon, Zea mays, Sorghum bicolor, Setaria italica, Musa acuminata, Selaginella moellendorffii, Physcomitrium patens, Ostreococcus tauri, Ostreococcus lucimarinus CCE9901, Chlamydomonas reinhardtii, Cyanidioschyzon merolae, Encephalitozoon hellem ATCC 50504, Encephalitozoon intestinalis ATCC 50506, Encephalitozoon cuniculi GB M1, Puccinia graminis, Puccinia triticina, Ustilago maydis, Malassezia globosa CBS 7966, Cryptococcus gattii WM276, Cryptococcus neoformans var. neoformans JEC21, Cryptococcus neoformans var. neoformans B 3501A, Phanerochaete chrysosporium, Schizophyllum commune H4 8, Coprinopsis cinerea okayama7\_130, Laccaria bicolor S238N H82, Schizosaccharomyces japonicus yFS275, Schizosaccharomyces pombe, Clavicipitaceae ATCC 42720, Aspergillus terreus, Candida tropicalis MYA 3404, Candida dubliniensis CD36, Lodderomyces elongisporus NRR YB 4239, Scheffersomyces stipitis CBS 6054, Meyeromyza guilliermondii ATCC 6260, Pichia guilliermondii, Lachancea thermotolerans, Kluyveromyces lactis NRR Y 1140, Saccharomyces cerevisiae, Zygosaccharomyces rouxii, Komagataella pastoris GS115, Vanderwaltozyma polyspora DSM 70294, Torulaspora delbrueckii, Candida glabrata CBS 138, Tetrapisispora phaffii CBS 4417, Naumovozyma dairensensis CBS 421, Naumovozyma castelli CBS 4309, Eremothecium cymbalariae DBVPG\_7215, Eremothecium corynanthii, Tuber melanosporum, Zymoseptoria tritici, Phaeosphaeria nodorum, Leptosphaeria maculans, Pyrenophora tritici repens Pt 1C BFP, Pyrenophora teres f. teres 0 1, Botryotinia fuckeliana, Sclerotinia sclerotiorum, Verticillium albo atrum VaMs.102, Fusarium oxysporum, Hypocrea viridis, Hypocreasclerina, Nectria haematozoea, Gibberella moniliiformis, Gibberella zeae PH 1, Gibberella zeae, Gaeumannomyces graminis, Magnaporthe grisea, Magnaporthe poae, Magnaporthe oryzae, Podospora anserina S mat, Neurospora crassa, Sclerotinia sclerotiorum k hell, Myceliophthora thermophila ATCC 42464, Chaetomium globosum CBS 148.51, Thielavia terrestris NRR L 8126, Uncinocarpus reesii 1704, Ajellomyces capsulatus NAm1, Ajellomyces dermatitidis SLH14081, Paracoccidioides sp. lutzi Pb01, Coccidioides posadasii C735 delta SOWgp, Coccidioides immitis RS, Trichophyton rubrum CBS 118892, Trichophyton verrucosum HKI 0517, Arthroderma benhamiae CBS 112371, Arthroderma gypseum CBS 118893, Arthroderma otiae CBS 113480, Talaromyces stipitatus ATCC 10500, Neosartorya fischeri, Emericella nidulans, Penicillium chrysogenum Wisconsin 54 1255, Penicillium marneffei ATCC 18224, Aspergillus clavatus, Aspergillus flavus, Aspergillus oryzae, Aspergillus niger, Aspergillus fumigatus, Aspergillus terreus, Monosiga brevicollis MX1, Amphimedon 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Xenopus (Silurana) tropicalis, Pelodiscus sinensis, Anolis carolinensis, Taenioptynx guttata, Gallus gallus, Meleagris gallopavo, Ornithodoros anatinus, Monodelphis domestica, Sarcophilus harrisii, Macropus eugenii, Dipodomys cinctus, Loxodontia africana, Echinops tellinii, Procavia capensis, Myotis lucifugus, Pteropus vampyrus, Sus scrofa, Tursiops truncatus, Bos taurus, Equus caballus, Felis catus, Canis lupus familiaris, Mustela putorius furo, Ailuropoda melanoleuca, Oryctolagus cuniculus, Cavia porcellus, Ictidomys tridecemlineatus, Dipodomys ordii, Rattus norvegicus, Mus musculus, Tupaia belangeri, Deltoptilus garnettii, Microtus leucurus, Tarsius syrichta, Callithrix jacchus, Macaca mulatta, Nomascus leucogenys, Pongo abelii, Gorilla gorilla, Pan troglodytes, Homo sapiens, Perkinsus marinus ATCC 50983, Tetrahymena thermophila, Paramecium tetraurelia strain d4 2, Neospora caninum Liverpool, Toxoplasma gondii, Cryptosporidium muris RN66, Cryptosporidium parvum Iowa II, Cryptosporidium hominis TU502, Theileria annulata strain Ankara, Theileria parva strain Muguga, Plasmodium falciparum, Plasmodium knowlesi, Plasmodium vivax, Plasmodium chabaudi, Plasmodium yoelii yoelii 17XNL, Plasmodium berghei, Phaeodactylum tricorum, Thalassiosira pseudonana, Pythium ultimum, Alticus labachii, Hyaloperonospora arabidopsis, Phytophthora ramorum, Phytophthora infestans, Phytophthora sojae, Trypanosoma brucei, Trypanosoma cruzi strain CL Brener, Leishmania brasiliensis MHOM BR 75 M2904, Leishmania mexicana MHOM GT 2001 U1103, Leishmania major, Leishmania donovani, Leishmania infantum JPCM5, Entamoeba histolytica, Entamoeba dispar SAW760, Dictyostelium discoideum, Dictyostelium purpureum, Trichomonas vaginalis G3, Trichomonas vaginalis, Naegleria gruberi, Giardia lamblia ATCC 50803.

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.975  
Pvalue = 8.4e-06  
AdjPValue = 1.0e-03

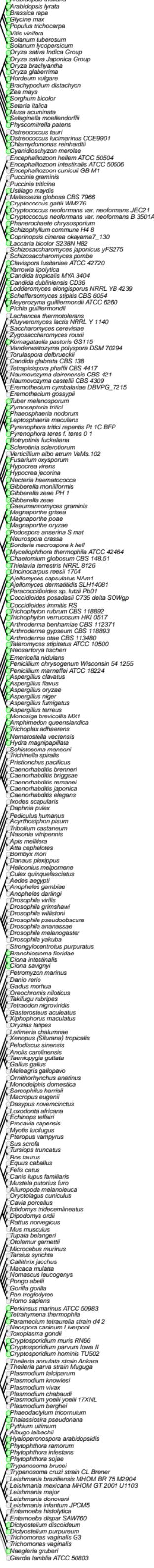
# NOG131810

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagnicella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus fumigatus MYA 3404  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
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Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
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Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
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Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
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Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananasae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellmeri  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iwao II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 0.833  
Pvalue = 1.32e-04  
AdjPValue = 1.57e-02

# NOG13193



OG presence

OG absence

Inferred root

Dscore = 0.821

Pvalue = 1.27e-04

AdjPValue = 1.51e-02

# NOG133099

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent organisms where the Outgroup (OG) was present, while grey circles represent where it was absent. The tree shows a dense cluster of eukaryotic organisms, with a significant number of plant species (green circles) and a smaller number of protist and animal species (grey circles). The inferred root is positioned near the base of the tree, with a red diamond marking its location.

- OG presence (Green circle)
- OG absence (Grey circle)
- Inferred root (Red diamond)

Dscore = 0.992  
Pvalue = 4.80e-06  
AdjPValue = 5.71e-04

Arabidopsis thaliana  
Arabis lyra  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagninella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
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Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
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Aspergillus fumigatus MYA 3404  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
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Lachancea thermotolerans  
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Saccharomyces cerevisiae  
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Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
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Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys cinctus  
Lorcdonia africana  
Echinops tellinii  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turkiops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogenys  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence

OG absence

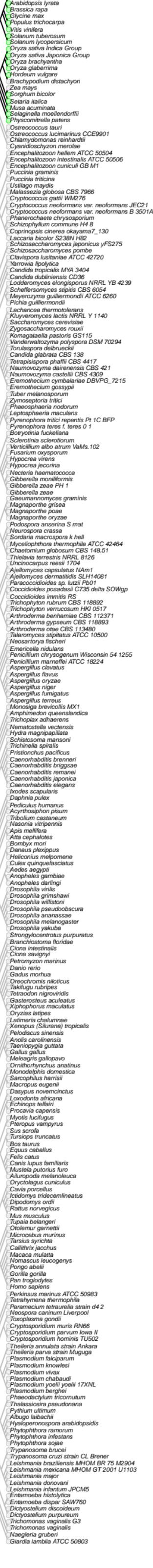
Inferred root

Dscore = 0.992

Pvalue = 4.80e-06

AdjPValue = 5.71e-04

NOG135096



Dscore = 0.9  
Pvalue = 2.02

AdjPvalue =

# NOG136237

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
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*Uncinocarpus reesii 1704*  
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*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
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*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
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*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhu*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iwao II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.986  
 Pvalue = 1.53e-05  
 AdjPValue = 1.82e-03

# NOG140340

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent organisms where OG presence was found, while grey circles represent where it was absent. The tree shows a dense cluster of eukaryotes, with a prominent clade including plants like Arabidopsis thaliana, Oryza sativa Indica Group, and Zea mays, along with fungi such as Encephalitozoon hellem and Encephalitozoon intestinalis. Bacteria are also represented, including *Escherichia coli*, *Staphylococcus aureus*, and *Neisseria gonorrhoeae*. The tree also includes protists like Giardia lamblia and Trichomonas vaginalis, and other eukaryotes like *Plasmodium falciparum* and *Leishmania* species.

- OG presence
- OG absence
- Inferred root

Dscore = 0.889  
 Pvalue = 1.58e-04  
 AdjPvalue = 1.88e-02

# NOG141489

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a significant number of bacteria and archaea branching off from the main eukaryotic clade.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosarcococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
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- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
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- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
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- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
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- Plasmodium yoelii yoelii 17XNL*
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- Phaeodactylum tricoronatum*
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- Pythium ultimum*
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- Entamoeba dispar SAW760*
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- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 8.71e-06  
AdjPValue = 1.04e-03

# NOG142960

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagonelina moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Kluyveromyces lactis  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricoronatum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hyaloperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

- OG presence
- OG absence

◆ Inferred root

Dscore = 0.898

Pvalue = 1.68e-05

AdjPValue = 2.00e-03

# NOG143076

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade of plants and fungi branching off to the right. A prominent green circle is located near the inferred root, indicating an organism with OG presence.

- Arabidopsis thaliana
- Arabidopsis lyrata
- Brassica rapa
- Glycine max
- Populus trichocarpa
- Vitis vinifera
- Solanum tuberosum
- Solanum lycopersicum
- Oryza sativa Indica Group
- Oryza sativa Japonica Group
- Oryza brachyantha
- Oryza glaberrima
- Hordeum vulgare
- Brachypodium distachyon
- Zea mays
- Sorghum bicolor
- Setaria italica
- Musa acuminata
- Stagninella moellendorffii
- Physcomitrium patens
- Ostreococcus tauri
- Ostreococcus lucimarinus CCE9901
- Chlamydomonas reinhardtii
- Cyanidioschyzon merolae
- Encephalitozoon hellem ATCC 50504
- Encephalitozoon intestinalis ATCC 50506
- Encephalitozoon cuniculi GB M1
- Puccinia graminis
- Puccinia triticina
- Ustilago maydis
- Malassezia globosa CBS 7966
- Cryptococcus gattii WM276
- Cryptococcus neoformans var. neoformans JEC21
- Cryptococcus neoformans var. neoformans B 3501A
- Phanerochaete chrysosporium
- Schizophyllum commune H4 8
- Coprinopsis cinerea okayama7\_ 130
- Laccaria bicolor S238N H82
- Schizosaccharomyces japonicus yFS275
- Schizosaccharomyces pombe
- Clavispora lusitaniae ATCC 42720
- Candida tropicalis MYA 3404
- Candida dubliniensis CD36
- Lodderomyces elongisporus NRR L YB 4239
- Schefersomyces stipiti CBS 6054
- Meyerozyma guilliermondii ATCC 6260
- Pichia guilliermondii
- Lachancea thermotolerans
- Kluyveromyces lactis NRR L Y 1140
- Saccharomyces cerevisiae
- Zygosaccharomyces rouxii
- Komagataella pastoris GS115
- Vanderwaltozyma polyspora DSM 70294
- Torulaspora delbrueckii
- Candida glabrata CBS 138
- Tetrapisispora phaffii CBS 4417
- Naumovozyma dairensensis CBS 421
- Naumovozyma castelli CBS 4309
- Eremothecium cymbalariae DBVPG\_7215
- Eremothecium coryniforme
- Tuber melanosporum
- Zymesporangia tritici
- Phaeosphaeria nodorum
- Leptosphaeria maculans
- Pyrenophora tritici repens Pt 1C BFP
- Pyrenophora teres f. teres 0 1
- Botryotinia fuckeliana
- Sclerotinia sclerotiorum
- Verticillium albo atrum VaMs.102
- Fusarium oxysporum
- Hypocrea viridis
- Hypocreales jeckerina
- Nectria haematococca
- Gibberella moniliiformis
- Gibberella zeae PH 1
- Gibberella zeae
- Gaeumannomyces graminis
- Magnaporthe grisea
- Magnaporthe poae
- Magnaporthe oryzae
- Podospora anserina S mat
- Neurospora crassa
- Neurospora crassa k hell
- Mycelopithophthora thermophila ATCC 42464
- Chaetomium globosum CBS 148.51
- Thielavia terrestris NRR L 8126
- Uncinocarpus reesii 1704
- Ajellomyces capsulatus NArl1
- Ajellomyces dermatitidis SLH14081
- Paracoccidioides sp. lutzi Pb01
- Coccidioides posadasii C735 delta SOWgp
- Coccidioides immitis RS
- Trichophyton rubrum CBS 118892
- Trichophyton verrucosum HKI 0517
- Arthroderma benhamiae CBS 112371
- Arthroderma gypseum CBS 118893
- Arthroderma otiae CBS 113480
- Talaromyces stipitatus ATCC 10500
- Neosartorya fischeri
- Emericella nidulans
- Penicillium chrysogenum Wisconsin 54 1255
- Penicillium marneffei ATCC 18224
- Aspergillus clavatus
- Aspergillus flavus
- Aspergillus oryzae
- Aspergillus niger
- Aspergillus fumigatus
- Aspergillus terreus
- Monosiga brevicollis MX1
- Amphimedon queenslandica
- Trichoplax adhaerens
- Nematostella vectensis
- Hydra magnipapillata
- Schistosoma mansoni
- Trichinella spiralis
- Pristionchus pacificus
- Caenorhabditis brenneri
- Caenorhabditis briggsae
- Caenorhabditis remanei
- Caenorhabditis japonica
- Caenorhabditis elegans
- Ixodes scapularis
- Daphnia pulex
- Pediculus humanus
- Anthonomus grandis
- Tribolium castaneum
- Nasonia vitripennis
- Apis mellifera
- Atta cephalotes
- Bombyx mori
- Danaus plexippus
- Heliconius melpomene
- Culex quinquefasciatus
- Aedes aegypti
- Anopheles gambiae
- Anopheles darlingi
- Drosophila virilis
- Drosophila grimshawi
- Drosophila willistoni
- Drosophila pseudoobscura
- Drosophila ananassae
- Drosophila melanogaster
- Drosophila yakuba
- Strongylocentrotus purpuratus
- Branchiostoma floridae
- Ciona intestinalis
- Ciona savignyi
- Petromyzon marinus
- Danio rerio
- Cedrus morhuza
- Oreochromis niloticus
- Takifugu rubripes
- Tetraodon nigroviridis
- Gasterosteus aculeatus
- Xiphophorus maculatus
- Oryzias latipes
- Latimeria chalumnae
- Xenopus (Silurana) tropicalis
- Pelodiscus sinensis
- Anolis carolinensis
- Taeniopygia guttata
- Gallus gallus
- Meleagris gallopavo
- Ornithodorus anatinus
- Monodelphis domestica
- Sarcophilus harrisii
- Macropus eugenii
- Dasyurus maculatus
- Lorcinia africana
- Echinops tellinii
- Procavia capensis
- Myotis lucifugus
- Pteropus vampyrus
- Sus scrofa
- Tursiops truncatus
- Bos taurus
- Equus caballus
- Felis catus
- Canis lupus familiaris
- Mustela putorius furo
- Ailuropoda melanoleuca
- Oryctolagus cuniculus
- Cavia porcellus
- Ictidomys tridecemlineatus
- Dipodomys ordii
- Rattus norvegicus
- Mus musculus
- Tupaia belangeri
- Dolichur garnettii
- Microtus leucogenys
- Tarsius syrichta
- Callithrix jacchus
- Macaca mulatta
- Nomascus leucogenys
- Pongo abelii
- Gorilla gorilla
- Pan troglodytes
- Homo sapiens
- Perkinsus marinus ATCC 50983
- Tetrahymena thermophila
- Paramecium tetraurelia strain d4 2
- Neospora caninum Liverpool
- Toxoplasma gondii
- Cryptosporidium muris RN66
- Cryptosporidium parvum Iwao II
- Cryptosporidium hominis TU502
- Theileria annulata strain Ankara
- Theileria parva strain Muguga
- Plasmodium falciparum
- Plasmodium knowlesi
- Plasmodium vivax
- Plasmodium chabaudi
- Plasmodium yoelii yoelii 17XNL
- Plasmodium berghei
- Phaeodactylum tricornutum
- Thalassiosira pseudonana
- Pythium ultimum
- Alticus labachii
- Hydroperonospora arabidopsis
- Phytophthora ramorum
- Phytophthora infestans
- Phytophthora sojae
- Trypanosoma brucei
- Trypanosoma cruzi strain CL Brener
- Leishmania brasiliensis MHOM BR 75 M2904
- Leishmania mexicana MHOM GT 2001 U1103
- Leishmania major
- Leishmania donovani
- Leishmania infantum JPCM5
- Entamoeba histolytica
- Entamoeba dispar SAW760
- Dictyostelium discoideum
- Dictyostelium purpureum
- Trichomonas vaginalis G3
- Trichomonas vaginalis
- Naegleria gruberi
- Giardia lamblia ATCC 50803

OG presence

OG absence

Inferred root

Dscore = 1

Pvalue = 4.33e-06

AdjPValue = 5.16e-04

# NOG143140



● OG presence  
○ OG absence

◆ Inferred root

Dscore = 1  
Pvalue = 5.99e-06  
AdjPValue = 7.13e-04

# NOG143703

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Mus acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavispora lusitaniae ATCC 42720  
 Aspergillus sydowii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRYL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisporra phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor K 45  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis virginiana  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.889  
 Pvalue = 4.82e-05  
 AdjPValue = 5.73e-03

# NOG144070

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
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 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
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 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus sydowii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR YB 4239  
 Scheffersomyces stipitis CBS 6054  
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 Pichia guilliermondii  
 Lachancea thermotolerans  
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 Saccharomyces cerevisiae  
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 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
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 Candida glabrata CBS 138  
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 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematozoea  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus terreus k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRR 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Dasyurus maculatus  
 Loxodontia africana  
 Echinops tellinii  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis virginiana  
 Microtus marmarinus  
 Tarsus syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.889  
 Pvalue = 6.37e-05  
 AdjPValue = 7.58e-03

# NOG145474

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade of plants and fungi branching off to the right. The inferred root is located near the base of this main cluster.

- OG presence (green circles): Arabidopsis thaliana, Arabidopsis lyrata, Brassica rapa, Glycine max, Populus trichocarpa, Vitis vinifera, Solanum tuberosum, Solanum lycopersicum, Oryza sativa Indica Group, Oryza sativa Japonica Group, Oryza brachyantha, Oryza glaberrima, Hordeum vulgare, Brachypodium distachyon, Zea mays, Sorghum bicolor, Setaria italica, Musa acuminata, Selaginella moellendorffii, Physcomitrium patens, Ostreococcus tauri, Ostreococcus lucimarinus CCE9901, Chlamydomonas reinhardtii, Cyanidioschyzon merolae, Encephalitozoon hellem ATCC 50504, Encephalitozoon intestinalis ATCC 50506, Encephalitozoon cuniculi GB M1, Puccinia graminis, Puccinia triticina, Ustilago maydis, Malassezia globosa CBS 7966, Cryptococcus gattii WM276, Cryptococcus neoformans var. neoformans JEC21, Cryptococcus neoformans var. neoformans B 3501A, Phanerochaete chrysosporium, Schizophyllum commune H4 8, Coprinopsis cinerea okayama7\_130, Laccaria bicolor S238N H82, Schizosaccharomyces japonicus yFS275, Schizosaccharomyces pombe, Clavicipitaceae ATCC 42720, Aspergillus terreus, Candida tropicalis MYA 3404, Candida dubliniensis CD36, Lodderomyces elongisporus NRR YB 4239, Scheffersomyces stipitis CBS 6054, Meyeromyza guilliermondii ATCC 6260, Pichia guilliermondii, Lachancea thermotolerans, Kluyveromyces lactis NRRL Y 1140, Saccharomyces cerevisiae, Zygosaccharomyces rouxii, Komagataella pastoris GS115, Vanderwaltozyma polyspora DSM 70294, Torulaspora delbrueckii, Candida glabrata CBS 138, Tetrapisispora phaffii CBS 4417, Naumovozyma dairensensis CBS 421, Naumovozyma castelli CBS 4309, Eremothecium cymbalariae DBVPG\_7215, Eremothecium coryniforme, Tuber melanosporum, Zymoseptoria tritici, Phaeosphaeria nodorum, Leptosphaeria maculans, Pyrenophora tritici repens Pt 1C BFP, Pyrenophora teres f. teres 0 1, Botryotinia fuckeliana, Sclerotinia sclerotiorum, Verticillium albo atrum VaMs.102, Fusarium oxysporum, Hypocrea viridis, Hypocreasclerina, Nectria haematozoea, Gibberella moniliiformis, Gibberella zeae PH 1, Gibberella zeae, Gaeumannomyces graminis, Magnaporthe grisea, Magnaporthe poae, Magnaporthe oryzae, Podospora anserina S mat, Neurospora crassa, Rhizopus microsporus k helle, Myceliophthora thermophila ATCC 42464, Chaetomium globosum CBS 148.51, Thielavia terrestris NRRL 8126, Uncinocarpus reesii 1704, Ajellomyces capsulatus NAm1, Ajellomyces dermatitidis SLH14081, Paracoccidioides sp. lutzi Pb01, Coccidioides posadasii C735 delta SOWgp, Coccidioides immitis RS, Trichophyton rubrum CBS 118892, Trichophyton verrucosum HKI 0517, Arthroderma benhamiae CBS 112371, Arthroderma gypseum CBS 118893, Arthroderma otiae CBS 113480, Talaromyces stipitatus ATCC 10500, Neosartorya fischeri, Emericella nidulans, Penicillium chrysogenum Wisconsin 54 1255, Penicillium marneffei ATCC 18224, Aspergillus clavatus, Aspergillus flavus, Aspergillus oryzae, Aspergillus niger, Aspergillus fumigatus, Aspergillus terreus, Monosiga brevicollis MX1, Amphimedon queenslandica, Trichoplax adhaerens, Nematostella vectensis, Hydra magnipapillata, Schistosoma mansoni, Trichinella spiralis, Pristionchus pacificus, Caenorhabditis brenneri, Caenorhabditis briggsae, Caenorhabditis remanei, Caenorhabditis japonica, Caenorhabditis elegans, Ixodes scapularis, Daphnia pulex, Pediculus humanus, Adonis amurensis plenum, Tribolium castaneum, Nasoia vitripennis, Apis mellifera, Atta cephalotes, Bombyx mori, Danaus plexippus, Heliconius melpomene, Culex quinquefasciatus, Aedes aegypti, Anopheles gambiae, Anopheles darlingi, Drosophila virilis, Drosophila grimshawi, Drosophila willistoni, Drosophila pseudoobscura, Drosophila ananassae, Drosophila melanogaster, Drosophila yakuba, Strongylocentrotus purpuratus, Branchiostoma floridae, Ciona intestinalis, Ciona savignyi, Petromyzon marinus, Danio rerio, Gadus morhua, Oreochromis niloticus, Takifugu rubripes, Tetraodon nigroviridis, Gasterosteus aculeatus, Xiphophorus maculatus, Oryzias latipes, Latimeria chalumnae, Xenopus (Silurana) tropicalis, Pelodiscus sinensis, Anolis carolinensis, Taenioptynx guttata, Gallus gallus, Meleagris gallopavo, Ornithodorus anatinus, Monodelphis domestica, Sarcophilus harrisii, Macropus eugenii, Dipodomys cinctus, Loxodonta africana, Echinops tellima, Procavia capensis, Myotis lucifugus, Pteropus vampyrus, Sus scrofa, Tursiops truncatus, Bos taurus, Equus caballus, Felis catus, Canis lupus familiaris, Mustela putorius furo, Ailuropoda melanoleuca, Oryctolagus cuniculus, Cavia porcellus, Ictidomys tridecemlineatus, Dipodomys ordii, Rattus norvegicus, Mus musculus, Tupaia belangeri, Didelphis garnettii, Microtus marmarinus, Tarsius syrichta, Callithrix jacchus, Macaca mulatta, Nomascus leucogenys, Pongo abelii, Gorilla gorilla, Pan troglodytes, Homo sapiens, Perkinsus marinus ATCC 50983, Tetrahymena thermophila, Paramecium tetraurelia strain d4 2, Neospora caninum Liverpool, Toxoplasma gondii, Cryptosporidium muris RN66, Cryptosporidium parvum Iowa II, Cryptosporidium hominis TU502, Theileria annulata strain Ankara, Theileria parva strain Muguga, Plasmodium falciparum, Plasmodium knowlesi, Plasmodium vivax, Plasmodium chabaudi, Plasmodium yoelii yoelii 17XNL, Plasmodium berghei, Phaeodactylum tricoronatum, Thalassiosira pseudonana, Pythium ultimum, Alticus labachii, Hyaloperonospora arabidopsis, Phytophthora ramorum, Phytophthora infestans, Phytophthora sojae, Trypanosoma brucei, Trypanosoma cruzi strain CL Brener, Leishmania brasiliensis MHOM BR 75 M2904, Leishmania mexicana MHOM GT 2001 U1103, Leishmania major, Leishmania donovani, Leishmania infantum JPCM5, Entamoeba histolytica, Entamoeba dispar SAW760, Dictyostelium discoideum, Dictyostelium purpureum, Trichomonas vaginalis G3, Trichomonas vaginalis, Naegleria gruberi, Giardia lamblia ATCC 50803.

OG presence  
OG absence  
Inferred root

Dscore = 0.992  
Pvalue = 8.45e-06  
AdjPValue = 1.01e-03

# NOG146607

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Setaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavispora lusitaniae ATCC 42720  
 Aspergillus sydowii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR L YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematozoea  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

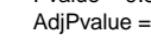
Dscore = 0.975  
 Pvalue = 5.10e-06  
 AdjPValue = 6.07e-04

# NOG147190

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Colored circles (green, grey, and white) indicate the presence or absence of specific Operational Taxonomic Groups (OTGs) across the branches. The tree is rooted at the top and branches downwards, with many clades collapsed.

- OG presence (green):** Arabidopsis thaliana, Arabidopsis lyrata, Brassica rapa, Glycine max, Populus trichocarpa, Vitis vinifera, Solanum tuberosum, Solanum lycopersicum, Oryza sativa Indica Group, Oryza sativa Japonica Group, Oryza brachyantha, Oryza glaberrima, Hordeum vulgare, Brachypodium distachyon, Zea mays, Sorghum bicolor, Setaria italica, Musa acuminata, Selaginella moellendorffii, Physcomitrium patens, Ostreococcus tauri, Ostreococcus lucimarinus CCE9901, Chlamydomonas reinhardtii, Cyanidioschyzon merolae, Encephalitozoon hellem ATCC 50504, Encephalitozoon intestinalis ATCC 50506, Encephalitozoon cuniculi GB M1, Puccinia graminis, Puccinia triticina, Ustilago maydis, Malassezia globosa CBS 7966, Cryptococcus gattii WM276, Cryptococcus neoformans var. neoformans JEC21, Cryptococcus neoformans var. neoformans B 3501A, Phanerochaete chrysosporium, Schizophyllum commune H4 8, Coprinopsis cinerea okayama7\_130, Laccaria bicolor S238N H82, Schizosaccharomyces japonicus yFS275, Schizosaccharomyces pombe, Clavicipitaceae ATCC 42720, Aspergillus terreus, Candida tropicalis MYA 3404, Candida dubliniensis CD36, Lodderomyces elongisporus NRR YB 4239, Scheffersomyces stipitis CBS 6054, Meyeromyza guilliermondii ATCC 6260, Pichia guilliermondii, Lachancea thermotolerans, Kluyveromyces lactis NRR Y 1140, Saccharomyces cerevisiae, Zygosaccharomyces rouxii, Komagataella pastoris GS115, Vanderwaltozyma polyspora DSM 70294, Torulaspora delbrueckii, Candida glabrata CBS 138, Tetrapisispora phaffii CBS 4417, Naumovozyma dairensensis CBS 421, Naumovozyma castelli CBS 4309, Eremothecium cymbalariae DBVPG\_7215, Eremothecium coryniforme, Tuber melanosporum, Zymoseptoria tritici, Phaeosphaeria nodorum, Leptosphaeria maculans, Pyrenophora tritici repens Pt 1C BFP, Pyrenophora teres f. teres 0 1, Botryotinia fuckeliana, Sclerotinia sclerotiorum, Verticillium albo atrum VaMs.102, Fusarium oxysporum, Hypocrea viridis, Hypocreasclerina, Nectria haematozoea, Gibberella moniliiformis, Gibberella zeae PH 1, Gibberella zeae, Gaeumannomyces graminis, Magnaporthe grisea, Magnaporthe poae, Magnaporthe oryzae, Podospora anserina S mat, Neurospora crassa, Rhizopus microsporus k hell, Myceliophthora thermophila ATCC 42464, Chaetomium globosum CBS 148.51, Thielavia terrestris NRR L 8126, Uncinocarpus reesii 1704, Ajellomyces capsulatus NAm1, Ajellomyces dermatitidis SLH14081, Paracoccidioides sp. lutzi Pb01, Coccidioides posadasii C735 delta SOWgp, Coccidioides immitis RS, Trichophyton rubrum CBS 118892, Trichophyton verrucosum HKI 0517, Arthroderma benhamiae CBS 112371, Arthroderma gypseum CBS 118893, Arthroderma otiae CBS 113480, Talaromyces stipitatus ATCC 10500, Neosartorya fischeri, Emericella nidulans, Penicillium chrysogenum Wisconsin 54 1255, Penicillium marneffei ATCC 18224, Aspergillus clavatus, Aspergillus flavus, Aspergillus oryzae, Aspergillus niger, Aspergillus fumigatus, Aspergillus terreus, Monosiga brevicollis MX1, Amphimedon queenslandica, Trichoplax adhaerens, Nematostella vectensis, Hydra magnipapillata, Schistosoma mansoni, Trichinella spiralis, Pristionchus pacificus, Caenorhabditis brenneri, Caenorhabditis briggsae, Caenorhabditis remanei, Caenorhabditis japonica, Caenorhabditis elegans, Ixodes scapularis, Daphnia pulex, Pediculus humanus, Adonis amurensis plenum, Tribolium castaneum, Nasoia vitripennis, Apis mellifera, Atta cephalotes, Bombyx mori, Danaus plexippus, Heliconius melpomene, Culex quinquefasciatus, Aedes aegypti, Anopheles gambiae, Anopheles darlingi, Drosophila virilis, Drosophila grimshawi, Drosophila willistoni, Drosophila pseudoobscura, Drosophila ananassae, Drosophila melanogaster, Drosophila yakuba, Strongylocentrotus purpuratus, Branchiostoma floridae, Ciona intestinalis, Ciona savignyi, Petromyzon marinus, Danio rerio, Gadus morhua, Oreochromis niloticus, Takifugu rubripes, Tetraodon nigroviridis, Gasterosteus aculeatus, Xiphophorus maculatus, Oryzias latipes, Latimeria chalumnae, Xenopus (Silurana) tropicalis, Pelodiscus sinensis, Anolis carolinensis, Taenioptynx guttata, Gallus gallus, Meleagris gallopavo, Ornithodoros anatinus, Monodelphis domestica, Sarcophilus harrisii, Macropus eugenii, Dasyurus maculatus cinctus, Loxodontia africana, Echinops tellinii, Procavia capensis, Myotis lucifugus, Pteropus vampyrus, Sus scrofa, Tursiops truncatus, Bos taurus, Equus caballus, Felis catus, Canis lupus familiaris, Mustela putorius furo, Ailuropoda melanoleuca, Oryctolagus cuniculus, Cavia porcellus, Ictidomys tridecemlineatus, Dipodomys ordii, Rattus norvegicus, Mus musculus, Tupaia belangeri, Deltoptilus garnettii, Microtus marmarinus, Tarsius syrichta, Callithrix jacchus, Macaca mulatta, Nomascus leucogenys, Pongo abelii, Gorilla gorilla, Pan troglodytes, Homo sapiens, Perkinsus marinus ATCC 50983, Tetrahymena thermophila, Paramecium tetraurelia strain d4 2, Neospora caninum Liverpool, Toxoplasma gondii, Cryptosporidium muris RN66, Cryptosporidium parvum Iowa II, Cryptosporidium hominis TU502, Theileria annulata strain Ankara, Theileria parva strain Muguga, Plasmodium falciparum, Plasmodium knowlesi, Plasmodium vivax, Plasmodium chabaudi, Plasmodium yoelii yoelii 17XNL, Plasmodium berghei, Phaeodactylum tricoronatum, Thalassiosira pseudonana, Pythium ultimum, Alticus labachii, Hyaloperonospora arabidopsis, Phytophthora ramorum, Phytophthora infestans, Phytophthora sojae, Trypanosoma brucei, Trypanosoma cruzi strain CL Brener, Leishmania brasiliensis MHOM BR 75 M2904, Leishmania mexicana MHOM GT 2001 U1103, Leishmania major, Leishmania donovani, Leishmania infantum JPCM5, Entamoeba histolytica, Entamoeba dispar SAW760, Dictyostelium discoideum, Dictyostelium purpureum, Trichomonas vaginalis G3, Trichomonas vaginalis, Naegleria gruberi, Giardia lamblia ATCC 50803.

- OG presence
- OG absence



Dscore = 0.992

Pvalue = 9.85e-06

AdjPValue = 1.17e-03

# NOG148203

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Selaginella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium corynanthii  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus ochraceus  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodoros anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellmeri  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turriops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsus syrichta  
Calithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricoronatum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hyaloperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 6.27e-06  
AdjPValue = 7.46e-04

# NOG148585

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Mus acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus terreus  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRRL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisporra phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor K 45  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Cedrus morhuza  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucurus  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.778  
 Pvalue = 4.23e-04  
 AdjPValue = 5.04e-02

# NOG150593

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, including plants, fungi, and animals, with a clear separation from prokaryotes like *Bacillus* and *Escherichia coli*.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Schagrinella moellendorffii*
- Physcomitrium patens*
- Ostreococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emerickella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowia II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Alticus labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence

OG absence

Inferred root

Dscore = 0.937

Pvalue = 2.16e-05

AdjPValue = 2.57e-03

NOG151739



Dscore = 0.9  
Pvalue = 1.39

AdjPvalue =

# NOG151858

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent organisms where the Outgroup (OG) was present, while grey circles represent where it was absent. The tree shows a dense cluster of eukaryotes, with a prominent clade including plants like Arabidopsis thaliana, Oryza sativa Indica Group, and Zea mays, along with fungi such as Aspergillus fumigatus and Trichophyton rubrum.

- OG presence (green circle): Arabidopsis thaliana, Arabidopsis lyrata, Brassica rapa, Glycine max, Populus trichocarpa, Vitis vinifera, Solanum tuberosum, Solanum lycopersicum, Oryza sativa Indica Group, Oryza sativa Japonica Group, Oryza brachyantha, Oryza glaberrima, Hordeum vulgare, Brachypodium distachyon, Zea mays, Sorghum bicolor, Setaria italica, Musa acuminata, Selaginella moellendorffii, Physcomitrium patens, Ostreococcus tauri, Ostreococcus lucimarinus CCE9901, Chlamydomonas reinhardtii, Cyanidioschyzon merolae, Encephalitozoon hellem ATCC 50504, Encephalitozoon intestinalis ATCC 50506, Encephalitozoon cuniculi GB M1, Puccinia graminis, Puccinia triticina, Ustilago maydis, Malassezia globosa CBS 7966, Cryptococcus gattii WM276, Cryptococcus neoformans var. neoformans JEC21, Cryptococcus neoformans var. neoformans B 3501A, Phanerochaete chrysosporium, Schizophyllum commune H4 8, Coprinopsis cinerea okayama7\_130, Laccaria bicolor S238N H82, Schizosaccharomyces japonicus yFS275, Schizosaccharomyces pombe, Clavicipitaceae ATCC 42720, Leucaspis yunnanensis, Candida tropicalis MYA 3404, Candida dubliniensis CD36, Lodderomyces elongisporus NRR YB 4239, Scheffersomyces stipitis CBS 6054, Meyeromyza guilliermondii ATCC 6260, Pichia guilliermondii, Lachancea thermotolerans, Kluyveromyces lactis NRRRL Y 1140, Saccharomyces cerevisiae, Zygosaccharomyces rouxii, Komagataella pastoris GS115, Vanderwaltozyma polyspora DSM 70294, Torulaspora delbrueckii, Candida glabrata CBS 138, Tetrapisispora phaffii CBS 4417, Naumovozyma dairensensis CBS 421, Naumovozyma castelli CBS 4309, Eremothecium cymbalariae DBVPG\_7215, Eremothecium corynanthii, Tuber melanosporum, Zymoseptoria tritici, Phaeosphaeria nodorum, Leptosphaeria maculans, Pyrenophora tritici repens Pt 1C BFP, Pyrenophora teres f. teres 0 1, Botryotinia fuckeliana, Sclerotinia sclerotiorum, Verticillium albo atrum VaMs.102, Fusarium oxysporum, Hypocrea viridis, Hypocreasclerina, Nectria haematococca, Gibberella moniliiformis, Gibberella zeae PH 1, Gibberella zeae, Gaeumannomyces graminis, Magnaporthe grisea, Magnaporthe poae, Magnaporthe oryzae, Podospora anserina S mat, Neurospora crassa, Sclerotinia sclerotiorum k hell, Myceliophthora thermophila ATCC 42464, Chaetomium globosum CBS 148.51, Thielavia terrestris NRRRL 8126, Uncinocarpus reesii 1704, Ajellomyces capsulatus NAm1, Ajellomyces dermatitidis SLH14081, Paracoccidioides sp. lutzi Pb01, Coccidioides posadasii C735 delta SOWgp, Coccidioides immitis RS, Trichophyton rubrum CBS 118892, Trichophyton verrucosum HKI 0517, Arthroderma benhamiae CBS 112371, Arthroderma gypseum CBS 118893, Arthroderma otiae CBS 113480, Talaromyces stipitatus ATCC 10500, Neosartorya fischeri, Emericella nidulans, Penicillium chrysogenum Wisconsin 54 1255, Penicillium marneffei ATCC 18224, Aspergillus clavatus, Aspergillus flavus, Aspergillus oryzae, Aspergillus niger, Aspergillus fumigatus, Aspergillus terreus, Monosiga brevicollis MX1, Amphimedon queenslandica, Trichoplax adhaerens, Nematostella vectensis, Hydra magnipapillata, Schistosoma mansoni, Trichinella spiralis, Pristionchus pacificus, Caenorhabditis brenneri, Caenorhabditis briggsae, Caenorhabditis remanei, Caenorhabditis japonica, Caenorhabditis elegans, Ixodes scapularis, Daphnia pulex, Pediculus humanus, Aedes vexans plenum, Tribolium castaneum, Nasoia vitripennis, Apis mellifera, Atta cephalotes, Bombyx mori, Danaus plexippus, Heliconius melpomene, Culex quinquefasciatus, Aedes aegypti, Anopheles gambiae, Anopheles darlingi, Drosophila virilis, Drosophila grimshawi, Drosophila willistoni, Drosophila pseudoobscura, Drosophila ananassae, Drosophila melanogaster, Drosophila yakuba, Strongylocentrotus purpuratus, Branchiostoma floridae, Ciona intestinalis, Ciona savignyi, Petromyzon marinus, Danio rerio, Gadus morhua, Oreochromis niloticus, Takifugu rubripes, Tetraodon nigroviridis, Gasterosteus aculeatus, Xiphophorus maculatus, Oryzias latipes, Latimeria chalumnae, Xenopus (Silurana) tropicalis, Pelodiscus sinensis, Anolis carolinensis, Taenioptynx guttata, Gallus gallus, Meleagris gallopavo, Ornithodoros anatinus, Monodelphis domestica, Sarcophilus harrisii, Macropus eugenii, Dasyurus maculatus, Loxodontidae cinctus, Loxodonta africana, Echinops tellinii, Procavia capensis, Myotis lucifugus, Pteropus vampyrus, Sus scrofa, Tursiops truncatus, Bos taurus, Equus caballus, Felis catus, Canis lupus familiaris, Mustela putorius furo, Ailuropoda melanoleuca, Oryctolagus cuniculus, Cavia porcellus, Ictidomys tridecemlineatus, Dipodomys ordii, Rattus norvegicus, Mus musculus, Tupaia belangeri, Didelphis garnettii, Microtus marmarinus, Tarsius syrichta, Callithrix jacchus, Macaca mulatta, Nomascus leucogenys, Pongo abelii, Gorilla gorilla, Pan troglodytes, Homo sapiens, Perkinsus marinus ATCC 50983, Tetrahymena thermophila, Paramecium tetraurelia strain d4 2, Neospora caninum Liverpool, Toxoplasma gondii, Cryptosporidium muris RN66, Cryptosporidium parvum Iowa II, Cryptosporidium hominis TU502, Theileria annulata strain Ankara, Theileria parva strain Muguga, Plasmodium falciparum, Plasmodium knowlesi, Plasmodium vivax, Plasmodium chabaudi, Plasmodium yoelii yoelii 17XNL, Plasmodium berghei, Phaeodactylum tricoronatum, Thalassiosira pseudonana, Pythium ultimum, Alticus labachii, Hyaloperonospora arabidopsis, Phytophthora ramorum, Phytophthora infestans, Phytophthora sojae, Trypanosoma brucei, Trypanosoma cruzi strain CL Brener, Leishmania brasiliensis MHOM BR 75 M2904, Leishmania mexicana MHOM GT 2001 U1103, Leishmania major, Leishmania donovani, Leishmania infantum JPCM5, Entamoeba histolytica, Entamoeba dispar SAW760, Dictyostelium discoideum, Dictyostelium purpureum, Trichomonas vaginalis G3, Trichomonas vaginalis, Naegleria gruberi, Giardia lamblia ATCC 50803.

- OG presence (green circle)
- OG absence (grey circle)
- Inferred root (red diamond)

Dscore = 1  
Pvalue = 4.24e-06  
AdjPValue = 5.05e-04

# NOG152378

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Thlaspiella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoea  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellmeri  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogaster  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricorum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 0.993  
Pvalue = 1.13e-05  
AdjPValue = 1.34e-03

# NOG157462

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a significant number of plant species (green circles) and a smaller cluster of protists and fungi.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotricha tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
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- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonta africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence

Inferred root

Dscore = 1

Pvalue = 3.76e-06

AdjPValue = 4.48e-04

# NOG158362

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus terreus  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRRL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium corynomyces  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematozoea  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodontidae  
 Loxodonta africana  
 Echinops tellmeri  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Turcicus truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.869  
 Pvalue = 9.18e-05  
 AdjPValue = 1.09e-02

# NOG18420

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.794  
 Pvalue = 6.79e-04  
 AdjPValue = 8.08e-02

<img alt="A phylogenetic tree diagram showing the evolutionary relationships between various organisms. The tree is rooted at the bottom left with a red diamond symbol. The nodes are colored according to their presence (green) or absence (grey) of OGs. The tree branches out towards the top right, with many nodes being green, indicating they have OGs. The organisms listed along the branches include: Arabidopsis thaliana, Arabidopsis lyrata, Brassica rapa, Glycine max, Populus trichocarpa, Vitis vinifera, Solanum tuberosum, Solanum lycopersicum, Oryza sativa Indica Group, Oryza sativa Japonica Group, Oryza brachyantha, Oryza glaberrima, Hordeum vulgare, Brachypodium distachyon, Zea mays, Sorghum bicolor, Setaria italica, Musa acuminata, Selaginella moellendorffii, Psathyrotes ramosissima, Ostreococcus tauri, Ostreococcus lucimarinus CCE9901, Chlamydomonas reinhardtii, Cyanidioschyzon merolae, Encephalitozoon hellem ATCC 50504, Encephalitozoon intestinalis ATCC 50506, Encephalitozoon cuniculi GB M1, Puccinia graminis, Puccinia tritici, Ustilago maydis, Malassezia globosa CBS 7966, Cryptococcus gattii WM276, Cryptococcus neoformans var. neoformans JEC21, Cryptococcus neoformans var. neoformans B 3501A, Phanerochaete chrysosporium, Schizophyllum commune H4 8, Coprinopsis cinerea okayama7\_130, Laccaria bicolor S238N H82, Schizosaccharomyces japonicus yFS275, Schizosaccharomyces pombe, Claviceps fusiformis ATCC 42720, Candida tropicalis MYA 3404, Candida dubliniensis CD36, Lodderomyces elongisporus NRRRL YB 4239, Scheffersomyces stipitis CBS 6054, Meyeromyza guilliermondii ATCC 6260, Pichia guilliermondii, Lachancea thermotolerans, Kluyveromyces lactis NRRRL Y 1140, Saccharomyces cerevisiae, Zygosaccharomyces rouxii, Komagataella pastoris GS115, Vanderwaltozyma polyspora DSM 70294, Torulaspora delbrueckii, Candida glabrata CBS 138, Tetrapispora phaffii CBS 4417, Naumovozyma dairensensis CBS 421, Naumovozyma castelli CBS 4309, Eremothecium cymbalariae DBVPG\_7215, Eremothecium corynanthii, Tuber melanosporum, Zymoseptoria tritici, Phaeosphaeria nodorum, Leptosphaeria maculans, Pyrenophora tritici repens Pt 1C BFP, Pyrenophora teres f. teres 0 1, Botryotinia fuckeliana, Sclerotinia sclerotiorum, Verticillium albo atrum VaMs.102, Fusarium oxysporum, Hypocrea virens, Hypocreasclerina, Nectria haematozoe, Gibberella moniliiformis, Gibberella zeae PH 1, Gibberella zeae, Gaeumannomyces graminis, Magnaporthe grisea, Magnaporthe poae, Magnaporthe oryzae, Podospora anserina S mat, Neurospora crassa, Aspergillus terreus k hell, Myceliophthora thermophila ATCC 42464, Chaetomium globosum CBS 8126, Thielavia terrestrial NRRRL 8126, Uncinocarpus reesii 1704, Ajellomyces capsulatus NAm1, Ajellomyces dermatitidis SLH14081, Paracoccidioides sp. lutzi Pb01, Coccidioides posadasii C735 delta SOWgp, Coccidioides immitis RS, Trichophyton rubrum CBS 118892, Trichophyton verrucosum HKI 0517, Arthroderma benhamiae CBS 112371, Arthroderma gypseum CBS 118893, Arthroderma otiae CBS 113480, Talaromyces stipitatus ATCC 10500, Neosartorya fischeri, Emericella nidulans, Penicillium chrysogenum Wisconsin 54 1255, Penicillium marneffei ATCC 18224, Aspergillus clavatus, Aspergillus flavus, Aspergillus oryzae, Aspergillus niger, Aspergillus fumigatus, Aspergillus terreus, Monosiga brevicollis MX1, Amphimedon queenslandica, Trichoplax adhaerens, Nematoscella vectensis, Hydra magnipapillata, Schistosoma mansoni, Trichinella spiralis, Pristonchus pacificus, Caenorhabditis brenneri, Caenorhabditis briggsae, Caenorhabditis remanei, Caenorhabditis japonica, Caenorhabditis elegans, Xodes scapularis, Daphnia pulex, Pediculus humanus, Hippocampus plumieri, Tribolium castaneum, Nasoia vitripennis, Apis mellifera, Atta cephalotes, Bombyx mori, Danaus plexippus, Heliconius melpomene, Culex quinquefasciatus, Aedes aegypti, Anopheles gambiae, Anopheles darlingi, Drosophila virilis, Drosophila grimshawi, Drosophila willistoni, Drosophila pseudoobscura, Drosophila ananasae, Drosophila melanogaster, Drosophila yakuba, Strongylocentrotus purpuratus, Branchiostoma floridae, Ciona intestinalis, Ciona savignyi, Petromyzon marinus, Danio rerio, Gadus morhua, Oreochromis niloticus, Takifugu rubripes, Tetraodon nigroviridis, Gasterosteus aculeatus, Xiphophorus maculatus, Oryzias latipes, Latimeria chalumnae, Xenopus (Silurana) tropicalis, Pelodiscus sinensis, Anolis carolinensis, Taenioptynx guttata, Gallus gallus, Meleagris gallopavo, Ornithodoros anatinus, Monodelphis domestica, Sarcophilus harrisii, Macropus eugenii, Cercartetus cinctus, Loxodontida africana, Echinops tellima, Procavia capensis, Myotis lucifugus, Peropus vampyrus, Sus scrofa, Turdus truncatus, Bos taurus, Equus caballus, Felis catus, Canis lupus familiaris, Mustela putorius furo, Alliropoda melanoleuca, Oryctolagus cuniculus, Cavia porcellus, Cidomys tridecemlineatus, Dipodomys ordii, Rattus norvegicus, Mus musculus, Tupaia belangeri, Didelphis garnettii, Microtus arcticus, Tarsus syrichta, Callithrix jacchus, Macaca mulatta, Nomascus leucogenys, Pongo abelii, Gorilla gorilla, Pan troglodytes, Homo sapiens, Perkinsus marinus ATCC 50983, Tetrahymena thermophila, Paramecium tetraurelia strain d4 2, Neospora caninum Liverpool, Toxoplasma gondii, Cryptosporidium muris RN66, Cryptosporidium parvum Iowa II, Cryptosporidium hominis TU502, Theileria annulata strain Ankara, Theileria parva strain Muguga, Plasmodium falciparum, Plasmodium knowlesi, Plasmodium vivax, Plasmodium chabaudi, Plasmodium yoelii yoelii 17XNL, Plasmodium berghei, Haemadactylus tricornutum, Thalassiosira pseudonana, Pythium ultimum, Alticus labachii, Hyaloperonospora arabidopsis, Phytophthora ramorum, Phytophthora infestans, Phytophthora sojae, Trypanosoma brucei, Trypanosoma cruzi strain CL Brener, Leishmania brasiliensis MHOM BR 75 M2904, Leishmania mexicana MHOM GT 2001 U1103, Leishmania major, Leishmania donovani, Leishmania infantum JPCM5, Entamoeba histolytica, Entamoeba dispar SAW760, Dityostopium diotopodium, Dictyostelium purpureum, Trichomonas vaginalis G3, Trichomonas vaginalis, Naegleria gruberi, Giardia lamblia ATCC 50803
 </p>

# NOG185758



OG presence

OG absence

Inferred root

Dscore = 0.987

Pvalue = 2.91e-06

AdjPValue = 3.46e-04

# NOG191381

The phylogenetic tree illustrates the evolutionary relationships between various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, including plants, fungi, and animals, with a clear separation from prokaryotes like *Bacillus* and *Escherichia coli*.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavispora lusitaniae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence

OG absence

Inferred root

Dscore = 0.905

Pvalue = 2.19e-05

AdjPValue = 2.61e-03

# NOG19163

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrium patens*  
*Osteosporus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematozoecca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence

◆ Inferred root

Dscore = 1  
Pvalue = 8.84e-06  
AdjPValue = 1.05e-03

# NOG19390

Phylogenetic tree illustrating the distribution of Organellar Genes (OG) across various species. The tree is rooted at the bottom left. A red diamond marks the inferred root. Green circles indicate where OG are present, while grey circles indicate where they are absent. The tree shows a complex branching pattern with many long branches.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosarcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavicipitaceae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NArl1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microcebus murinus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence (green circle)

OG absence (grey circle)

Inferred root (red diamond)

Dscore = 0.877

Pvalue = 7.14e-05

AdjPValue = 8.49e-03

# NOG20146

OG presence

OG absence

Inferred root

Dscore = 0.884

Pvalue = 7.91e-05

AdjPValue = 9.42e-03

- Arabidopsis thaliana
- Arabidopsis lyrata
- Brassica rapa
- Glycine max
- Populus trichocarpa
- Vitis vinifera
- Solanum tuberosum
- Solanum lycopersicum
- Oryza sativa Indica Group
- Oryza sativa Japonica Group
- Oryza brachyantha
- Oryza glaberrima
- Hordeum vulgare
- Brachypodium distachyon
- Zea mays
- Sorghum bicolor
- Setaria italica
- Musa acuminata
- Selaginella moellendorffii
- Physcomitrium patens
- Osteosporus tauri
- Ostreococcus lucimarinus CCE9901
- Chlamydomonas reinhardtii
- Cyanidioschyzon merolae
- Encephalitozoon hellem ATCC 50504
- Encephalitozoon intestinalis ATCC 50506
- Encephalitozoon cuniculi GB M1
- Puccinia graminis
- Puccinia triticina
- Ustilago maydis
- Malassezia globosa CBS 7966
- Cryptococcus gattii WM276
- Cryptococcus neoformans var. neoformans JEC21
- Cryptococcus neoformans var. neoformans B 3501A
- Phanerochaete chrysosporium
- Schizophyllum commune H4 8
- Coprinopsis cinerea okayama7\_130
- Laccaria bicolor S238N H82
- Schizosaccharomyces japonicus yFS275
- Schizosaccharomyces pombe
- Clavispora lusitaniae ATCC 42720
- Candida tropicalis MYA 3404
- Candida dubliniensis CD36
- Lodderomyces elongisporus NRR YB 4239
- Schefersomyces stipitis CBS 6054
- Meyeromyza guilliermondii ATCC 6260
- Pichia guilliermondii
- Lachancea thermotolerans
- Kluyveromyces lactis NRR L 1140
- Saccharomyces cerevisiae
- Zygosaccharomyces rouxii
- Komagataella pastoris GS115
- Vanderwaltozyma polyspora DSM 70294
- Torulaspora delbrueckii
- Candida glabrata CBS 138
- Tetrapisporra phaffii CBS 4417
- Naumovozyma dairensensis CBS 421
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- Eremothecium cymbalariae DBVPG\_7215
- Eremothecium coryniforme
- Tuber melanosporum
- Zymesporangia tritici
- Phaeosphaeria nodorum
- Leptosphaeria maculans
- Pyrenophora tritici repens Pt 1C BFP
- Pyrenophora teres f. teres 0 1
- Botryotinia fuckeliana
- Sclerotinia sclerotiorum
- Verticillium albo atrum VaMs.102
- Fusarium oxysporum
- Hypocrea viridis
- Hypocrealescina
- Nectria haematococca
- Gibberella moniliiformis
- Gibberella zeae PH 1
- Gibberella zeae
- Gaeumannomyces graminis
- Magnaporthe grisea
- Magnaporthe poae
- Magnaporthe oryzae
- Podospora anserina S mat
- Neurospora crassa
- Neurospora crassa k hell
- Mycelopithophora thermophila ATCC 42464
- Chaetomium globosum CBS 148.51
- Thielavia terrestris NRR L 8126
- Uncinocarpus reesii 1704
- Ajellomyces capsulatus NAm1
- Ajellomyces dermatitidis SLH14081
- Paracoccidioides sp. lutzi Pb01
- Coccidioides posadasii C735 delta SOWgp
- Coccidioides immitis RS
- Trichophyton rubrum CBS 118892
- Trichophyton verrucosum HKI 0517
- Arthroderma benhamiae CBS 112371
- Arthroderma gypseum CBS 118893
- Arthroderma otiae CBS 113480
- Talaromyces stipitatus ATCC 10500
- Neosartorya fischeri
- Emmericella nidulans
- Penicillium chrysogenum Wisconsin 54 1255
- Penicillium marneffei ATCC 18224
- Aspergillus clavatus
- Aspergillus flavus
- Aspergillus oryzae
- Aspergillus niger
- Aspergillus fumigatus
- Aspergillus terreus
- Monosiga brevicollis MX1
- Amphimedon queenslandica
- Trichoplax adhaerens
- Nematostella vectensis
- Hydra magnipapillata
- Schistosoma mansoni
- Trichinella spiralis
- Pristionchus pacificus
- Caenorhabditis brenneri
- Caenorhabditis briggsae
- Caenorhabditis remanei
- Caenorhabditis japonica
- Caenorhabditis elegans
- Xodes scapularis
- Daphnia pulex
- Pediculus humanus
- Periplaneta americana
- Tribolium castaneum
- Nasonia vitripennis
- Apis mellifera
- Atta cephalotes
- Bombyx mori
- Danaus plexippus
- Heliconius melpomene
- Culex quinquefasciatus
- Aedes aegypti
- Anopheles gambiae
- Anopheles darlingi
- Drosophila virilis
- Drosophila grimshawi
- Drosophila willistoni
- Drosophila pseudoobscura
- Drosophila ananassae
- Drosophila melanogaster
- Drosophila yakuba
- Strongylocentrotus purpuratus
- Branchiostoma floridae
- Ciona intestinalis
- Ciona savignyi
- Petrosynopsis marinus
- Darwiniella reticulata
- Cedrus morhuza
- Oreochromis niloticus
- Takifugu rubripes
- Tetraodon nigroviridis
- Gasterosteus aculeatus
- Xiphophorus maculatus
- Oryzias latipes
- Latimeria chalumnae
- Xenopus (Silurana) tropicalis
- Pelodiscus sinensis
- Anolis carolinensis
- Taeniopygia guttata
- Gallus gallus
- Meleagris gallopavo
- Ornithodorus anatinus
- Monodelphis domestica
- Sarcophilus harrisii
- Macropus eugenii
- Dasyurus maculatus
- Lyrcus cinctus
- Locusta africana
- Echinops tellimagia
- Procavia capensis
- Myotis lucifugus
- Pteropus vampyrus
- Sus scrofa
- Tursiops truncatus
- Bos taurus
- Equus caballus
- Felis catus
- Canis lupus familiaris
- Mustela putorius furo
- Alliropoda melanoleuca
- Oryctolagus cuniculus
- Cavia porcellus
- Citellus tridecemlineatus
- Dipodomys ordii
- Rattus norvegicus
- Mus musculus
- Tupaia belangeri
- Otolemur garnettii
- Microtus arcticus
- Tarsius syrichta
- Calithrix jacchus
- Macaca mulatta
- Nomascus leucogenys
- Pongo abelii
- Gorilla gorilla
- Pan troglodytes
- Homo sapiens
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- Tetrahymena thermophila
- Paramecium tetraurelia strain d4 2
- Neospora caninum Liverpool
- Toxoplasma gondii
- Cryptosporidium muris RN66
- Cryptosporidium parvum Iowa II
- Cryptosporidium hominis TU502
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- Theileria parva strain Muguga
- Plasmodium falciparum
- Plasmodium knowlesi
- Plasmodium vivax
- Plasmodium chabaudi
- Plasmodium yoelii yoelii 17XNL
- Plasmodium berghei
- Phaeodactylum tricornutum
- Thalassiosira pseudonana
- Pythium ultimum
- Alticus labachii
- Hydroperonospora arabidopsis
- Phytophthora ramorum
- Phytophthora infestans
- Phytophthora sojae
- Trypanosoma brucei
- Trypanosoma cruzi strain CL Brener
- Leishmania brasiliensis MHOM BR 75 M2904
- Leishmania mexicana MHOM GT 2001 U1103
- Leishmania major
- Leishmania donovani
- Leishmania infantum JPCM5
- Entamoeba histolytica
- Entamoeba dispar SAW760
- Dictyostelium discoideum
- Dictyostelium purpureum
- Trichomonas vaginalis G3
- Trichomonas vaginalis
- Naegleria gruberi
- Giardia lamblia ATCC 50803

# NOG232612

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zygosporangium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematozoecca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emmericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus arcticus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium bergeri*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

**Dscore = 1**  
**Pvalue = 5.23e-07**  
**AdjPValue = 6.22e-05**

# NOG232879

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematozoecca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium bergeri*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

Dscore = 1

Pvalue = 2.56e-07

AdjPValue = 3.05e-05

OG presence

OG absence

Inferred root

# NOG232889

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 1.25e-06  
 AdjPValue = 1.48e-04

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
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*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
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*Komagataella pastoris GS115*  
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*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
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*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
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*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
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*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emmericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhu*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG232894

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
● *Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
○ *Neurospora k holl*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

Dscore = 0.667

Pvalue = 2.21e-06

AdjPValue = 2.63e-04

OG presence

OG absence

Inferred root

# NOG233164

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 5.17e-07  
 AdjPvalue = 6.15e-05

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrella patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisporia phaffii CBS 4417*  
*Naumovozyma dairensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zygosporina tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocrealescina*  
*Nectria haematozoea*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
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*Pan troglodytes*  
*Homo sapiens*  
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*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
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*Cryptosporidium muris RN66*  
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*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
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*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricoronatum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG234501

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrella patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
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*Puccinia triticina*  
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*Lodderomyces elongisporus NRR YB 4239*  
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*Torulaspora delbrueckii*  
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*Tetrapisispora phaffii CBS 4417*  
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*Eremothecium coryniforme*  
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*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocrealescincina*  
*Nectria haematozoea*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
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*Magnaporthe oryzae*  
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*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus arcticus*  
*Tarsus syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

Dscore = 1

Pvalue = 2.67e-07

AdjPValue = 3.18e-05

# NOG234820

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 9.40e-07  
 AdjPValue = 1.12e-04

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG235401

● OG presence  
○ OG absence  
◆ Inferred root

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zygosporina tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iwao II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

**Dscore = 1**  
**Pvalue = 3.53e-07**  
**AdjPValue = 4.21e-05**

# NOG236110

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.667  
 Pvalue = 3.50e-06  
 AdjPValue = 4.16e-04

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
● *Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_ 130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zygosporina tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus marmarinus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG236115

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 4.32e-07  
 AdjPvalue = 5.14e-05

*Arabidopsis thaliana*  
◆ *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporidium tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
○ *Neurospora kuhnei*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
○ *Pediculus humanus pilosum*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
○ *Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowia II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
○ *Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricorum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG237024

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.917  
 Pvalue = 1.52e-06  
 AdjPvalue = 1.80e-04

*Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
◆ *Brassica rapa*  
● *Glycine max*  
● *Populus trichocarpa*  
● *Vitis vinifera*  
● *Solanum tuberosum*  
● *Solanum lycopersicum*  
● *Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
● *Oryza brachyantha*  
● *Oryza glaberrima*  
● *Hordeum vulgare*  
● *Brachypodium distachyon*  
● *Zea mays*  
● *Sorghum bicolor*  
● *Setaria italica*  
● *Musa acuminata*  
● *Stagninella moellendorffii*  
● *Physcomitrium patens*  
● *Ostreococcus tauri*  
● *Ostreococcus lucimarinus CCE9901*  
● *Chlamydomonas reinhardtii*  
● *Cyanidioschyzon merolae*  
● *Encephalitozoon hellem ATCC 50504*  
● *Encephalitozoon intestinalis ATCC 50506*  
● *Encephalitozoon cuniculi GB M1*  
● *Puccinia graminis*  
● *Puccinia triticina*  
● *Ustilago maydis*  
● *Malassezia globosa CBS 7966*  
● *Cryptococcus gattii WM276*  
● *Cryptococcus neoformans var. neoformans JEC21*  
● *Cryptococcus neoformans var. neoformans B 3501A*  
● *Phanerochaete chrysosporium*  
● *Schizophyllum commune H4 8*  
● *Coprinopsis cinerea okayama7\_130*  
● *Laccaria bicolor S238N H82*  
● *Schizosaccharomyces japonicus yFS275*  
● *Schizosaccharomyces pombe*  
● *Clavispora lusitaniae ATCC 42720*  
● *Candida tropicalis MYA 3404*  
● *Candida dubliniensis CD36*  
● *Lodderomyces elongisporus NRR L YB 4239*  
● *Schefersomyces stipiti CBS 6054*  
● *Meyerozyma guilliermondii ATCC 6260*  
● *Pichia guilliermondii*  
● *Lachancea thermotolerans*  
● *Kluyveromyces lactis NRR L Y 1140*  
● *Saccharomyces cerevisiae*  
● *Zygosaccharomyces rouxii*  
● *Komagataella pastoris GS115*  
● *Vanderwaltozyma polyspora DSM 70294*  
● *Torulaspora delbrueckii*  
● *Candida glabrata CBS 138*  
● *Tetrapisispora phaffii CBS 4417*  
● *Naumovozyma dairensensis CBS 421*  
● *Naumovozyma castelli CBS 4309*  
● *Eremothecium cymbalariae DBVPG\_7215*  
● *Eremothecium coryniforme*  
● *Tuber melanosporum*  
● *Zymesporidium tritici*  
● *Phaeosphaeria nodorum*  
● *Leptosphaeria maculans*  
● *Pyrenophora tritici repens Pt 1C BFP*  
● *Pyrenophora teres f. teres 0 1*  
● *Botryotinia fuckeliana*  
● *Sclerotinia sclerotiorum*  
● *Verticillium albo atrum VaMs.102*  
● *Fusarium oxysporum*  
● *Hypocreë virens*  
● *Hypocreë jecorina*  
● *Nectria haematococca*  
● *Gibberella moniliiformis*  
● *Gibberella zeae PH 1*  
● *Gibberella zeae*  
● *Gaeumannomyces graminis*  
● *Magnaporthe grisea*  
● *Magnaporthe poae*  
● *Magnaporthe oryzae*  
● *Podospora anserina S mat*  
● *Neurospora crassa*  
● *Neurospora crassa k hell*  
● *Mycelopithophthora thermophila ATCC 42464*  
● *Chaetomium globosum CBS 148.51*  
● *Thielavia terrestris NRR L 8126*  
● *Uncinocarpus reesii 1704*  
● *Ajellomyces capsulatus NAm1*  
● *Ajellomyces dermatitidis SLH14081*  
● *Paracoccidioides sp. lutzi Pb01*  
● *Coccidioides posadasii C735 delta SOWgp*  
● *Coccidioides immitis RS*  
● *Trichophyton rubrum CBS 118892*  
● *Trichophyton verrucosum HKI 0517*  
● *Arthroderma benhamiae CBS 112371*  
● *Arthroderma gypseum CBS 118893*  
● *Arthroderma otiae CBS 113480*  
● *Talaromyces stipitatus ATCC 10500*  
● *Neosartorya fischeri*  
● *Emerickella nidulans*  
● *Penicillium chrysogenum Wisconsin 54 1255*  
● *Penicillium marneffei ATCC 18224*  
● *Aspergillus clavatus*  
● *Aspergillus flavus*  
● *Aspergillus oryzae*  
● *Aspergillus niger*  
● *Aspergillus fumigatus*  
● *Aspergillus terreus*  
● *Monosiga brevicollis MX1*  
● *Amphimedon queenslandica*  
● *Trichoplax adhaerens*  
● *Nematostella vectensis*  
● *Hydra magnipapillata*  
● *Schistosoma mansoni*  
● *Trichinella spiralis*  
● *Pristionchus pacificus*  
● *Caenorhabditis brenneri*  
● *Caenorhabditis briggsae*  
● *Caenorhabditis remanei*  
● *Caenorhabditis japonica*  
● *Caenorhabditis elegans*  
● *Ixodes scapularis*  
● *Daphnia pulex*  
● *Pediculus humanus*  
● *Anthonomus grandis plenum*  
● *Tribolium castaneum*  
● *Nasonia vitripennis*  
● *Apis mellifera*  
● *Atta cephalotes*  
● *Bombyx mori*  
● *Danaus plexippus*  
● *Heliconius melpomene*  
● *Culex quinquefasciatus*  
● *Aedes aegypti*  
● *Anopheles gambiae*  
● *Anopheles darlingi*  
● *Drosophila virilis*  
● *Drosophila grimshawi*  
● *Drosophila willistoni*  
● *Drosophila pseudoobscura*  
● *Drosophila ananassae*  
● *Drosophila melanogaster*  
● *Drosophila yakuba*  
● *Strongylocentrotus purpuratus*  
● *Branchiostoma floridae*  
● *Ciona intestinalis*  
● *Ciona savignyi*  
● *Petromyzon marinus*  
● *Danio rerio*  
● *Cedrus morhuza*  
● *Oreochromis niloticus*  
● *Takifugu rubripes*  
● *Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
● *Xiphophorus maculatus*  
● *Oryzias latipes*  
● *Latimeria chalumnae*  
● *Xenopus (Silurana) tropicalis*  
● *Pelodiscus sinensis*  
● *Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
● *Meleagris gallopavo*  
● *Ornithorhynchus anatinus*  
● *Monodelphis domestica*  
● *Sarcophilus harrisii*  
● *Macropus eugenii*  
● *Dasyurus maculatus*  
● *Lorcdonia africana*  
● *Echinops tellinii*  
● *Procavia capensis*  
● *Myotis lucifugus*  
● *Pteropus vampyrus*  
● *Sus scrofa*  
● *Tursiops truncatus*  
● *Bos taurus*  
● *Equus caballus*  
● *Felis catus*  
● *Canis lupus familiaris*  
● *Mustela putorius furo*  
● *Ailuropoda melanoleuca*  
● *Oryctolagus cuniculus*  
● *Cavia porcellus*  
● *Ictidomys tridecemlineatus*  
● *Dipodomys ordii*  
● *Rattus norvegicus*  
● *Mus musculus*  
● *Tupaia belangeri*  
● *Dolichur garnettii*  
● *Microtus leucogenys*  
● *Tarsius syrichta*  
● *Callithrix jacchus*  
● *Macaca mulatta*  
● *Nomascus leucogenys*  
● *Pongo abelii*  
● *Gorilla gorilla*  
● *Pan troglodytes*  
● *Homo sapiens*  
● *Perkinsus marinus ATCC 50983*  
● *Tetrahymena thermophila*  
● *Paramecium tetraurelia strain d4 2*  
● *Neospora caninum Liverpool*  
● *Toxoplasma gondii*  
● *Cryptosporidium muris RN66*  
● *Cryptosporidium parvum Iowa II*  
● *Cryptosporidium hominis TU502*  
● *Theileria annulata strain Ankara*  
● *Theileria parva strain Muguga*  
● *Plasmodium falciparum*  
● *Plasmodium knowlesi*  
● *Plasmodium chabaudi*  
● *Plasmodium yoelii yoelii 17XNL*  
● *Plasmodium berghei*  
● *Phaeodactylum tricoronatum*  
● *Thalassiosira pseudonana*  
● *Pithyma ultimum*  
● *Alticus labachii*  
● *Hyalellamorosa arabidopsis*  
● *Phytophthora ramorum*  
● *Phytophthora infestans*  
● *Phytophthora sojae*  
● *Trypanosoma brucei*  
● *Trypanosoma cruzi strain CL Brener*  
● *Leishmania brasiliensis MHOM BR 75 M2904*  
● *Leishmania mexicana MHOM GT 2001 U1103*  
● *Leishmania major*  
● *Leishmania donovani*  
● *Leishmania infantum JPCM5*  
● *Entamoeba histolytica*  
● *Entamoeba dispar SAW760*  
● *Dictyostelium discoideum*  
● *Dictyostelium purpureum*  
● *Trichomonas vaginalis G3*  
● *Trichomonas vaginalis*  
● *Naegleria gruberi*  
● *Giardia lamblia ATCC 50803*

# NOG24542

● OG presence  
○ OG absence  
◆ Inferred root

● *Arabidopsis thaliana*  
● *Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
● *Oryza sativa Japonica Group*  
● *Oryza brachyantha*  
● *Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Selaginella moellendorffii*  
*Physcomitrium patens*  
*Osmunda cinnamomea*  
*Ostreococcus lucimarinus CCE9901*  
● *Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
● *Neurospora crassa k hell*  
*Mycelopithophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
*Paracoccidioides sp. lutzi Pb01*  
*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emmericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
● *Takifugu rubripes*  
*Tetraodon nigroviridis*  
● *Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
● *Taeniopygia guttata*  
● *Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
● *Lonchura africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
● *Equus caballus*  
*Felis catus*  
● *Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
● *Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

Dscore = 0.73

Pvalue = 1.55e-03

AdjPValue = 1.85e-01

OG presence

OG absence

Inferred root

# NOG24739

Phylogenetic tree illustrating the distribution of Organellar Genes (OG) across various species. The tree is rooted at the bottom left. A red diamond marks the inferred root. Green circles indicate where OG are present, while grey circles indicate where they are absent. The tree shows a complex branching pattern with many long branches.

- Arabidopsis thaliana
- Arabidopsis lyrata
- Brassica rapa
- Glycine max
- Populus trichocarpa
- Vitis vinifera
- Solanum tuberosum
- Solanum lycopersicum
- Oryza sativa Indica Group
- Oryza sativa Japonica Group
- Oryza brachyantha
- Oryza glaberrima
- Hordeum vulgare
- Brachypodium distachyon
- Zea mays
- Sorghum bicolor
- Setaria italica
- Musa acuminata
- Selaginella moellendorffii
- Physcomitrium patens
- Osteosporascus suave
- Ostreococcus lucimarinus CCE9901
- Chlamydomonas reinhardtii
- Cyanidioschyzon merolae
- Encephalitozoon hellem ATCC 50504
- Encephalitozoon intestinalis ATCC 50506
- Encephalitozoon cuniculi GB M1
- Puccinia graminis
- Puccinia triticina
- Ustilago maydis
- Malassezia globosa CBS 7966
- Cryptococcus gattii WM276
- Cryptococcus neoformans var. neoformans JEC21
- Cryptococcus neoformans var. neoformans B 3501A
- Phanerochaete chrysosporium
- Schizophyllum commune H4 8
- Coprinopsis cinerea okayama7\_130
- Laccaria bicolor S238N H82
- Schizosaccharomyces japonicus yFS275
- Schizosaccharomyces pombe
- Clavispora lusitaniae ATCC 42720
- Candida tropicalis MYA 3404
- Candida dubliniensis CD36
- Lodderomyces elongisporus NRR L YB 4239
- Schefersomyces stipiti CBS 6054
- Meyeromyza guilliermondii ATCC 6260
- Pichia guilliermondii
- Lachancea thermotolerans
- Kluyveromyces lactis NRR L Y 1140
- Saccharomyces cerevisiae
- Zygosaccharomyces rouxii
- Komagataella pastoris GS115
- Vanderwaltozyma polyspora DSM 70294
- Torulaspora delbrueckii
- Candida glabrata CBS 138
- Tetrapisispora phaffii CBS 4417
- Naumovozyma dairensensis CBS 421
- Naumovozyma castelli CBS 4309
- Eremothecium cymbalariae DBVPG\_7215
- Eremothecium corynifus
- Tuber melanosporum
- Zymesporangia tritici
- Phaeosphaeria nodorum
- Leptosphaeria maculans
- Pyrenophora tritici repens Pt 1C BFP
- Pyrenophora teres f. teres 0 1
- Botryotinia fuckeliana
- Sclerotinia sclerotiorum
- Verticillium albo atrum VaMs.102
- Fusarium oxysporum
- Hypocrea viridis
- Hypocreales jeckerina
- Nectria haematococca
- Gibberella moniliiformis
- Gibberella zeae PH 1
- Gibberella zeae
- Gaeumannomyces graminis
- Magnaporthe grisea
- Magnaporthe poae
- Magnaporthe oryzae
- Podospora anserina S mat
- Neurospora crassa
- Neurospora crassa k hell
- Mycelopithophthora thermophila ATCC 42464
- Chaetomium globosum CBS 148.51
- Thielavia terrestris NRR L 8126
- Uncinocarpus reesii 1704
- Ajellomyces capsulatus NAm1
- Ajellomyces dermatitidis SLH14081
- Paracoccidioides sp. lutzi Pb01
- Coccidioides posadasii C735 delta SOWgp
- Coccidioides immitis RS
- Trichophyton rubrum CBS 118892
- Trichophyton verrucosum HKI 0517
- Arthroderma benhamiae CBS 112371
- Arthroderma gypseum CBS 118893
- Arthroderma otiae CBS 113480
- Talaromyces stipitatus ATCC 10500
- Neosartorya fischeri
- Emericella nidulans
- Penicillium chrysogenum Wisconsin 54 1255
- Penicillium marneffei ATCC 18224
- Aspergillus clavatus
- Aspergillus flavus
- Aspergillus oryzae
- Aspergillus niger
- Aspergillus fumigatus
- Aspergillus terreus
- Monosiga brevicollis MX1
- Amphimedon queenslandica
- Trichoplax adhaerens
- Nematostella vectensis
- Hydra magnipapillata
- Schistosoma mansoni
- Trichinella spiralis
- Pristionchus pacificus
- Caenorhabditis brenneri
- Caenorhabditis briggsae
- Caenorhabditis remanei
- Caenorhabditis japonica
- Caenorhabditis elegans
- Ixodes scapularis
- Daphnia pulex
- Pediculus humanus
- Apion elongatum pilosum
- Tribolium castaneum
- Nasonia vitripennis
- Apis mellifera
- Atta cephalotes
- Bombyx mori
- Danaus plexippus
- Heliconius melpomene
- Culex quinquefasciatus
- Aedes aegypti
- Anopheles gambiae
- Anopheles darlingi
- Drosophila virilis
- Drosophila grimshawi
- Drosophila willistoni
- Drosophila pseudoobscura
- Drosophila ananassae
- Drosophila melanogaster
- Drosophila yakuba
- Strongylocentrotus purpuratus
- Branchiostoma floridae
- Ciona intestinalis
- Ciona savignyi
- Petromyzon marinus
- Danio rerio
- Cedrus morhuza
- Oreochromis niloticus
- Takifugu rubripes
- Tetraodon nigroviridis
- Gasterosteus aculeatus
- Xiphophorus maculatus
- Oryzias latipes
- Latimeria chalumnae
- Xenopus (Silurana) tropicalis
- Pelodiscus sinensis
- Anolis carolinensis
- Taeniopygia guttata
- Gallus gallus
- Meleagris gallopavo
- Ornithodorus anatinus
- Monodelphis domestica
- Sarcophilus harrisii
- Macropus eugenii
- Dasyurus maculatus
- Lorcinia africana
- Echinops tellinii
- Procavia capensis
- Myotis lucifugus
- Pteropus vampyrus
- Sus scrofa
- Tursiops truncatus
- Bos taurus
- Equus caballus
- Felis catus
- Canis lupus familiaris
- Mustela putorius furo
- Ailuropoda melanoleuca
- Oryctolagus cuniculus
- Cavia porcellus
- Ictidomys tridecemlineatus
- Dipodomys ordii
- Rattus norvegicus
- Mus musculus
- Tupaia belangeri
- Dolichur garnettii
- Microtus leucogaster
- Tarsus syrichta
- Callithrix jacchus
- Macaca mulatta
- Nomascus leucogenys
- Pongo abelii
- Gorilla gorilla
- Pan troglodytes
- Homo sapiens
- Perkinsus marinus ATCC 50983
- Tetrahymena thermophila
- Paramecium tetraurelia strain d4 2
- Neospora caninum Liverpool
- Toxoplasma gondii
- Cryptosporidium muris RN66
- Cryptosporidium parvum Iowa II
- Cryptosporidium hominis TU502
- Theileria annulata strain Ankara
- Theileria parva strain Muguga
- Plasmodium falciparum
- Plasmodium knowlesi
- Plasmodium vivax
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- Leishmania major
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- Entamoeba histolytica
- Entamoeba dispar SAW760
- Dictyostelium discoideum
- Dictyostelium purpureum
- Trichomonas vaginalis G3
- Trichomonas vaginalis
- Naegleria gruberi
- Giardia lamblia ATCC 50803

● OG presence

○ OG absence

◆ Inferred root

Dscore = 0.915

Pvalue = 5.81e-05

AdjPValue = 6.91e-03

# NOG26018

The phylogenetic tree illustrates the evolutionary relationships of various organisms. A red diamond at the top indicates the inferred root. Green circles represent OG presence, while grey circles represent OG absence. The tree shows a dense cluster of eukaryotic organisms, with a large clade on the left and a more diverse group on the right.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporascus suave*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
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- Puccinia triticina*
- Ustilago maydis*
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- Phanerochaete chrysosporium*
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- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
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- Candida tropicalis MYA 3404*
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- Lodderomyces elongisporus NRR L YB 4239*
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- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
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- Candida glabrata CBS 138*
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- Naumovozyma dairensensis CBS 421*
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- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
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- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
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- Neurospora crassa k hell*
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- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
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- Ajellomyces dermatitidis SLH14081*
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- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowa II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricornutum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 9.15e-06  
AdjPValue = 1.09e-03

# NOG269739

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Thlaspiella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_ 130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus terreus MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRR YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRR Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Rhizopus microsporus k hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRR 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucogenys  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.667  
 Pvalue = 4.24e-04  
 AdjPValue = 5.04e-02

# NOG271274

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
 Oryza sativa Indica Group  
 Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Stagonelina moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavicipitaceae ATCC 42720  
 Aspergillus terreus MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRYL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium corynomyces  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocreë virens  
 Hypocreë jecorina  
 Nectria haematococca  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
 Aspergillus versicolor K hell  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emericella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis cinctus  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis garnettii  
 Microtus leucurus  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
 Perkinsus marinus ATCC 50983  
 Tetrahymena thermophila  
 Paramecium tetraurelia strain d4 2  
 Neospora caninum Liverpool  
 Toxoplasma gondii  
 Cryptosporidium muris RN66  
 Cryptosporidium parvum Iowa II  
 Cryptosporidium hominis TU502  
 Theileria annulata strain Ankara  
 Theileria parva strain Muguga  
 Plasmodium falciparum  
 Plasmodium knowlesi  
 Plasmodium vivax  
 Plasmodium chabaudi  
 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
 Phytophthora ramorum  
 Phytophthora infestans  
 Phytophthora sojae  
 Trypanosoma brucei  
 Trypanosoma cruzi strain CL Brener  
 Leishmania brasiliensis MHOM BR 75 M2904  
 Leishmania mexicana MHOM GT 2001 U1103  
 Leishmania major  
 Leishmania donovani  
 Leishmania infantum JPCM5  
 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.944  
 Pvalue = 5.24e-06  
 AdjPValue = 6.23e-04

# NOG272155

The tree diagram illustrates the evolutionary relationships among numerous species, color-coded by their presence (OG presence) or absence (OG absence) in the dataset. The inferred root is marked with a red diamond.

- OG presence (green):**
  - Arabidopsis thaliana
  - Arabidopsis lyrata
  - Brassica rapa
  - Glycine max
  - Populus trichocarpa
  - Vitis vinifera
  - Solanum tuberosum
  - Solanum lycopersicum
  - Oryza sativa Indica Group
  - Oryza sativa Japonica Group
  - Oryza brachyantha
  - Oryza glaberrima
  - Hordeum vulgare
  - Brachypodium distachyon
  - Zea mays
  - Sorghum bicolor
  - Setaria italica
  - Musa acuminata
  - Stagninella moellendorffii
  - Physcomitrium patens
  - Ostreococcus tauri
  - Ostreococcus lucimarinus CCE9901
  - Chlamydomonas reinhardtii
  - Cyanidioschyzon merolae
  - Encephalitozoon hellem ATCC 50504
  - Encephalitozoon intestinalis ATCC 50506
  - Encephalitozoon cuniculi GB M1
  - Puccinia graminis
  - Puccinia triticina
  - Ustilago maydis
  - Malassezia globosa CBS 7966
  - Cryptococcus gattii WM276
  - Cryptococcus neoformans var. neoformans JEC21
  - Cryptococcus neoformans var. neoformans B 3501A
  - Phanerochaete chrysosporium
  - Schizophyllum commune H4 8
  - Coprinopsis cinerea okayama7\_130
  - Laccaria bicolor S238N H82
  - Schizosaccharomyces japonicus yFS275
  - Schizosaccharomyces pombe
  - Clavispora lusitaniae ATCC 42720
  - Candida tropicalis MYA 3404
  - Candida dubliniensis CD36
  - Lodderomyces elongisporus NRR L YB 4239
  - Schefersomyces stipitis CBS 6054
  - Meyerozyma guilliermondii ATCC 6260
  - Pichia guilliermondii
  - Lachancea thermotolerans
  - Kluyveromyces lactis NRR L Y 1140
  - Saccharomyces cerevisiae
  - Zygosaccharomyces rouxii
  - Komagataella pastoris GS115
  - Vanderwaltozyma polyspora DSM 70294
  - Torulaspora delbrueckii
  - Candida glabrata CBS 138
  - Tetrapisispora phaffii CBS 4417
  - Naumovozyma dairensensis CBS 421
  - Naumovozyma castelli CBS 4309
  - Eremothecium cymbalariae DBVPG\_7215
  - Eremothecium coryniforme
  - Tuber melanosporum
  - Zymesporangia tritici
  - Phaeosphaeria nodorum
  - Leptosphaeria maculans
  - Pyrenophora tritici repens Pt 1C BFP
  - Pyrenophora teres f. teres 0 1
  - Botryotinia fuckeliana
  - Sclerotinia sclerotiorum
  - Verticillium albo atrum VaMs.102
  - Fusarium oxysporum
  - Hypocrea viridis
  - Hypocrea jecorina
  - Nectria haematococca
  - Gibberella moniliiformis
  - Gibberella zeae PH 1
  - Gibberella zeae
  - Gaeumannomyces graminis
  - Magnaporthe grisea
  - Magnaporthe poae
  - Magnaporthe oryzae
  - Podospora anserina S mat
  - Neurospora crassa
  - Neurospora crassa k hell
  - Mycelopithophthora thermophila ATCC 42464
  - Chaetomium globosum CBS 148.51
  - Thielavia terrestris NRR L 8126
  - Uncinocarpus reesii 1704
  - Ajellomyces capsulatus NAm1
  - Ajellomyces dermatitidis SLH14081
  - Paracoccidioides sp. lutzi Pb01
  - Coccidioides posadasii C735 delta SOWgp
  - Coccidioides immitis RS
  - Trichophyton rubrum CBS 118892
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  - Arthroderra benhamiae CBS 112371
  - Arthroderra gypseum CBS 118893
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  - Talaromyces stipitatus ATCC 10500
  - Neosartorya fischeri
  - Emericella nidulans
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  - Penicillium marneffei ATCC 18224
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  - Aspergillus flavus
  - Aspergillus oryzae
  - Aspergillus niger
  - Aspergillus fumigatus
  - Aspergillus terreus
  - Monosiga brevicollis MX1
  - Amphimedon queenslandica
  - Trichoplax adhaerens
  - Nematostella vectensis
  - Hydra magnipapillata
  - Schistosoma mansoni
  - Trichinella spiralis
  - Pristionchus pacificus
  - Caenorhabditis brenneri
  - Caenorhabditis briggsae
  - Caenorhabditis remanei
  - Caenorhabditis japonica
  - Caenorhabditis elegans
  - Ixodes scapularis
  - Daphnia pulex
  - Pediculus humanus
  - Anthonomus grandis
  - Tribolium castaneum
  - Nasonia vitripennis
  - Apis mellifera
  - Atta cephalotes
  - Bombyx mori
  - Danaus plexippus
  - Heliconius melpomene
  - Culex quinquefasciatus
  - Aedes aegypti
  - Anopheles gambiae
  - Anopheles darlingi
  - Drosophila virilis
  - Drosophila grimshawi
  - Drosophila willistoni
  - Drosophila pseudoobscura
  - Drosophila ananassae
  - Drosophila melanogaster
  - Drosophila yakuba
  - Strongylocentrotus purpuratus
  - Branchiostoma floridae
  - Ciona intestinalis
  - Ciona savignyi
  - Petromyzon marinus
  - Danio rerio
  - Cedrus morhuza
  - Oreochromis niloticus
  - Takifugu rubripes
  - Tetraodon nigroviridis
  - Gasterosteus aculeatus
  - Xiphophorus maculatus
  - Oryzias latipes
  - Latimeria chalumnae
  - Xenopus (Silurana) tropicalis
  - Pelodiscus sinensis
  - Anolis carolinensis
  - Taeniopygia guttata
  - Gallus gallus
  - Meleagris gallopavo
  - Ornithodorus anatinus
  - Monodelphis domestica
  - Sarcophilus harrisii
  - Macropus eugenii
  - Dasyurus maculatus
  - Lorcdonia africana
  - Echinops tellinii
  - Procavia capensis
  - Myotis lucifugus
  - Pteropus vampyrus
  - Sus scrofa
  - Tursiops truncatus
  - Bos taurus
  - Equus caballus
  - Felis catus
  - Canis lupus familiaris
  - Mustela putorius furo
  - Ailuropoda melanoleuca
  - Oryctolagus cuniculus
  - Cavia porcellus
  - Ictidomys tridecemlineatus
  - Dipodomys ordii
  - Rattus norvegicus
  - Mus musculus
  - Tupaia belangeri
  - Dolichur garnettii
  - Microtus arcticus
  - Tarsius syrichta
  - Callithrix jacchus
  - Macaca mulatta
  - Nomascus leucogenys
  - Pongo abelii
  - Gorilla gorilla
  - Pan troglodytes
  - Homo sapiens
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  - Tetrahymena thermophila
  - Paramecium tetraurelia strain d4 2
  - Neospora caninum Liverpool
  - Toxoplasma gondii
  - Cryptosporidium muris RN66
  - Cryptosporidium parvum Iwao II
  - Cryptosporidium hominis TU502
  - Theileria annulata strain Ankara
  - Theileria parva strain Muguga
  - Plasmodium falciparum
  - Plasmodium knowlesi
  - Plasmodium vivax
  - Plasmodium chabaudi
  - Plasmodium yoelii yoelii 17XNL
  - Plasmodium berghei
  - Phaeodactylum tricornutum
  - Thalassiosira pseudonana
  - Pythium ultimum
  - Altigo labachii
  - Hydroperonospora arabidopsis
  - Phytophthora ramorum
  - Phytophthora infestans
  - Phytophthora sojae
  - Trypanosoma brucei
  - Trypanosoma cruzi strain CL Brener
  - Leishmania brasiliensis MHOM BR 75 M2904
  - Leishmania mexicana MHOM GT 2001 U1103
  - Leishmania major
  - Leishmania donovani
  - Leishmania infantum JPCM5
  - Entamoeba histolytica
  - Entamoeba dispar SAW760
  - Dictyostelium discoideum
  - Dictyostelium purpureum
  - Trichomonas vaginalis G3
  - Trichomonas vaginalis
  - Naegleria gruberi
  - Giardia lamblia ATCC 50803

● OG presence

○ OG absence

◆ Inferred root

Dscore = 0.917

Pvalue = 3.18e-06

AdjPValue = 3.78e-04

# NOG275802

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagninella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_ 130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematozoecca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodoros anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonta africana  
Echinops tellinii  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turkiops truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus arcticus  
Tarsus syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SWA760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

OG presence  
OG absence  
Inferred root

Dscore = 1  
Pvalue = 1.67e-06  
AdjPValue = 1.99e-04

# NOG276879

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.917  
 Pvalue = 1.73e-06  
 AdjPValue = 2.06e-04

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa*  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Thlaspiella moellendorffii*  
*Physcomitrella patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
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*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR L 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
*Vanderwaltozyma polyspora DSM 70294*  
*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
*Tetrapisispora phaffii CBS 4417*  
*Naumovozyma dairensensis CBS 421*  
*Naumovozyma castelli CBS 4309*  
*Eremothecium cymbalariae DBVPG\_7215*  
*Eremothecium coryniforme*  
*Tuber melanosporum*  
*Zymesporangia tritici*  
*Phaeosphaeria nodorum*  
*Leptosphaeria maculans*  
*Pyrenophora tritici repens Pt 1C BFP*  
*Pyrenophora teres f. teres 0 1*  
*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematococca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
*Magnaporthe poae*  
*Magnaporthe oryzae*  
*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
*Myceliophthora thermophila ATCC 42464*  
*Chaetomium globosum CBS 148.51*  
*Thielavia terrestris NRR L 8126*  
*Uncinocarpus reesii 1704*  
*Ajellomyces capsulatus NAm1*  
*Ajellomyces dermatitidis SLH14081*  
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*Coccidioides posadasii C735 delta SOWgp*  
*Coccidioides immitis RS*  
*Trichophyton rubrum CBS 118892*  
*Trichophyton verrucosum HKI 0517*  
*Arthroderma benhamiae CBS 112371*  
*Arthroderma gypseum CBS 118893*  
*Arthroderma otiae CBS 113480*  
*Talaromyces stipitatus ATCC 10500*  
*Neosartorya fischeri*  
*Emericella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhu*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus marmotinus*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
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*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
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*Phytophthora ramorum*  
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*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
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*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

# NOG277769

*Arabidopsis thaliana*  
*Arabidopsis lyrata*  
*Brassica rapa* ◆  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
*Sorghum bicolor*  
*Setaria italica*  
*Musa acuminata*  
*Stagninella moellendorffii*  
*Physcomitrium patens*  
*Ostreococcus tauri*  
*Ostreococcus lucimarinus CCE9901*  
*Chlamydomonas reinhardtii*  
*Cyanidioschyzon merolae*  
*Encephalitozoon hellem ATCC 50504*  
*Encephalitozoon intestinalis ATCC 50506*  
*Encephalitozoon cuniculi GB M1*  
*Puccinia graminis*  
*Puccinia triticina*  
*Ustilago maydis*  
*Malassezia globosa CBS 7966*  
*Cryptococcus gattii WM276*  
*Cryptococcus neoformans var. neoformans JEC21*  
*Cryptococcus neoformans var. neoformans B 3501A*  
*Phanerochaete chrysosporium*  
*Schizophyllum commune H4 8*  
*Coprinopsis cinerea okayama7\_130*  
*Laccaria bicolor S238N H82*  
*Schizosaccharomyces japonicus yFS275*  
*Schizosaccharomyces pombe*  
*Clavispora lusitaniae ATCC 42720*  
*Candida tropicalis MYA 3404*  
*Candida dubliniensis CD36*  
*Lodderomyces elongisporus NRR L YB 4239*  
*Schefersomyces stipiti CBS 6054*  
*Meyerozyma guilliermondii ATCC 6260*  
*Pichia guilliermondii*  
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*Kluyveromyces lactis NRR L Y 1140*  
*Saccharomyces cerevisiae*  
*Zygosaccharomyces rouxii*  
*Komagataella pastoris GS115*  
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*Torulaspora delbrueckii*  
*Candida glabrata CBS 138*  
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*Naumovozyma dairensensis CBS 421*  
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*Phaeosphaeria nodorum*  
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*Botryotinia fuckeliana*  
*Sclerotinia sclerotiorum*  
*Verticillium albo atrum VaMs.102*  
*Fusarium oxysporum*  
*Hypocrea viridis*  
*Hypocreales jeckerina*  
*Nectria haematozoecca*  
*Gibberella moniliiformis*  
*Gibberella zeae PH 1*  
*Gibberella zeae*  
*Gaeumannomyces graminis*  
*Magnaporthe grisea*  
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*Podospora anserina S mat*  
*Neurospora crassa*  
*Neurospora crassa k hell*  
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*Chaetomium globosum CBS 148.51*  
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*Arthroderra gypseum CBS 118893*  
*Arthroderra otiae CBS 113480*  
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*Emerickella nidulans*  
*Penicillium chrysogenum Wisconsin 54 1255*  
*Penicillium marneffei ATCC 18224*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus oryzae*  
*Aspergillus niger*  
*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
*Amphimedon queenslandica*  
*Trichoplax adhaerens*  
*Nematostella vectensis*  
*Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
*Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
*Ciona savignyi*  
*Petromyzon marinus*  
*Danio rerio*  
*Cedrus morhuza*  
*Oreochromis niloticus*  
*Takifugu rubripes*  
*Tetraodon nigroviridis*  
*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
*Oryzias latipes*  
*Latimeria chalumnae*  
*Xenopus (Silurana) tropicalis*  
*Pelodiscus sinensis*  
*Anolis carolinensis*  
*Taeniopygia guttata*  
*Gallus gallus*  
*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellimus*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus leucogenys*  
*Tarsius syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
*Phaeodactylum tricornutum*  
*Thalassiosira pseudonana*  
*Pythium ultimum*  
*Altigo labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 1  
 Pvalue = 4.05e-07  
 AdjPValue = 4.82e-05

(Note: The tree diagram shows a complex phylogenetic relationship with many nodes colored green (OG presence), grey (OG absence), and red (Inferred root). The inferred root is located near the top of the tree, indicated by a red diamond symbol.)

# NOG29116

Arabidopsis thaliana  
 Arabidopsis lyrata  
 Brassica rapa  
 Glycine max  
 Populus trichocarpa  
 Vitis vinifera  
 Solanum tuberosum  
 Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
 Oryza brachyantha  
 Oryza glaberrima  
 Hordeum vulgare  
 Brachypodium distachyon  
 Zea mays  
 Sorghum bicolor  
 Setaria italica  
 Musa acuminata  
 Selaginella moellendorffii  
 Physcomitrium patens  
 Ostreococcus tauri  
 Ostreococcus lucimarinus CCE9901  
 Chlamydomonas reinhardtii  
 Cyanidioschyzon merolae  
 Encephalitozoon hellem ATCC 50504  
 Encephalitozoon intestinalis ATCC 50506  
 Encephalitozoon cuniculi GB M1  
 Puccinia graminis  
 Puccinia triticina  
 Ustilago maydis  
 Malassezia globosa CBS 7966  
 Cryptococcus gattii WM276  
 Cryptococcus neoformans var. neoformans JEC21  
 Cryptococcus neoformans var. neoformans B 3501A  
 Phanerochaete chrysosporium  
 Schizophyllum commune H4 8  
 Coprinopsis cinerea okayama7\_130  
 Laccaria bicolor S238N H82  
 Schizosaccharomyces japonicus yFS275  
 Schizosaccharomyces pombe  
 Clavispora lusitaniae ATCC 42720  
 Debaryomyces hansenii  
 Candida tropicalis MYA 3404  
 Candida dubliniensis CD36  
 Lodderomyces elongisporus NRRRL YB 4239  
 Scheffersomyces stipitis CBS 6054  
 Meyeromyza guilliermondii ATCC 6260  
 Pichia guilliermondii  
 Lachancea thermotolerans  
 Kluyveromyces lactis NRRRL Y 1140  
 Saccharomyces cerevisiae  
 Zygosaccharomyces rouxii  
 Komagataella pastoris GS115  
 Vanderwaltozyma polyspora DSM 70294  
 Torulaspora delbrueckii  
 Candida glabrata CBS 138  
 Tetrapisispora phaffii CBS 4417  
 Naumovozyma dairensensis CBS 421  
 Naumovozyma castelli CBS 4309  
 Eremothecium cymbalariae DBVPG\_7215  
 Eremothecium coryniforme  
 Tuber melanosporum  
 Zygosporangium tritici  
 Phaeosphaeria nodorum  
 Leptosphaeria maculans  
 Pyrenophora tritici repens Pt 1C BFP  
 Pyrenophora teres f. teres 0 1  
 Botryotinia fuckeliana  
 Sclerotinia sclerotiorum  
 Verticillium albo atrum VaMs.102  
 Fusarium oxysporum  
 Hypocrea viridis  
 Hypocreales  
 Nectria haematozoea  
 Gibberella moniliiformis  
 Gibberella zeae PH 1  
 Gibberella zeae  
 Gaeumannomyces graminis  
 Magnaporthe grisea  
 Magnaporthe poae  
 Magnaporthe oryzae  
 Podospora anserina S mat  
 Neurospora crassa  
Neurospora crassa  
 Myceliophthora thermophila ATCC 42464  
 Chaetomium globosum CBS 148.51  
 Thielavia terrestris NRRRL 8126  
 Uncinocarpus reesii 1704  
 Ajellomyces capsulatus NAm1  
 Ajellomyces dermatitidis SLH14081  
 Paracoccidioides sp. lutzi Pb01  
 Coccidioides posadasii C735 delta SOWgp  
 Coccidioides immitis RS  
 Trichophyton rubrum CBS 118892  
 Trichophyton verrucosum HKI 0517  
 Arthroderma benhamiae CBS 112371  
 Arthroderma gypseum CBS 118893  
 Arthroderma otiae CBS 113480  
 Talaromyces stipitatus ATCC 10500  
 Neosartorya fischeri  
 Emerickella nidulans  
 Penicillium chrysogenum Wisconsin 54 1255  
 Penicillium marneffei ATCC 18224  
 Aspergillus clavatus  
 Aspergillus flavus  
 Aspergillus oryzae  
 Aspergillus niger  
 Aspergillus fumigatus  
 Aspergillus terreus  
 Monosiga brevicollis MX1  
 Amphimedon queenslandica  
 Trichoplax adhaerens  
 Nematostella vectensis  
 Hydra magnipapillata  
 Schistosoma mansoni  
 Trichinella spiralis  
 Pristionchus pacificus  
 Caenorhabditis brenneri  
 Caenorhabditis briggsae  
 Caenorhabditis remanei  
 Caenorhabditis japonica  
 Caenorhabditis elegans  
 Ixodes scapularis  
 Daphnia pulex  
 Pediculus humanus  
 Aedes vexans plenum  
 Tribolium castaneum  
 Nasoia vitripennis  
 Apis mellifera  
 Atta cephalotes  
 Bombyx mori  
 Danaus plexippus  
 Heliconius melpomene  
 Culex quinquefasciatus  
 Aedes aegypti  
 Anopheles gambiae  
 Anopheles darlingi  
 Drosophila virilis  
 Drosophila grimshawi  
 Drosophila willistoni  
 Drosophila pseudoobscura  
 Drosophila ananassae  
 Drosophila melanogaster  
 Drosophila yakuba  
 Strongylocentrotus purpuratus  
 Branchiostoma floridae  
 Ciona intestinalis  
 Ciona savignyi  
 Petromyzon marinus  
 Danio rerio  
 Gadus morhua  
 Oreochromis niloticus  
 Takifugu rubripes  
 Tetraodon nigroviridis  
 Gasterosteus aculeatus  
 Xiphophorus maculatus  
 Oryzias latipes  
 Latimeria chalumnae  
 Xenopus (Silurana) tropicalis  
 Pelodiscus sinensis  
 Anolis carolinensis  
 Taeniopygia guttata  
 Gallus gallus  
 Meleagris gallopavo  
 Ornithodoros anatinus  
 Monodelphis domestica  
 Sarcophilus harrisii  
 Macropus eugenii  
 Delphinus delphis  
 Loxodonta africana  
 Echinops tellimus  
 Procavia capensis  
 Myotis lucifugus  
 Pteropus vampyrus  
 Sus scrofa  
 Tursiops truncatus  
 Bos taurus  
 Equus caballus  
 Felis catus  
 Canis lupus familiaris  
 Mustela putorius furo  
 Ailuropoda melanoleuca  
 Oryctolagus cuniculus  
 Cavia porcellus  
 Ictidomys tridecemlineatus  
 Dipodomys ordii  
 Rattus norvegicus  
 Mus musculus  
 Tupaia belangeri  
 Didelphis virginiana  
 Microtus marmotinus  
 Tarsius syrichta  
 Callithrix jacchus  
 Macaca mulatta  
 Nomascus leucogenys  
 Pongo abelii  
 Gorilla gorilla  
 Pan troglodytes  
 Homo sapiens  
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 Plasmodium vivax  
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 Plasmodium yoelii yoelii 17XNL  
 Plasmodium berghei  
 Phaeodactylum tricornutum  
 Thalassiosira pseudonana  
 Pythium ultimum  
 Alticus labachii  
 Hyaloperonospora arabidopsis  
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 Phytophthora infestans  
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 Entamoeba histolytica  
 Entamoeba dispar SAW760  
 Dictyostelium discoideum  
 Dictyostelium purpureum  
 Trichomonas vaginalis G3  
 Trichomonas vaginalis  
 Naegleria gruberi  
 Giardia lamblia ATCC 50803

OG presence  
 OG absence  
 Inferred root

Dscore = 0.647  
 Pvalue = 2.34e-03  
 AdjPValue = 2.78e-01

# NOG29576

● OG presence  
 ○ OG absence  
 ◊ Inferred root

Dscore = 1  
 Pvalue = 1.54e-05  
 AdjPvalue = 1.84e-03

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosarcocystis tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomyces reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
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- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
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- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
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- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
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- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
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- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus leucogenys*
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- Callithrix jacchus*
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- Nomascus leucogenys*
- Pongo abelii*
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- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
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- Cryptosporidium muris RN66*
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- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Altigo labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
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- Trypanosoma brucei*
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- Leishmania brasiliensis MHOM BR 75 M2904*
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- Leishmania major*
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- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
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- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
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- Giardia lamblia ATCC 50803*

# NOG33768

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Stagnicella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
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Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
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Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_ 130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L 1140  
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Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
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Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium corynanthii  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
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Gibberella moniliiformis  
Gibberella zeae PH 1  
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Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
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Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
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Daphnia pulex  
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Nasonia vitripennis  
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Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
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Xiphophorus maculatus  
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Latimeria chalumnae  
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Anolis carolinensis  
Taeniopygia guttata  
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Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys cinctus  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
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Macaca mulatta  
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Plasmodium knowlesi  
Plasmodium vivax  
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Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

- OG presence
- OG absence

◆ Inferred root

Dscore = 0.875

Pvalue = 3.65e-05

AdjPValue = 4.35e-03

# NOG35174

OG presence (green)

OG absence (grey)

Inferred root (red diamond)

Dscore = 0.944

Pvalue = 1.91e-05

AdjPValue = 2.27e-03

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Selaginella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluuyeromyces lactis NRRL Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocrealescina  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora intermedia k hell  
Mycelopithophthora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRRL 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Xodes scapularis  
Daphnia pulex  
Pediculus humanus  
Dermatophagoides pteronyssinus  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombix mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Onychomys leucogaster  
Lacerta agilis  
Locusta migratoria  
Echinops tellima  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turkiops truncatus  
Bos taurus  
Equus caballus  
Felis catulus  
Canis lupus familiaris  
Mustela putorius furo  
Alliopoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Citellus tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichorhynchus garnettii  
Microtus marmotinus  
Tarsius syrichta  
Calithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hyaloperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
Trypanosoma brucei  
Trypanosoma cruzi strain CL Brener  
Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

# NOG45847

Phylogenetic tree illustrating the distribution of Organellar Genes (OG) across various species. The tree is rooted at a red diamond. Nodes are colored green if they contain OG presence, grey if they contain OG absence, and white if they contain the inferred root. The tree shows a complex branching pattern with many long branches.

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Osteosporascus suave*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
- Encephalitozoon cuniculi GB M1*
- Puccinia graminis*
- Puccinia triticina*
- Ustilago maydis*
- Malassezia globosa CBS 7966*
- Cryptococcus gattii WM276*
- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
- Clavicipitaceae ATCC 42720*
- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR YB 4239*
- Schefersomyces stipiti CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium coryniforme*
- Tuber melanosporum*
- Zymesporangia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë viridis*
- Hypocreë jeckerina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Aspergillus terreus k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
- Coccidioides immitis RS*
- Trichophyton rubrum CBS 118892*
- Trichophyton verrucosum HKI 0517*
- Arthroderma benhamiae CBS 112371*
- Arthroderma gypseum CBS 118893*
- Arthroderma otiae CBS 113480*
- Talaromyces stipitatus ATCC 10500*
- Neosartorya fischeri*
- Emericella nidulans*
- Penicillium chrysogenum Wisconsin 54 1255*
- Penicillium marneffei ATCC 18224*
- Aspergillus clavatus*
- Aspergillus flavus*
- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
- Caenorhabditis briggsae*
- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Xodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Haemaphysalis plumbea*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Pterorhinus marinus*
- Darwiniella reticulata*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lyrcus cinctus*
- Locusta migratoria*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Alliropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Citellus tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Otolemur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Calithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
- Tetrahymena thermophila*
- Paramecium tetraurelia strain d4 2*
- Neospora caninum Liverpool*
- Toxoplasma gondii*
- Cryptosporidium muris RN66*
- Cryptosporidium parvum Iowia II*
- Cryptosporidium hominis TU502*
- Theileria annulata strain Ankara*
- Theileria parva strain Muguga*
- Plasmodium falciparum*
- Plasmodium knowlesi*
- Plasmodium vivax*
- Plasmodium chabaudi*
- Plasmodium yoelii yoelii 17XNL*
- Plasmodium berghei*
- Phaeodactylum tricoronatum*
- Thalassiosira pseudonana*
- Pythium ultimum*
- Alticus labachii*
- Hydroperonospora arabidopsis*
- Phytophthora ramorum*
- Phytophthora infestans*
- Phytophthora sojae*
- Trypanosoma brucei*
- Trypanosoma cruzi strain CL Brener*
- Leishmania brasiliensis MHOM BR 75 M2904*
- Leishmania mexicana MHOM GT 2001 U1103*
- Leishmania major*
- Leishmania donovani*
- Leishmania infantum JPCM5*
- Entamoeba histolytica*
- Entamoeba dispar SAW760*
- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

● OG presence

○ OG absence

◆ Inferred root

Dscore = 0.795

Pvalue = 3.68e-04

AdjPValue = 4.39e-02

# NOG53024

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.788  
 Pvalue = 1.01e-03  
 AdjPValue = 1.21e-01

- *Arabidopsis thaliana*
- *Arabidopsis lyrata*
- *Brassica rapa*
- *Glycine max*
- *Populus trichocarpa*
- *Vitis vinifera*
- *Solanum tuberosum*
- *Solanum lycopersicum*
- *Oryza sativa Indica Group*
- *Oryza sativa Japonica Group*
- *Oryza brachyantha*
- *Oryza glaberrima*
- *Hordeum vulgare*
- *Brachypodium distachyon*
- *Zea mays*
- *Sorghum bicolor*
- *Setaria italica*
- *Musa acuminata*
- *Selaginella moellendorffii*
- *Psathyrotes ramosissima*
- *Osteosarcococcus tauri*
- *Ostreococcus lucimarinus CCE9901*
- *Chlamydomonas reinhardtii*
- *Cyanidioschyzon merolae*
- *Encephalitozoon hellem ATCC 50504*
- *Encephalitozoon intestinalis ATCC 50506*
- *Encephalitozoon cuniculi GB M1*
- *Puccinia graminis*
- *Puccinia tritici*
- *Ustilago maydis*
- *Malassezia globosa CBS 7966*
- *Cryptococcus gattii WM276*
- *Cryptococcus neoformans var. neoformans JEC21*
- *Cryptococcus neoformans var. neoformans B 3501A*
- *Phanerochaete chrysosporium*
- *Schizophyllum commune H4 8*
- *Coprinopsis cinerea okayama7\_130*
- *Laccaria bicolor S238N H82*
- *Schizosaccharomyces japonicus yFS275*
- *Schizosaccharomyces pombe*
- *Clavispora lusitaniae ATCC 42720*
- *Candida tropicalis MYA 3404*
- *Candida dubliniensis CD36*
- *Lodderomyces elongisporus NRR L YB 4239*
- *Schaffersomyces stipitis CBS 6054*
- *Meyerozyma guilliermondii ATCC 6260*
- *Pichia guilliermondii*
- *Lachancea thermotolerans*
- *Kluyveromyces lactis NRR L Y 1140*
- *Saccharomyces cerevisiae*
- *Zygosaccharomyces rouxii*
- *Komagataella pastoris GS115*
- *Vanderwaltozyma polyspora DSM 70294*
- *Torulaspora delbrueckii*
- *Candida glabrata CBS 138*
- *Tetrapispora phaffii CBS 4417*
- *Naumovozyma dairensensis CBS 421*
- *Naumovozyma castellii CBS 4309*
- *Eremothecium cymbalariae DBVPG\_7215*
- *Eremothecium corynifsporum*
- *Tuber melanosporum*
- *Zygosporina tritici*
- *Phaeospheeria nodorum*
- *Leptosphaeria maculans*
- *Pyrenophora tritici repens Pt 1C BFP*
- *Pyrenophora teres f. teres 0 1*
- *Botryotinia fuckeliana*
- *Sclerotinia sclerotiorum*
- *Verticillium albo atrum VaMs.102*
- *Fusarium oxysporum*
- *Hypocreë virens*
- *Hypocreë jeckerina*
- *Nectria haematococca*
- *Gibberella zaeae PH 1*
- *Gibberella zaeae*
- *Gaeumannomyces graminis*
- *Magnaporthe grisea*
- *Magnaporthe poae*
- *Magnaporthe oryzae*
- *Podospora anserina S mat*
- *Neurospora crassa*
- *Aspergillus terreus k hell*
- *Myceliophthora thermophila ATCC 42464*
- *Chaetomium globosum CBS 11826*
- *Thielavia terrestris NRR L 8126*
- *Uncinocarpus reesii 1704*
- *Ajellomyces capsulatus NAm1*
- *Ajellomyces dermatitidis SLH14081*
- *Paracoccidioides sp. lutzi Pb01*
- *Coccidioides posadasii C735 delta SOWgp*
- *Coccidioides immitis RS*
- *Trichophyton rubrum CBS 118892*
- *Trichophyton verrucosum HKI 0517*
- *Arthroderma benhamiae CBS 112371*
- *Arthroderma gypseum CBS 118893*
- *Arthroderma otiae CBS 113480*
- *Ocularomyces stipitatus ATCC 10500*
- *Neosartorya fischeri*
- *Emmericella nidulans*
- *Penicillium chrysogenum Wisconsin 54 1255*
- *Penicillium marneffei ATCC 18224*
- *Aspergillus clavatus*
- *Aspergillus flavus*
- *Aspergillus oryzae*
- *Aspergillus niger*
- *Aspergillus fumigatus*
- *Aspergillus terreus*
- *Monosiga brevicollis MX1*
- *Amphimedon queenslandica*
- *Trichoplax adhaerens*
- *Nematostella vectensis*
- *Hydra magnipapillata*
- *Schistosoma mansoni*
- *Trichinella spiralis*
- *Pristionchus pacificus*
- *Caenorhabditis brenneri*
- *Caenorhabditis briggsae*
- *Caenorhabditis remanei*
- *Caenorhabditis japonica*
- *Caenorhabditis elegans*
- *Ixodes scapularis*
- *Daphnia pulex*
- *Pediculus humanus*
- *Haemaphysalis plumbea*
- *Tribolium castaneum*
- *Nasonia vitripennis*
- *Apis mellifera*
- *Atta cephalotes*
- *Bombyx mori*
- *Danaus plexippus*
- *Heliconius melpomene*
- *Culex quinquefasciatus*
- *Aedes aegypti*
- *Anopheles gambiae*
- *Anopheles darlingi*
- *Drosophila virilis*
- *Drosophila grimshawi*
- *Drosophila willistoni*
- *Drosophila pseudoobscura*
- *Drosophila ananassae*
- *Drosophila melanogaster*
- *Drosophila yakuba*
- *Strongylocentrotus purpuratus*
- *Branchiostoma floridae*
- *Ciona intestinalis*
- *Ciona savignyi*
- *Petromyzon marinus*
- *Danio rerio*
- *Gadus morhua*
- *Oreochromis niloticus*
- *Takifugu rubripes*
- *Tetraodon nigroviridis*
- *Gasterosteus aculeatus*
- *Xiphophorus maculatus*
- *Oryzias latipes*
- *Latimeria chalumnae*
- *Xenopus (Silurana) tropicalis*
- *Pelodiscus sinensis*
- *Anolis carolinensis*
- *Taeniopygia guttata*
- *Gallus gallus*
- *Meleagris gallopavo*
- *Ornithodoros anatinus*
- *Monodelphis domestica*
- *Sarcophilus harrisii*
- *Macropus eugenii*
- *Onychoprion anaemicus*
- *Locusta migratoria*
- *Echinops tellinii*
- *Procavia capensis*
- *Myotis lucifugus*
- *Pteropus vampyrus*
- *Sus scrofa*
- *Tursiops truncatus*
- *Bos taurus*
- *Equus caballus*
- *Felis catus*
- *Canis lupus familiaris*
- *Mustela putorius furo*
- *Alliropoda melanoleuca*
- *Oryctolagus cuniculus*
- *Cavia porcellus*
- *Citellus tridecemlineatus*
- *Dipodomys ordii*
- *Rattus norvegicus*
- *Mus musculus*
- *Tupaia belangeri*
- *Dolichorhynchus setifrons*
- *Microtus arcticus*
- *Tarsius syrichta*
- *Callithrix jacchus*
- *Macaca mulatta*
- *Nomascus leucogenys*
- *Pongo abelii*
- *Gorilla gorilla*
- *Pan troglodytes*
- *Homo sapiens*
- *Perkinsus marinus ATCC 50983*
- *Tetrahymena thermophila*
- *Paramecium tetraurelia strain d4 2*
- *Neospora caninum Liverpool*
- *Toxoplasma gondii*
- *Cryptosporidium muris RN66*
- *Cryptosporidium parvum Iwao II*
- *Cryptosporidium hominis TU502*
- *Theileria annulata strain Ankara*
- *Theileria parva strain Muguga*
- *Plasmodium falciparum*
- *Plasmodium knowlesi*
- *Plasmodium chabaudi*
- *Plasmodium yoelii yoelii 17XNL*
- *Plasmodium berghei*
- *Phaeodactylus tricinctum*
- *Thalassiosira pseudonana*
- *Pythium ultimum*
- *Altugia labachii*
- *Hydroperonospora arabidopsis*
- *Phytophthora ramorum*
- *Phytophthora infestans*
- *Phytophthora sojae*
- *Trypanosoma brucei*
- *Trypanosoma cruzi strain CL Brener*
- *Leishmania brasiliensis MHOM BR 75 M2904*
- *Leishmania mexicana MHOM GT 2001 U1103*
- *Leishmania major*
- *Leishmania donovani*
- *Leishmania infantum JPCM5*
- *Entamoeba histolytica*
- *Entamoeba dispar SAW760*
- *Dictyostelium discoideum*
- *Dityostelium purpureum*
- *Trichomonas vaginalis G3*
- *Trichomonas vaginalis*
- *Naegleria gruberi*
- *Giardia lamblia ATCC 50803*

# NOG58286

Arabidopsis thaliana  
Arabidopsis lyrata  
Brassica rapa  
Glycine max  
Populus trichocarpa  
Vitis vinifera  
Solanum tuberosum  
Solanum lycopersicum  
Oryza sativa Indica Group  
Oryza sativa Japonica Group  
Oryza brachyantha  
Oryza glaberrima  
Hordeum vulgare  
Brachypodium distachyon  
Zea mays  
Sorghum bicolor  
Setaria italica  
Musa acuminata  
Thlaspiella moellendorffii  
Physcomitrium patens  
Ostreococcus tauri  
Ostreococcus lucimarinus CCE9901  
Chlamydomonas reinhardtii  
Cyanidioschyzon merolae  
Encephalitozoon hellem ATCC 50504  
Encephalitozoon intestinalis ATCC 50506  
Encephalitozoon cuniculi GB M1  
Puccinia graminis  
Puccinia triticina  
Ustilago maydis  
Malassezia globosa CBS 7966  
Cryptococcus gattii WM276  
Cryptococcus neoformans var. neoformans JEC21  
Cryptococcus neoformans var. neoformans B 3501A  
Phanerochaete chrysosporium  
Schizophyllum commune H4 8  
Coprinopsis cinerea okayama7\_130  
Laccaria bicolor S238N H82  
Schizosaccharomyces japonicus yFS275  
Schizosaccharomyces pombe  
Clavispora lusitaniae ATCC 42720  
Aspergillus sydowii  
Candida tropicalis MYA 3404  
Candida dubliniensis CD36  
Lodderomyces elongisporus NRR L YB 4239  
Scheffersomyces stipitis CBS 6054  
Meyeromyza guilliermondii ATCC 6260  
Pichia guilliermondii  
Lachancea thermotolerans  
Kluyveromyces lactis NRR L Y 1140  
Saccharomyces cerevisiae  
Zygosaccharomyces rouxii  
Komagataella pastoris GS115  
Vanderwaltozyma polyspora DSM 70294  
Torulaspora delbrueckii  
Candida glabrata CBS 138  
Tetrapisispora phaffii CBS 4417  
Naumovozyma dairensensis CBS 421  
Naumovozyma castelli CBS 4309  
Eremothecium cymbalariae DBVPG\_7215  
Eremothecium coryniforme  
Tuber melanosporum  
Zygosporina tritici  
Phaeosphaeria nodorum  
Leptosphaeria maculans  
Pyrenophora tritici repens Pt 1C BFP  
Pyrenophora teres f. teres 0 1  
Botryotinia fuckeliana  
Sclerotinia sclerotiorum  
Verticillium albo atrum VaMs.102  
Fusarium oxysporum  
Hypocrea viridis  
Hypocreales  
Nectria haematococca  
Gibberella moniliiformis  
Gibberella zeae PH 1  
Gibberella zeae  
Gaeumannomyces graminis  
Magnaporthe grisea  
Magnaporthe poae  
Magnaporthe oryzae  
Podospora anserina S mat  
Neurospora crassa  
Neurospora crassa  
Mycelopithophora thermophila ATCC 42464  
Chaetomium globosum CBS 148.51  
Thielavia terrestris NRR L 8126  
Uncinocarpus reesii 1704  
Ajellomyces capsulatus NAm1  
Ajellomyces dermatitidis SLH14081  
Paracoccidioides sp. lutzi Pb01  
Coccidioides posadasii C735 delta SOWgp  
Coccidioides immitis RS  
Trichophyton rubrum CBS 118892  
Trichophyton verrucosum HKI 0517  
Athroderma benhamiae CBS 112371  
Athroderma gypseum CBS 118893  
Athroderma otiae CBS 113480  
Talaromyces stipitatus ATCC 10500  
Neosartorya fischeri  
Emerickella nidulans  
Penicillium chrysogenum Wisconsin 54 1255  
Penicillium marneffei ATCC 18224  
Aspergillus clavatus  
Aspergillus flavus  
Aspergillus oryzae  
Aspergillus niger  
Aspergillus fumigatus  
Aspergillus terreus  
Monosiga brevicollis MX1  
Amphimedon queenslandica  
Trichoplax adhaerens  
Nematostella vectensis  
Hydra magnipapillata  
Schistosoma mansoni  
Trichinella spiralis  
Pristionchus pacificus  
Caenorhabditis brenneri  
Caenorhabditis briggsae  
Caenorhabditis remanei  
Caenorhabditis japonica  
Caenorhabditis elegans  
Ixodes scapularis  
Daphnia pulex  
Pediculus humanus  
Aedes vexans plenum  
Tribolium castaneum  
Nasonia vitripennis  
Apis mellifera  
Atta cephalotes  
Bombyx mori  
Dananus plexippus  
Heliconius melpomene  
Culex quinquefasciatus  
Aedes aegypti  
Anopheles gambiae  
Anopheles darlingi  
Drosophila virilis  
Drosophila grimshawi  
Drosophila willistoni  
Drosophila pseudoobscura  
Drosophila ananassae  
Drosophila melanogaster  
Drosophila yakuba  
Strongylocentrotus purpuratus  
Branchiostoma floridae  
Ciona intestinalis  
Ciona savignyi  
Petromyzon marinus  
Danio rerio  
Gadus morhua  
Oreochromis niloticus  
Takifugu rubripes  
Tetraodon nigroviridis  
Gasterosteus aculeatus  
Xiphophorus maculatus  
Oryzias latipes  
Latimeria chalumnae  
Xenopus (Silurana) tropicalis  
Pelodiscus sinensis  
Anolis carolinensis  
Taeniopygia guttata  
Gallus gallus  
Meleagris gallopavo  
Ornithodorus anatinus  
Monodelphis domestica  
Sarcophilus harrisii  
Macropus eugenii  
Dipodomys deserti  
Lorcdonia africana  
Echinops tellimus  
Procavia capensis  
Myotis lucifugus  
Pteropus vampyrus  
Sus scrofa  
Turcicus truncatus  
Bos taurus  
Equus caballus  
Felis catus  
Canis lupus familiaris  
Mustela putorius furo  
Ailuropoda melanoleuca  
Oryctolagus cuniculus  
Cavia porcellus  
Ictidomys tridecemlineatus  
Dipodomys ordii  
Rattus norvegicus  
Mus musculus  
Tupaia belangeri  
Dolichur garnettii  
Microtus leucogaster  
Tarsius syrichta  
Callithrix jacchus  
Macaca mulatta  
Nomascus leucogenys  
Pongo abelii  
Gorilla gorilla  
Pan troglodytes  
Homo sapiens  
Perkinsus marinus ATCC 50983  
Tetrahymena thermophila  
Paramecium tetraurelia strain d4 2  
Neospora caninum Liverpool  
Toxoplasma gondii  
Cryptosporidium muris RN66  
Cryptosporidium parvum Iowa II  
Cryptosporidium hominis TU502  
Theileria annulata strain Ankara  
Theileria parva strain Muguga  
Plasmodium falciparum  
Plasmodium knowlesi  
Plasmodium vivax  
Plasmodium chabaudi  
Plasmodium yoelii yoelii 17XNL  
Plasmodium berghei  
Phaeodactylum tricornutum  
Thalassiosira pseudonana  
Pythium ultimum  
Alticus labachii  
Hydroperonospora arabidopsis  
Phytophthora ramorum  
Phytophthora infestans  
Phytophthora sojae  
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Leishmania brasiliensis MHOM BR 75 M2904  
Leishmania mexicana MHOM GT 2001 U1103  
Leishmania major  
Leishmania donovani  
Leishmania infantum JPCM5  
Entamoeba histolytica  
Entamoeba dispar SAW760  
Dictyostelium discoideum  
Dictyostelium purpureum  
Trichomonas vaginalis G3  
Trichomonas vaginalis  
Naegleria gruberi  
Giardia lamblia ATCC 50803

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.993  
Pvalue = 7.44e-06  
AdjPValue = 8.85e-04

# NOG66170

Phylogenetic tree illustrating the distribution of Organellar Genes (OG) across various species. The tree is rooted at a red diamond. Nodes are colored green for OG presence and grey for OG absence. A legend at the bottom left indicates: OG presence (green circle), OG absence (grey circle), and Inferred root (red diamond).

- Arabidopsis thaliana*
- Arabidopsis lyrata*
- Brassica rapa*
- Glycine max*
- Populus trichocarpa*
- Vitis vinifera*
- Solanum tuberosum*
- Solanum lycopersicum*
- Oryza sativa Indica Group*
- Oryza sativa Japonica Group*
- Oryza brachyantha*
- Oryza glaberrima*
- Hordeum vulgare*
- Brachypodium distachyon*
- Zea mays*
- Sorghum bicolor*
- Setaria italica*
- Musa acuminata*
- Selaginella moellendorffii*
- Physcomitrium patens*
- Ostrococcus tauri*
- Ostreococcus lucimarinus CCE9901*
- Chlamydomonas reinhardtii*
- Cyanidioschyzon merolae*
- Encephalitozoon hellem ATCC 50504*
- Encephalitozoon intestinalis ATCC 50506*
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- Cryptococcus neoformans var. neoformans JEC21*
- Cryptococcus neoformans var. neoformans B 3501A*
- Phanerochaete chrysosporium*
- Schizophyllum commune H4 8*
- Coprinopsis cinerea okayama7\_130*
- Laccaria bicolor S238N H82*
- Schizosaccharomyces japonicus yFS275*
- Schizosaccharomyces pombe*
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- Candida tropicalis MYA 3404*
- Candida dubliniensis CD36*
- Lodderomyces elongisporus NRR L YB 4239*
- Schefersomyces stipitis CBS 6054*
- Meyerozyma guilliermondii ATCC 6260*
- Pichia guilliermondii*
- Lachancea thermotolerans*
- Kluyveromyces lactis NRR L Y 1140*
- Saccharomyces cerevisiae*
- Zygosaccharomyces rouxii*
- Komagataella pastoris GS115*
- Vanderwaltozyma polyspora DSM 70294*
- Torulaspora delbrueckii*
- Candida glabrata CBS 138*
- Tetrapisispora phaffii CBS 4417*
- Naumovozyma dairensensis CBS 421*
- Naumovozyma castelli CBS 4309*
- Eremothecium cymbalariae DBVPG\_7215*
- Eremothecium corynifissypilum*
- Tuber melanosporum*
- Zymesporotinia tritici*
- Phaeosphaeria nodorum*
- Leptosphaeria maculans*
- Pyrenophora tritici repens Pt 1C BFP*
- Pyrenophora teres f. teres 0 1*
- Botryotinia fuckeliana*
- Sclerotinia sclerotiorum*
- Verticillium albo atrum VaMs.102*
- Fusarium oxysporum*
- Hypocreë virens*
- Hypocreë jecorina*
- Nectria haematococca*
- Gibberella moniliiformis*
- Gibberella zeae PH 1*
- Gibberella zeae*
- Gaeumannomyces graminis*
- Magnaporthe grisea*
- Magnaporthe poae*
- Magnaporthe oryzae*
- Podospora anserina S mat*
- Neurospora crassa*
- Neurospora crassa k hell*
- Mycelopithophthora thermophila ATCC 42464*
- Chaetomium globosum CBS 148.51*
- Thielavia terrestris NRR L 8126*
- Uncinocarpus reesii 1704*
- Ajellomyces capsulatus NAm1*
- Ajellomyces dermatitidis SLH14081*
- Paracoccidioides sp. lutzi Pb01*
- Coccidioides posadasii C735 delta SOWgp*
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- Trichophyton rubrum CBS 118892*
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- Aspergillus oryzae*
- Aspergillus niger*
- Aspergillus fumigatus*
- Aspergillus terreus*
- Monosiga brevicollis MX1*
- Amphimedon queenslandica*
- Trichoplax adhaerens*
- Nematostella vectensis*
- Hydra magnipapillata*
- Schistosoma mansoni*
- Trichinella spiralis*
- Pristionchus pacificus*
- Caenorhabditis brenneri*
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- Caenorhabditis remanei*
- Caenorhabditis japonica*
- Caenorhabditis elegans*
- Ixodes scapularis*
- Daphnia pulex*
- Pediculus humanus*
- Anthonomus grandis*
- Tribolium castaneum*
- Nasonia vitripennis*
- Apis mellifera*
- Atta cephalotes*
- Bombyx mori*
- Danaus plexippus*
- Heliconius melpomene*
- Culex quinquefasciatus*
- Aedes aegypti*
- Anopheles gambiae*
- Anopheles darlingi*
- Drosophila virilis*
- Drosophila grimshawi*
- Drosophila willistoni*
- Drosophila pseudoobscura*
- Drosophila ananassae*
- Drosophila melanogaster*
- Drosophila yakuba*
- Strongylocentrotus purpuratus*
- Branchiostoma floridae*
- Ciona intestinalis*
- Ciona savignyi*
- Petromyzon marinus*
- Danio rerio*
- Cedrus morhuza*
- Oreochromis niloticus*
- Takifugu rubripes*
- Tetraodon nigroviridis*
- Gasterosteus aculeatus*
- Xiphophorus maculatus*
- Oryzias latipes*
- Latimeria chalumnae*
- Xenopus (Silurana) tropicalis*
- Pelodiscus sinensis*
- Anolis carolinensis*
- Taeniopygia guttata*
- Gallus gallus*
- Meleagris gallopavo*
- Ornithodorus anatinus*
- Monodelphis domestica*
- Sarcophilus harrisii*
- Macropus eugenii*
- Dasyurus maculatus*
- Lorcdonia africana*
- Echinops tellinii*
- Procavia capensis*
- Myotis lucifugus*
- Pteropus vampyrus*
- Sus scrofa*
- Tursiops truncatus*
- Bos taurus*
- Equus caballus*
- Felis catus*
- Canis lupus familiaris*
- Mustela putorius furo*
- Ailuropoda melanoleuca*
- Oryctolagus cuniculus*
- Cavia porcellus*
- Ictidomys tridecemlineatus*
- Dipodomys ordii*
- Rattus norvegicus*
- Mus musculus*
- Tupaia belangeri*
- Dolichur garnettii*
- Microtus arcticus*
- Tarsius syrichta*
- Callithrix jacchus*
- Macaca mulatta*
- Nomascus leucogenys*
- Pongo abelii*
- Gorilla gorilla*
- Pan troglodytes*
- Homo sapiens*
- Perkinsus marinus ATCC 50983*
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- Paramecium tetraurelia strain d4 2*
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- Dictyostelium discoideum*
- Dictyostelium purpureum*
- Trichomonas vaginalis G3*
- Trichomonas vaginalis*
- Naegleria gruberi*
- Giardia lamblia ATCC 50803*

OG presence (green circle)

OG absence (grey circle)

Inferred root (red diamond)

Dscore = 0.995

Pvalue = 2.16e-05

AdjPValue = 2.57e-03

# NOG75667

● Arabidopsis thaliana  
◆ Arabidopsis lyrata  
○ Brassica rapa  
*Glycine max*  
*Populus trichocarpa*  
*Vitis vinifera*  
*Solanum tuberosum*  
*Solanum lycopersicum*  
*Oryza sativa Indica Group*  
*Oryza sativa Japonica Group*  
*Oryza brachyantha*  
*Oryza glaberrima*  
*Hordeum vulgare*  
*Brachypodium distachyon*  
*Zea mays*  
● *Sorghum bicolor*  
○ *Setaria italica*  
● *Musa acuminata*  
*Schagrinella moellendorffii*  
*Physcomitrium patens*  
*Osteosporus tauri*  
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*Chlamydomonas reinhardtii*  
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*Pichia guilliermondii*  
*Lachancea thermotolerans*  
*Kluyveromyces lactis NRR Y 1140*  
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*Hypocrea viridis*  
*Hypocrealescina*  
*Nectria haematozoea*  
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*Aspergillus fumigatus*  
*Aspergillus terreus*  
*Monosiga brevicollis MX1*  
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● *Trichoplax adhaerens*  
*Nematostella vectensis*  
● *Hydra magnipapillata*  
*Schistosoma mansoni*  
*Trichinella spiralis*  
*Pristionchus pacificus*  
*Caenorhabditis brenneri*  
*Caenorhabditis briggsae*  
*Caenorhabditis remanei*  
*Caenorhabditis japonica*  
*Caenorhabditis elegans*  
*Ixodes scapularis*  
● *Daphnia pulex*  
*Pediculus humanus*  
*Anthonomus grandis*  
*Tribolium castaneum*  
*Nasonia vitripennis*  
*Apis mellifera*  
*Atta cephalotes*  
*Bombyx mori*  
*Danaus plexippus*  
*Heliconius melpomene*  
*Culex quinquefasciatus*  
*Aedes aegypti*  
*Anopheles gambiae*  
*Anopheles darlingi*  
*Drosophila virilis*  
*Drosophila grimshawi*  
*Drosophila willistoni*  
*Drosophila pseudoobscura*  
*Drosophila ananassae*  
*Drosophila melanogaster*  
*Drosophila yakuba*  
*Strongylocentrotus purpuratus*  
*Branchiostoma floridae*  
*Ciona intestinalis*  
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*Petromyzon marinus*  
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*Cedrus morhuza*  
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*Takifugu rubripes*  
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*Gasterosteus aculeatus*  
*Xiphophorus maculatus*  
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*Anolis carolinensis*  
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*Meleagris gallopavo*  
*Ornithodorus anatinus*  
*Monodelphis domestica*  
*Sarcophilus harrisii*  
*Macropus eugenii*  
*Dasyurus maculatus*  
*Lorcdonia africana*  
*Echinops tellinii*  
*Procavia capensis*  
*Myotis lucifugus*  
*Pteropus vampyrus*  
*Sus scrofa*  
*Tursiops truncatus*  
*Bos taurus*  
*Equus caballus*  
*Felis catus*  
*Canis lupus familiaris*  
*Mustela putorius furo*  
*Ailuropoda melanoleuca*  
*Oryctolagus cuniculus*  
*Cavia porcellus*  
*Ictidomys tridecemlineatus*  
*Dipodomys ordii*  
*Rattus norvegicus*  
*Mus musculus*  
*Tupaia belangeri*  
*Dolichur garnettii*  
*Microtus arcticus*  
*Tarsus syrichta*  
*Callithrix jacchus*  
*Macaca mulatta*  
*Nomascus leucogenys*  
*Pongo abelii*  
*Gorilla gorilla*  
*Pan troglodytes*  
*Homo sapiens*  
*Perkinsus marinus ATCC 50983*  
*Tetrahymena thermophila*  
*Paramecium tetraurelia strain d4 2*  
*Neospora caninum Liverpool*  
*Toxoplasma gondii*  
*Cryptosporidium muris RN66*  
*Cryptosporidium parvum Iowa II*  
*Cryptosporidium hominis TU502*  
*Theileria annulata strain Ankara*  
*Theileria parva strain Muguga*  
*Plasmodium falciparum*  
*Plasmodium knowlesi*  
*Plasmodium vivax*  
*Plasmodium chabaudi*  
*Plasmodium yoelii yoelii 17XNL*  
*Plasmodium berghei*  
● *Phaeodactylum tricornutum*  
● *Phalaenopsis pseudonana*  
*Pythium ultimum*  
*Alticus labachii*  
*Hydroperonospora arabidopsis*  
*Phytophthora ramorum*  
*Phytophthora infestans*  
*Phytophthora sojae*  
*Trypanosoma brucei*  
*Trypanosoma cruzi strain CL Brener*  
*Leishmania brasiliensis MHOM BR 75 M2904*  
*Leishmania mexicana MHOM GT 2001 U1103*  
*Leishmania major*  
*Leishmania donovani*  
*Leishmania infantum JPCM5*  
*Entamoeba histolytica*  
*Entamoeba dispar SAW760*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Trichomonas vaginalis G3*  
*Trichomonas vaginalis*  
*Naegleria gruberi*  
*Giardia lamblia ATCC 50803*

● OG presence  
○ OG absence  
◆ Inferred root

Dscore = 0.947  
 Pvalue = 9.57e-06  
 AdjPValue = 1.14e-03