Supplemental table S1: sequences analyzed in this study.

|  |  |  |
| --- | --- | --- |
| Putative ortholog group | GenBank accesions | taxon |
| archaerhodopsin | AAB19870 | *Halobacterium* |
| NOP-1 | AAG01180 | *Leptosphaeria maculans* |
| fungal opsin-like protein | AAQ75384 | *Oryza sativa* (plant) |
| fungal opsin-like protein | AAY82897 | *Acetabularia acetabulum* (plant) |
| fungal opsin-like protein | AAZ30049 | *Taiwanofungus camphoratus* |
| bacteriorhodopsin-like protein | ABA08437 | *Guillardia theta* |
| bacteriorhodopsin-like protein | ABA08438 | *Guillardia theta* |
| bacteriorhodopsin | BAA75200 | *Haloterrigena* |
| fungal opsin-like protein | BAA76591 | *Trametes versicolor* |
| CarO | BAH28808 | *Bipolaris oryzae* |
| NOP-1 | BAH28809 | *Bipolaris oryzae* |
| ORP-1 | CAB92637 | *Neurospora crassa* |
| CarO | CAD97459 | *Gibberella fujikuroi* |
| ORP-1 | CBI53178 | *Sordaria macrospora* |
| NOP-1 | CBI54495 | *Sordaria macrospora* |
| CarO | CBX94996 | *Leptosphaeria maculans* |
| NOP-1 | EAA30185 | *Neurospora crassa* |
| NOP-1 | EAA63329 | *Aspergillus nidulans* |
| fungal opsin-like protein | EAK83799 | *Ustilago maydis* |
| NOP-1 | EAQ83604 | *Chaetomium globosum* |
| NOP-1 | EDN96688 | *Sclerotinia sclerotioru* |
| NOP-1 | EEA26720 | *Penicillium marneffei* |
| NOP-1 | EED19097 | *Talaromyces stipitatu* |
| ORP-1 | EED23987 | *Talaromyces stipitatu* |
| NOP-1 | EED45568 | *Aspergillus flavus* |
| NOP-1 | EEH44959 | *Paracoccidioides brasiliensis* |
| bacteriorhodopsin-like protein | EEH55023 | *Micromonas pusilla* |
| NOP-1 | EER23093 | *Coccidioides posadasii* |
| NOP-1 | EEU38165 | *Nectria haematococca* |
| ORP-1 | EEY21011 | *Verticillium albo atrum* |
| ORP-1 | EFQ32231 | *Glomerella graminicola* |
| CarO | EFQ36594 | *Glomerella graminicola* |
| NOP-1 | EFQ91496 | *Pyrenophora teres* |
| CarO | EFQ92862 | *Pyrenophora teres* |
| NOP-1 | EGC48677 | *Ajellomyces capsulatus* |
| NOP-1 | EGE08818 | *Trichophyton equinum* |
| HSP30 | EGE08969 | *Trichophyton equinum* |
| fungal opsin-like protein | EGG00632 | *Melampsora larici-populina* |
| fungal opsin-like protein | EGG00698 | *Melampsora larici-populina* |
| fungal opsin-like protein | EGO26132 | *Serpula lacrymans1* |
| CarO | EGP82651 | *Mycosphaerella graminicola* |
| NOP-1 | EGP87680 | *Mycosphaerella graminicola* |
| NOP-1(?) | EGX51087 | *Arthrobotrys oligospora* |
| ORP-1 | EGY15600 | *Verticillium dahliae* |
| CarO | EGY21409 | *Verticillium dahliae* |
| CarO | EHK97458 | *Glarea lozoyensis* |
| HSP30 | NP009610 | *Saccharomyces cerevisia* |
| HSP30 | NP587895 | *Schizosaccharomyces pombe* |
| NOP-1 | Opsin-like protein-1\* | *Cladonia grayi* |
| CarO | Opsin-like protein-2\* | *Cladonia grayi* |
| NOP-1 | Opsin-like protein\* | *Blumeria graminis* |
| NOP-1 | Opsin-like protein\* | *Erysiphe pisi* |
| ORP-1 | XP\_001217659 | *Aspergillus terreus* |
| NOP-1 | XP\_001240940 | *Coccidioides immitis* |
| NOP-1 | XP\_001262778 | *Neosartorya fischeri* |
| NOP-1 | XP\_001272404 | *Aspergillus clavatus* |
| NOP-1 | XP\_001395233 | *Aspergillus niger* |
| ORP-1 | XP\_001395306 | *Aspergillus niger* |
| CarO | XP\_001522062 | *Magnaporthe oryzae* |
| CarO | XP\_001547284 | *Botryotinia fuckeliana* |
| NOP-1 | XP\_001558822 | *Botryotinia fuckeliana* |
| CarO | XP\_001594532 | *Sclerotinia sclerotiorum* |
| HSP30 | XP\_001642933 | *Vanderwaltozyma polyspora* |
| bacteriorhodopsin-like protein | XP\_001699021 | *Chlamydomonas reinhardtii* (plant) |
| CarO | XP\_001791031 | *Phaeosphaeria nodorum* |
| NOP-1 | XP\_001791479 | *Phaeosphaeria nodorum* |
| NOP-1 | XP\_001904282 | *Podospora anserina* |
| ORP-1 | XP\_001909487 | *Podospora anserina* |
| NOP-1 | XP\_001937307 | *Pyrenophora tritici repenti* |
| CarO | XP\_001937696 | *Pyrenophora tritici repentis* |
| ORP-1 | XP\_002144174 | *Penicillium marneffei* |
| HSP30 | XP\_002173741 | *Schizosaccharomyces japonicus* |
| NOP-1 | XP\_002542856 | *Uncinocarpus reesii* |
| NOP-1 | XP\_002568387 | *Penicillium chrysogenum* |
| HSP30 | XP\_002770265 | *Debaryomyces hansenii* |
| NOP-1 | XP\_002789509 | *Paracoccidioides brasiliensis* |
| ORP-1 | XP\_002835397 | *Tuber melanosporum* |
| HSP30 | XP\_002843478 | *Arthroderma otae* |
| NOP-1 | XP\_002849585 | *Arthroderma otae* |
| bacteriorhodopsin-like protein | XP\_002956515 | *Volvox carteri* (plant) |
| CarO | XP\_003008270 | *Verticillium albo atrum* |
| HSP30 | XP\_003012740 | *Arthroderma benhamia* |
| NOP-1 | XP\_003015929 | *Arthroderma benhamiae* |
| CarO | XP\_003042779 | *Nectria haematococca* |
| ORP-1 | XP\_003043115 | *Nectria haematococca* |
| ORP-1 | XP\_003049904 | *Nectria haematococca* |
| NOP-1 | XP\_003170270 | *Arthroderma gypseum* |
| HSP30 | XP\_003172169 | *Arthroderma gypseum* |
| fungal opsin-like protein | XP\_003195448 | *Cryptococcus gattii* |
| NOP-1 | XP\_003233999 | *Trichophyton rubrum* |
| HSP30 | XP\_003236933 | *Trichophyton rubrum* |
| fungal opsin-like protein | XP\_003330211 | *Puccinia graminis tritic* |
| ORP-1 | XP\_381616 | *Fusarium graminearum* |
| CarO | XP\_383240 | *Fusarium graminearum* |
| NOP-1 | XP\_387730 | *Fusarium graminearum* |
| HSP303 | XP\_448732 | *Candida glabrata* |
| fungal opsin-like protein | XP\_571773 | *Cryptococcus neoformans* |
| NOP-1 | XP\_746789 | *Aspergillus fumigatus* |
| fungal opsin-like protein | XP\_756518 | *Ustilago maydis* |
| fungal opsin-like protein | XP\_760272 | *Ustilago maydi* |
| bacteriorhodopsin | YP\_644794 | *Rubrobacter xylanophilus* |
| bacteriorhodopsin | ZP\_06974567 | *Ktedonobacter racemifer* |

\* Annotated amino acid and nucleotide sequences provided below.

>*Blumeria graminis* putative opsin-like protein-2

MNSPTSSPTISPVPTIIPKLPDYERVGPTGAKTLWVVFLIMLISSITFVALSVRVPVQKRLFYVLTTFMTIFSTTFYFVMATGSGFYWNNSNLNLIQDISLRQVFWVRFLDLIFTTPFIILNLAFLSNMNGASITTALVSDTLMIILSIFATFSTSQGQKWSYFAFSCLAYLSIVYQFAVPGRRAVASKSSSTRKLFTAIGSFTCILWTLYLIVWALGDCSRTYGVNTEIVAFAILDVLTKPVFGFWLLMAHGRNSGSLDGFWSSGLSTEGAIQIGEDH

atgaatagtccaacatcttcccctacaatttcacctgtcccgactataattccaaagcttcctgattatgaacgggttggaccaactggtgcgaaaactctatgggttgttttcttgatcatgctcatttcttcaatcacatttgttgcactttctgttagagtgcctgttcaaaaacgtcttttttatgttctcactacttttatgacgattttttccaccacgttctacttcgttatggcaactggcagtggtttttattggaataattctaacctgaacttaatccaagatatctcactgcgtcaagttttctgggtacgattccttgatttaatattcaccacgccattcattattttgaatctcgcatttctttcgaacatgaatggtgccagcataacaacagcactagtttcagatactctgatgattatcctgagtatatttgcgacatttagcacatctcaaggtcaaaagtggagctactttgcattctcgtgtctcgcctatttgagtattgtttaccaattcgccgtaccaggtcgccgcgctgtggccagcaagtccagtagcaccagaaagctttttacggccataggatctttcacttgtatcctatggactctttatctgattgtctgggctctcggagattgctctcgcacatatggcgtaaataccgagattgtagctttcgctattctcgacgttctgactaaacccgtattcggtttctggcttctcatggcacatgggcgaaattccggaagcttagacggtttctggagtagcggtctatctacagagggcgctattcaaattggcgaagatcat

>*Erysiphe pisi* putative opsin-like protein-2

MVDPMEVLNADDLTSTDLLNTNTYERAGVLGSRTLWVVFVIMVLSSISFAFLSLRVPVQKRLFYVLTTFITLFAAISYFAMASGDGYTYVADNTSHTIYRQVFWARYADWVVTTPLLLLDLAFLAGLDGASIVVSLVADILMILLGLFAAFSHNETQKWGYYAFSCFAYLVIVYQLAIPGRRAVSNKQNSTANLFAAIGGFTLILWTLYPIVWGIGDGARKWSVDSEIVAYAVLDVLAKPVFGFWLLIAHGRNAESIEGFWTHGLSTEGALRVGEEE

Atggttgatccaatggaggttttgaatgcagacgacctcacatctacagacctcttaaataccaatacatatgagcgtgccggagttctaggctcaagaaccctatgggttgtatttgtaatcatggttctctcgtctattagttttgcatttttatctctacgagtcccagtgcaaaaacgtcttttctatgttttaactaccttcattaccctatttgctgccatctcatatttcgctatggcttctggcgatgggtacacatatgttgccgacaacacatcgcataccatttatcgtcaggttttctgggctagatatgctgattgggtggttacgactcctctacttctccttgatctcgcatttcttgcaggtctagatggggccagtattgttgtttctttggttgcagacatactgatgattttactgggcctctttgccgcctttagtcacaatgagactcaaaaatgggggtactatgctttttcatgctttgcgtacttagtgattgtctatcaactcgctataccaggacgacgcgctgtttctaataaacaaaacagtacagctaatctcttcgccgccattggaggtttcactctcattctttggactctctatccaatcgtctggggtattggggatggagctcgtaaatggagcgttgactctgagattgttgcatacgcagttttagatgttcttgccaaacctgttttcggattttggttacttatagcccacggcagaaatgctgaaagtattgagggattttggactcatggtctgtcaacagaaggagcactccgagtaggcgaagaggag

>*Cladonia grayi* putative opsin-like protein-1

MDLTKRTNDAIHANGDHFVNGATSDIAITTHGSDWYFAVCAVMFVSTMAFIGLSFMRPRSHRIFHYITAAITMVAAIAYFTMGADLGETGIKPEFIRTNSKVSGTLREIFYVRYIDWVITTPLLLLDLLLTAGMPWPTILYTLLIDEIMIITGLIGALVSSSYKWGYFTFGCVAFLWVAWTVTWTARKHAAALGPDVSKVYLICGVWTIFLWFLYPIAWGLSEGGNVIAPDSEAIFYGILDIMAKPVFGTLLLWGHRNIEPSRLGRKYFHSLNVTRFNNRAVNIRDYDEAPLASTREKPLNGHNTGVTASDGNTATTTGASTV

atggacctcaccaagcgtacaaacgacgcgattcacgccaacggtgaccactttgtcaatggagctacctctgacattgccatcacaactcatggctcggactggtatttcgccgtttgcgcggtgatgtttgtttcgacaatggctttcattggcttgtcgttcatgaggccgcgttcccaccgtatcttccactacatcaccgctgcgatcactatggtcgcagctatcgcctatttcactatgggcgccgacttgggagagaccggtatcaagcctgagttcatccgaactaactctaaggtgtctggcacgctccgcgagatcttctacgttcgctatattgattgggtcatcactacaccacttttactcctagacttgctcctgacagctggcatgccatggcccaccatactatacaccctcttgatcgacgagattatgatcatcaccggtctcatcggcgcattggtctcgtccagttacaagtggggttacttcaccttcggctgcgttgccttcctctgggtcgcctggaccgtcacctggactgcgcgcaagcacgctgctgcccttggcccagacgtctccaaagtatatctgatctgtggtgtctggactatcttcctctggttcctgtacccaattgcctggggactttcggagggcggtaacgttatcgcgcctgattctgaagctatcttctacggtatcttggacatcatggctaagcctgtattcggtactctcctcctttggggtcacaggaatatcgagccatcccgtcttggccgtaagtactttcactctttaaatgtaactcgttttaacaatcgcgcagtcaatatccgcgactatgacgaagcaccactagccagcacgcgagagaagcccttgaacggccacaacactggtgtcaccgctagtgatggcaacactgccacaacgactggagcttccaccgtc

>*Cladonia grayi* putative opsin-like protein-2

MEALLKTSAPIVPLPTVVPTIEYQESGDVGNRTLWYVVFVIMLISSLAFYIMAFRVPVQKRMFHILTAFITTFAMISYYAMAVHDGVSKNQIVIKETHKHTPDTTKTIYREVYWARYVDWSVTTPLLLLDLCLLAGLPGANILVAIVADVIMILTGLFAAFTVEEGPKWGYYAIACIAYLVIVYQLAFNGRGVVQNKDKKTATFFSAIAGFTLVLWTVYPIIWGIADGSRNINVDSEIIAYAVLDVLAKPVFGFWLLFTHDAMSETSSIEGFWAHGLAKDGAIRVGDDDEGA

acaccttctgactatttgtcaattctttctataccctatcaagcaccacgcctatacatacagcaccacattgcagcacacacgggcgtcatggaagctttattgaagacatcagcacccatcgtgcctctgccgacagtagtgcccaccatcgaataccaggaatctggtgatgtcggcaaccgcactctatggtacgttgtctttgtcatcatgcttatttcctccctggctttctacatcatggcattccgcgtccctgtccaaaaacgcatgttccacatcctgactgccttcatcactactttcgctatgatctcgtactacgctatggctgtccatgatggcgtcagcaagaaccaaatcgtgatcaaggagacccacaagcataccccagacaccaccaagaccatctaccgtgaggtttactgggcccgctacgttgactggagcgtcaccaccccacttctgctactggatctttgcttgcttgctggtttgcctggggctaacatcctcgtcgcgattgttgccgacgtcatcatgattctcactggtctctttgccgccttcacagtagaggagggccccaaatggggatactacgcaattgcttgcattgcatacttggttatcgtgtaccagctcgccttcaacggccgtggtgttgtccagaacaaggacaagaagactgccaccttcttcagcgcaattgccggcttcaccttggtcctttggactgtgtacccaattatctggggtattgccgatggctcgcgcaacataaacgttgattctgagatcattgcctacgccgtcctcgatgttctagccaagcctgtctttggcttctggcttctcttcacccatgatgccatgtcggagacttcgtctattgaaggcttctgggcccacggtctcgccaaggacggcgccattcgcgttggtgacgatgacgagggtgcg