

Table S1. Accession numbers of RAD52 amino acid sequences used in this study.

| Taxa | GenBank ID |
|--|-------------------|
| RAD52 | |
| <i>Albugo candida</i> | 635369772 |
| <i>Albugo laibachii</i> | 325180256 |
| <i>Aphanomyces invadans</i> | 673048395 |
| <i>Arcobacter butzleri</i> | 315478862 |
| <i>Blastomyces gilchristii</i> | 261192601 |
| <i>Bos taurus</i> | 528951193 |
| <i>Calliarthron tuberculosum</i> | SRP005182 |
| <i>Campylobacter curvus</i> | 516863234 |
| <i>Campylobacter showae</i> | 489037738 |
| <i>Candidatus Phaeomarinobacter ectocarpii</i> | 918662481 |
| <i>Cyanidioschyzon merolae</i> | 544217672 |
| <i>Danio rerio</i> | 66269435 |
| <i>Ectocarpus siliculosus</i> | 298704860 |
| <i>Emiliana huxleyi</i> | 551599108 |
| <i>Encephalitozoon cuniculi</i> | 85014303 |
| <i>Entamoeba histolytica</i> | 67476176 |
| <i>Entamoeba invadens</i> | 471202697 |
| <i>Entamoeba nuttali</i> | 672809564 |
| <i>Galdieria sulphuraria</i> IPPAS P507 | MK317925 |
| <i>Galdieria sulphuraria</i> IPPAS P503 | MK21733250 |
| <i>Galdieria sp.</i> ACUF074 | MK217340 |
| <i>Gallus gallus</i> | 730466 |
| <i>Gracilaria chorda</i> | NBIV01000177 |
| <i>Homo sapiens</i> | 863018 |
| <i>Hyphomicrobium denitrificans</i> | 505409238 |
| <i>Kuraisha capsulata</i> | 584391207 |
| <i>Mus musculus</i> | 261824011 |
| <i>Naegleria gruberi</i> | 290981385 |
| <i>Phaeodactylum tricornutum</i> | 219126773 |
| <i>Phytophthora nicotianae</i> | 970651832 |
| <i>Phytophthora parasitica</i> | 566015423 |
| <i>Plasmopara halstedii</i> | 953492183 |
| <i>Rhizopus microsporus</i> | 729702307 |
| <i>Saprolegnia diclina</i> | 669164116 |
| <i>Saprolegnia parasitica</i> | 813177361 |
| <i>Schizophyllum commune</i> | 302678737 |
| <i>Schizosaccharomyces pombe</i> | 19112088 |
| <i>Spirochaeta sp.</i> | 917473204 |

| | |
|--------------------------|-----------|
| <i>Synechococcus sp.</i> | 494162898 |
|--------------------------|-----------|

| Taxa | GenBank ID |
|---------------------------------|------------|
| RAD52 | |
| <i>Thalassiosira oceanica</i> | 397635710 |
| <i>Thalassiosira pseudonana</i> | 220968365 |
| <i>Vittaforma corneae</i> | 667640414 |
| <i>Wickerhamomyces ciferrii</i> | 754409763 |
| RAD59 | |
| <i>Bos taurus</i> | 61864423 |
| <i>Chrysochromulina sp.</i> | 922864786 |
| <i>Gallus gallus</i> | 45383087 |
| <i>Guillardia theta</i> | 551643257 |
| <i>Homo sapiens</i> | 21717826 |
| <i>Kluyveromyces lactis</i> | 49643317 |
| <i>Mus musculus</i> | 13385116 |
| <i>Pan troglodytes</i> | 55645233 |
| <i>Saccharomyces cerevisiae</i> | 6320144 |

Table S2. Accession number of RAD52 nucleotide sequences from Cyanidiophyceae used in this study.

| Strain | Strain code | Accession number |
|--------------------------------|-------------|------------------|
| <i>Galdieria sulphuraria</i> | ACUF141G | MK217324 |
| | ACUF141Y | MK217328 |
| | ACUF141DG | MK217331 |
| | ACUF142 | MK217329 |
| | ACUF388 | MK217344 |
| | ACUF402 | MK217342 |
| | ACUF427 | MK217345 |
| | ACUF455 | MK217343 |
| | SAG108.79 | MK217327 |
| | SAG21.92 | MK217346 |
| <i>Galdieria sp.</i> | IPPAS_P503 | MK217325 |
| | CCMEE5720 | MK217326 |
| | CCMEE5639 | MK217330 |
| | CCMEE5716 | MK217332 |
| | CCMEE5658 | MK217333 |
| | CCMEE5664 | MK217334 |
| | CCMEE5665 | MK217335 |
| | CCMEE5672 | MK217336 |
| | CCMEE5680 | MK217337 |
| | CCMEE5715 | MK217338 |
| | CCMEE5712 | MK217339 |
| | ACUF074 | MK217340 |
| | IPPAS_P502 | MK217341 |
| | THAL033 | MK217347 |
| <i>Cyanidioschyzon merolae</i> | 10D | XM_005538923 |