

## Supplementary Table 1

**Species abbreviations and accession codes of the sequences used in the alignment and phylogenetic reconstruction. The sequences that have been extracted via genomic BLAST are those sequences that have been listed with their GenBank accession code, instead of the UniProt accession code.**

ADC\_ANASP *Anabaena* sp. (strain PCC 7120) (cyanobacteria) Uni-Prot: Q8YRP3  
 ADC\_BACTN *Bacteroides thetaiotaomicron* (bacteroidetes) Uni-Prot: Q8A2B1  
 ADC\_CHRVO *Chromobacterium violaceum* (proteobacteria) Uni-Prot: Q7NU27  
 ADC\_DEIRA *Deinococcus radiodurans* (deinococcus-thermus) Uni-Prot: Q9RXR4  
 ADC\_ECOLI *Escherichia coli* (proteobacteria) Uni-Prot: P21170  
 ADC\_GLOVI *Gloeobacter violaceus* (cyanobacteria) Uni-Prot: Q7NE10  
 ADC\_NEIMA *Neisseria meningitidis* (serogroup A) (proteobacteria) Uni-Prot: Q9JT25  
 ADC\_PASMU *Pasteurella multocida* (proteobacteria) Uni-Prot: Q9CL60  
 ADC\_PHOLL *Photorhabdus luminescens* (subsp. *Laumondii*) (proteobacteria) Uni-Prot: Q7N121  
 ADC\_PROMA *Prochlorococcus marinus* (cyanobacteria) Uni-Prot: Q7VEG4  
 ADC\_PSEAE *Pseudomonas aeruginosa* (proteobacteria) Uni-Prot: Q9HUX1  
 ADC\_PSESM *Pseudomonas syringae* (proteobacteria) Uni-Prot: Q87VU3  
 ADC\_RHOB A *Rhodopirellula baltica* (planctomycetes) Uni-Prot: Q7UTS2  
 ADC\_SALTI *Salmonella typhi* (proteobacteria) Uni-Prot: P60658  
 ADC\_SHEON *Shewanella oneidensis* (proteobacteria) Uni-Prot: Q8EFU5  
 ADC\_SYNEL *Synechococcus elongatus* (cyanobacteria) Uni-Prot: Q8DHY6  
 ADC\_SYNPX *Synechococcus* sp. (strain WH8102) (cyanobacteria) Uni-Prot: Q7U3S0  
 ADC\_VIBPA *Vibrio parahaemolyticus* (proteobacteria) Uni-Prot: Q87JS8  
 ADC\_VIBVU *Vibrio vulnificus* (proteobacteria) Uni-Prot: Q8DA54  
 ADC\_XANAC *Xanthomonas axonopodis* (proteobacteria) Uni-Prot: Q8PFQ5  
 ADC\_XYLFA *Xylella fastidiosa* (proteobacteria) Uni-Prot: Q9PH02  
 ADC\_YERPE *Yersinia pestis* (proteobacteria) Uni-Prot: Q8ZHG8  
 ADC1\_ARATH *Arabidopsis thaliana* (mouse-ear cress) Uni-Prot: Q9SI64  
 ADC1\_AVEA *Avena sativa* (oat) Uni-Prot: P22220  
 ADC1\_BRAJU *Brassica juncea* (leaf mustard) Uni-Prot: O82475  
 ADC1\_DIACA *Dianthus caryophyllus* (carnation) Uni-Prot: Q96412  
 ADC1\_LYCES *Lycopersicon esculentum* (tomato) Uni-Prot: P49726  
 ADC1\_ORYSA *Oryza sativa* (rice) Uni-Prot: Q9SNN0  
 ADC1\_PEA *Pisum sativum* (garden pea) Uni-Prot: Q43075  
 ADC1\_SOYBN *Glycine max* (soybean) Uni-Prot: Q39827  
 ADC1\_SYNY3 *Synechocystis* sp. (strain PCC 6803) (cyanobacteria) Uni-Prot: P74576  
 ADC2\_ARATH *Arabidopsis thaliana* (mouse-ear cress) Uni-Prot: O23141  
 ADC2\_SYNY3 *Synechocystis* sp. (strain PCC 6803) (cyanobacteria) Uni-Prot: P72587  
 AZIN\_BRARE *Brachydanio rerio* (zebrafish) Uni-Prot: Q801V3  
 AZIN\_HUMAN *Homo sapiens* (human) Uni-Prot: O14977  
 DCDA\_ACTPA *Actinosynnema pretiosum* (subsp. *Auranticum*) (actinobacteria) Uni-Prot: O69203  
 DCDA\_ANASP *Anabaena* sp. (strain PCC 7120) (cyanobacteria) Uni-Prot: Q8YST7  
 DCDA\_AQUAE *Aquifex aeolicus* (aquificae) Uni-Prot: O67262  
 DCDA\_ARATH *Arabidopsis thaliana* (mouse-ear cress) Uni-Prot: Q949X7  
 DCDA\_ARCFU *Archaeoglobus fulgidus* (archaea) Uni-Prot: O29458  
 DCDA\_BACHD *Bacillus halodurans* (firmicutes) Uni-Prot: Q9KCM5  
 DCDA\_BACMT *Bacillus methanolicus* (firmicutes) Uni-Prot: P41023  
 DCDA\_BACSU *Bacillus subtilis* (firmicutes) Uni-Prot: P23630  
 DCDA\_BUCAI *Buchnera aphidicola* (proteobacteria) Uni-Prot: P57513  
 DCDA\_BURML *Burkholderia multivorans* (proteobacteria) Uni-Prot: Q84BW0  
 DCDA\_CAMJE *Campylobacter jejuni* (proteobacteria) Uni-Prot: Q9PII5

DCDA\_CANBF *Candidatus Blochmannia floridanus* (proteobacteria) Uni-Prot: Q7VRF4  
 DCDA\_CHLTE *Chlorobium tepidum* (chlorobi) Uni-Prot: Q8KCP2  
 DCDA\_CHRVO *Chromobacterium violaceum* (proteobacteria) Uni-Prot: Q7NRM3  
 DCDA\_COREF *Corynebacterium efficiens* (actinobacteria) Uni-Prot: Q8RQM6  
 DCDA\_CORGL *Corynebacterium glutamicum* (actinobacteria) Uni-Prot: P09890  
 DCDA\_DEIRA *Deinococcus radiodurans* (deinococcus-thermus) Uni-Prot: Q9RTK2  
 DCDA\_DESVH *Desulfovibrio vulgaris* (strain Hildenborough) (proteobacteria) Uni-Prot: Q72BI9  
 DCDA\_ECOLI *Escherichia coli* (proteobacteria) Uni-Prot: P00861  
 DCDA\_ERWCT *Erwinia carotovora* (proteobacteria) Uni-Prot: Q6D0Z6  
 DCDA\_FERAC *Ferroplasma acidarmanus Fer1* (archaea) GenBank: EAM93270  
 DCDA\_GEOKA *Geobacillus kaustophilus* (firmicutes) Uni-Prot: Q5KXK1  
 DCDA\_GLOVI *Gloeobacter violaceus* (cyanobacteria) Uni-Prot: Q7NPE5  
 DCDA\_HAEIN *Haemophilus influenzae* (proteobacteria) Uni-Prot: P44316  
 DCDA\_HELHP *Helicobacter hepaticus* (proteobacteria) Uni-Prot: Q7VG17  
 DCDA\_HELPY *Helicobacter pylori* (proteobacteria) Uni-Prot: P56129  
 DCDA\_METBU *Methanococcoides burtonii* DSM 6242 (archaea) GenBank: ZP\_00561811  
 DCDA\_METJA *Methanococcus jannaschii* (archaea) Uni-Prot: Q58497  
 DCDA\_METTH *Methanobacterium thermoautotrophicum* (archaea) Uni-Prot: O27390  
 DCDA\_MYCLE *Mycobacterium leprae* (actinobacteria) Uni-Prot: Q50140  
 DCDA\_MYCSM *Mycobacterium smegmatis* (actinobacteria) Uni-Prot: Q9X5M1  
 DCDA\_MYCTU *Mycobacterium tuberculosis* (actinobacteria) Uni-Prot: P31848  
 DCDA\_NEIMA *Neisseria meningitidis* (serogroup A) (proteobacteria) Uni-Prot: Q9JWA6  
 DCDA\_ORYSA *Oryza sativa* (rice) GenBank: XP\_465375  
 DCDA\_PHOLL *Photobacterium luminescens* (subsp. *Laumondii*) (proteobacteria) Uni-Prot: Q7N7F9  
 DCDA\_PROMA *Prochlorococcus marinus* (cyanobacteria) Uni-Prot: Q7VBI7  
 DCDA\_PSEAE *Pseudomonas aeruginosa* (proteobacteria) Uni-Prot: P19572  
 DCDA\_RHILO *Rhizobium loti* (proteobacteria) Uni-Prot: Q98G34  
 DCDA\_RHOPA *Rhodopseudomonas palustris* (proteobacteria) Uni-Prot: Q6N0M1  
 DCDA\_SALTI *Salmonella typhi* (proteobacteria) Uni-Prot: Q8Z403  
 DCDA\_SILPO *Silicibacter pomeroyi* (proteobacteria) Uni-Prot: Q5LXB8  
 DCDA\_SYNPX *Synechococcus* sp. (strain WH8102) (cyanobacteria) Uni-Prot: Q7U7P5  
 DCDA\_SYNY3 *Synechocystis* sp. (strain PCC 6803) (cyanobacteria) Uni-Prot: Q55484  
 DCDA\_THEMA *Thermotoga maritima* (thermotogae) Uni-Prot: Q9X1K5  
 DCDA\_THETN *Thermoanaerobacter tengcongensis* (firmicutes) Uni-Prot: Q8R8L4  
 DCDA\_VIBCH *Vibrio cholerae* (proteobacteria) Uni-Prot: Q9KVL7  
 DCDA\_WOLSU *Wolinella succinogenes* (proteobacteria) Uni-Prot: Q7MAC7  
 DCDA\_YEPRE *Yersinia pestis* (proteobacteria) Uni-Prot: Q8ZHT8  
 DCDA\_ZYMMO *Zymomonas mobilis* (proteobacteria) Uni-Prot: Q9Z661  
 DCLO\_SELRU *Selenomonas ruminantium* (firmicutes) Uni-Prot: O50657  
 ODC\_AQUAE *Aquifex aeolicus* VF5 (aquificae) GenBank: NP\_213500  
 ODC\_ASPFU *Aspergillus fumigatus* Af293 (fungi) Uni-Prot: Q4WP47  
 ODC\_BRAJA *Bradyrhizobium japonicum* USDA 110 (proteobacteria) GenBank: NP\_774399  
 ODC\_BRARE *Brachydanio rerio* (zebrafish) Uni-Prot: Q9DGJ4  
 ODC\_CAEEL *Caenorhabditis elegans* (chromadorea) Uni-Prot: P41931  
 ODC\_CANAL *Candida albicans* (yeast) Uni-Prot: P78599  
 ODC\_COCIM *Coccidioides immitis* (fungi) Uni-Prot: Q9P8X0  
 ODC\_DATST *Datura stramonium* (jimsonweed) Uni-Prot: P50134  
 ODC\_HAECO *Haemonchus contortus* (barber pole worm) Uni-Prot: O76203  
 ODC\_HUMAN *Homo sapiens* (human) Uni-Prot: P11926  
 ODC\_KLULA *Kluyveromyces lactis* (yeast) Uni-Prot: Q6CWN8  
 ODC\_LEIDO *Leishmania donovani* (euglenozoa) Uni-Prot: P27116  
 ODC\_LOTJA *Lotus japonicus* (viridiplantae) Uni-Prot: Q70KF6

ODC\_LYCES *Lycopersicon esculentum* (tomato) Uni-Prot: O22616  
 ODC\_METMA *Methanosarcina mazei* GoI (archaea) GenBank: NP\_635209  
 ODC\_MOUSE *Mus musculus* (mouse) Uni-Prot: P00860  
 ODC\_MUCCI *Mucor circinelloides f. lusitanicus* (fungi) Uni-Prot: Q9UUQ7  
 ODC\_MUSDO *Musca domestica* (house fly) Uni-Prot: Q27702  
 ODC\_NEUCR *Neurospora crassa* (fungi) Uni-Prot: P27121  
 ODC\_NITEU *Nitrosomonas eutropha* C71 (proteobacteria) GenBank: ZP\_00669382  
 ODC\_NOCFA *Nocardia farcinica* IFM 10152 (actinobacteria) GenBank: YP\_119997  
 ODC\_OCUYA *Oculimacula yallundae* (fungi) Uni-Prot: Q96X19  
 ODC\_ORYSA *Oryza sativa* (rice) Uni-Prot: Q7XJ04  
 ODC\_PANRE *Panagrellus redivivus* (chromadorea) Uni-Prot: P49725  
 ODC\_PARBR *Paracoccidioides brasiliensis* (fungi) Uni-Prot: Q9P8T7  
 ODC\_PHANO *Phaeosphaeria nodorum* (fungi) Uni-Prot: Q9UVG2  
 ODC\_PSEAE *Pseudomonas aeruginosa* PAO1 (proteobacteria) GenBank: NP\_253209  
 ODC\_RHOBA *Rhodopirellula baltica* (planctomycetes) Uni-Prot: Q7UFM7  
 ODC\_SCHPO *Schizosaccharomyces pombe* (fission yeast) Uni-Prot: Q9UQW9  
 ODC\_SHEON *Shewanella oneidensis* MR-1 (proteobacteria) GenBank: NP\_719665  
 ODC\_SOYBN *Glycine max* (soybean) Uni-Prot: Q70MR6  
 ODC\_STRCO *Streptomyces coelicolor* A3(2) (actinobacteria) GenBank: NP\_630146  
 ODC\_THEMA *Thermotoga maritima* MSB8 (thermotogae) GenBank: AAD36935  
 ODC\_TOBAC *Nicotiana tabacum* (common tobacco) Uni-Prot: P93351  
 ODC\_TREDE *Treponema denticola* ATCC 35405 (spirochaetes) GenBank: NP\_971717  
 ODC\_TRYBB *Trypanosoma brucei brucei* (euglenozoa) Uni-Prot: P07805  
 ODC\_YARLI *Yarrowia lipolytica* (fungi) Uni-Prot: Q8WZM1  
 ODC\_YEAST *Saccharomyces cerevisiae* (baker's yeast) Uni-Prot: P08432  
 ODC1\_DROME *Drosophila melanogaster* (fruit fly) Uni-Prot: P40807  
 ODC1\_XENLA *Xenopus laevis* (frog) Uni-Prot: P27120  
 ODC2\_DROME *Drosophila melanogaster* (fruit fly) Uni-Prot: P40808  
 ODC2\_XENLA *Xenopus laevis* (frog) Uni-Prot: Q9I8S4  
 ODCp\_HUMAN *Homo sapiens* (human) Uni-Prot: Q96A70  
 ODCp\_MOUSE *Mus musculus* (mouse) Uni-Prot: Q8BVM4  
 ODCp\_RAT *Rattus norvegicus* (rat) Uni-Prot: Q6AYN0