

Supplement 1. List of sequences used in Fig 4.

Species

Candidatus_Melainabacteria_bacterium_RIFOXYA2_FULL_32_9
Candidatus_Melainabacteria_bacterium_GWF2_37_15
Candidatus_Melainabacteria_bacterium_GWA2_34_9
Candidatus_Melainabacteria_bacterium_RIFCSPLOWO2_12_FULL_35_11
Candidatus_Melainabacteria_bacterium_RIFCSPHIGHO2_02_FULL_34_12
Clostridium_sp._CAG:715
Synechocystis_sp._(strain_PCC_6803/_Kazusa)
Synechocystis_sp._(strain_PCC_6803/_Kazusa)
Gloeobacter_violaceus_(strain_PCC_7421)
Prochlorococcus_marinus_subsp._pastoris_(strain_CCMP1986/_NIES-2087/_MED4)
Gloeobacter_kilaueensis_JS1
Atelocyanobacterium_thalassa_(isolate_ALOHA)
Alkaliphilus_metalliredigens_(strain_QYMF)
Thermoanaerobacter_sp._(strain_X514)
Symbiobacterium_thermophilum_(strain_T/_IAM_14863)
Armatimonadetes_bacterium_GXS
Armatimonadetes_bacterium_GBS
Armatimonadetes_bacterium_DC
Candidatus_Methyloirabilis_oxyfera
Armatimonadetes_bacterium_CSP1-3
Thermanaerovibrio_acidaminovorans_(strain_ATCC_49978/_DSM_6589/_Su883)
Aminomonas_paucivorans_DSM_12260
Synergistales_bacterium_58_81
Synergistales_bacterium_53_16
uncultured_candidate_division_JS1_bacterium
uncultured_candidate_division_JS1_bacterium
Omnitrophica_bacterium_OLB16
Bacillus_subtilis_(strain_168)
Lactobacillus_plantarum_(strain_ATCC_BAA-793/_NCIMB_8826/_WCFS1)
Sphaerobacter_thermophilus_(strain_DSM_20745/_S_6022)
Thermomicrobium_roseum_(strain_ATCC_27502/_DSM_5159/_P-2)
Chloroflexus_aggregans_(strain_MD-66/_DSM_9485)
Candidatus_Peregrinibacteria_bacterium_GW2011_GWC2_33_13
Candidatus_Peregrinibacteria_bacterium_GW2011_GWA2_47_7
Candidatus_Peregrinibacteria_bacterium_GW2011_GWF2_38_29
Candidatus_Peregrinibacteria_bacterium_GW2011_GWC2_39_14
Candidatus_Peregrinibacteria_bacterium_GW2011_GWF2_43_17
Candidatus_Peregrinibacteria_bacterium_GW2011_GWF2_39_17
Candidatus_Peregrinibacteria_bacterium_GW2011_GWF2_33_10
Parcubacteria_bacterium_DG_72
Parcubacteria_bacterium_DG_74_3
Parcubacteria_bacterium_DG_74_2
Parcubacteria_bacterium_C7867-006
Parcubacteria_bacterium_C7867-007
Parcubacteria_bacterium_OLB19
Berkelbacteria_bacterium_GW2011_GWE1_39_12
Berkelbacteria_bacterium_GW2011_GWA2_35_9
Berkelbacteria_bacterium_GW2011_GWA2_38_9
Dictyoglomus_turgidum_(strain_Z-1310/_DSM_6724)

Dictyoglomus_thermophilum_(strain_ATCC_35947/_DSM_3960/_H-6-12)
Petrotoga_mobilis_(strain_DSM_10674/_SJ95)
Pseudothermotoga_lettingae_(strain_ATCC_BAA-301/_DSM_14385/_NBRC_107922/_TMO)
Thermotoga_maritima_(strain_ATCC_43589/_MSB8/_DSM_3109/_JCM_10099)
Thermotoga_maritima_(strain_ATCC_43589/_MSB8/_DSM_3109/_JCM_10099)
Kosmotoga_olearia_(strain_TBF_19.5.1)
Petrotoga_mobilis_(strain_DSM_10674/_SJ95)
Petrotoga_mobilis_(strain_DSM_10674/_SJ95)
Armatimonadetes_bacterium_OLB18
Fimbriimonas_ginsengisoli_Gsoil_348
Chthonomonas_calidirosea_(strain_DSM_23976/_ICMP_18418/_T49)
Chloroflexi_bacterium_OLB15
Fusobacterium_nucleatum_subsp._animalis_ATCC_51191
Fusobacterium_necrophorum_subsp._funduliforme_B35
Fusobacterium_necrophorum_subsp._funduliforme_B35
Fusobacterium_varium_ATCC_27725
Fusobacterium_mortiferum_ATCC_9817
Caldisericum_exile_(strain_DSM_21853/_NBRC_104410/_AZM16c01)
Bdellovibrio_bacteriovorus_(strain_ATCC_15356/_DSM_50701/_NCIB_9529/_HD100)
Acidobacterium_capsulatum_(strain_ATCC_51196/_DSM_11244/_JCM_7670/_NBRC_15755/_NCIMB_13)
Terriglobus_saanensis_(strain_ATCC_BAA-1853/_DSM_23119/_SP1PR4)
Terriglobus_roseus_(strain_DSM_18391/_NRRL_B-41598/_KBS_63)
Granulicella_mallensis_(strain_ATCC_BAA-1857/_DSM_23137/_MP5ACTX8)
Nitrospira_defluvii
Nitrospira_sp._OLB3
Nitrospira_moscoviensis
Nitrospira_sp._SCGC_AG-212-E16
Nitrospina_sp._SCGC_AAA799_A02
Nitrospina_gracilis_(strain_3/211)
Candidatus_Methylomirabilis_oxyfera
candidate_division_NC10_bacterium_CSP1-5
Candidatus_Entotheonella_sp._TSY1
Denitrovibrio_acetiphilus_(strain_DSM_12809/_N2460)
Flexistipes_sinusarabici_(strain_DSM_4947/_MAS_10)
Calditerrivibrio_nitroreducens_(strain_DSM_19672/_NBRC_101217/_Yu37-1)
Deferribacter_desulfuricans_(strain_DSM_14783/_JCM_11476/_NBRC_101012/_SSM1)
Thermodesulfatator_indicus_(strain_DSM_15286/_JCM_11887/_CIR29812)
Mucispirillum_schaedleri_ASF457
Nitrospirae_bacterium_HCH-1
Desulfurispirillum_indicum_(strain_ATCC_BAA-1389/_S5)
Photobacterium_profundum_(strain_SS9)
Salmonella_typhimurium_(strain_LT2/_SGSC1412/_ATCC_700720)
Escherichia_coli_(strain_K12)
Acidithiobacillales_bacterium_SG8_45
Acidithiobacillus_sp._GGI-221
Acidithiobacillus_ferrivorans_SS3
Acidithiobacillus_caldus_ATCC_51756
Acidithiobacillales_bacterium_SG8_45
Magnetococcus_marinus_(strain_ATCC_BAA-1437/_JCM_17883/_MC-1)
Candidatus_Dadabacteria_bacterium_CSP1-2
Chlorobi_bacterium_OLB5

candidate_division_TA06_bacterium_DG_24
candidate_division_TA06_bacterium_SM23_40
candidate_division_TA06_bacterium_SM1_40
candidate_division_WOR_3_bacterium_SM23_42
candidate_division_WOR_3_bacterium_SM23_60
candidate_division_Zixibacteria_bacterium_DG_27
candidate_division_Zixibacteria_bacterium_SM23_73
candidate_division_Zixibacteria_bacterium_SM1_73
candidate_division_Zixibacteria_bacterium_SM23_73_3
candidate_division_Zixibacteria_bacterium_RBG-1
Latescibacteria_bacterium_DG_63
Caldithrix_abyssi_DSM_13497
Thermodesulfobacterium_geofontis_(strain_OPF15)
Gemmatimonas_phototrophica
Gemmatimonas_aurantiaca_(strain_T-27/_DSM_14586/_JCM_11422/_NBRC_100505)
Gemmatirosa_kalamazoonesis
Gemmatimonas_sp._SG8_17
Gemmatimonas_sp._SM23_52
Thermosulfurimonas_dismutans
Mariprofundus_ferrooxydans_PV-1
Haliangium_ochraceum_(strain_DSM_14365/_JCM_11303/_SMP-2)
Sorangium_cellulosum_(strain_So_ce56)
Myxococcus_xanthus_(strain_DK_1622)
Thermovibrio_ammonificans_(strain_DSM_15698/_JCM_12110/_HB-1)
Desulfurobacterium_thermolithotrophum_(strain_DSM_11699/_BSA)
Caulobacter_crescentus_(strain_NA1000/_CB15N)
Bartonella_bacilliformis_(strain_ATCC_35685/_KC583)
Rickettsia_felis_(strain_ATCC_VR-1525/_URRWXCal2)
Acidobacteria_bacterium_DSM_100886
Cupriavidus_metallidurans_(strain_ATCC_43123/_DSM_2839/_NBRC_102507/_CH34)
Neorickettsia_risticii_(strain_Illinois)
Fibrobacter_succinogenes_(strain_ATCC_19169/_S85)
Marinimicrobia_bacterium_46_43
Chitinivibrio_alkaliphilus_ACh1
Chitinispirillum_alkaliphilum
candidate_division_TA06_bacterium_34_109
Cloacimonas_acidaminovorans_(strain_Evry)
Hydrogenobaculum_sp._(strain_Y04AAS1)
Aquifex_aeolicus_(strain_VF5)
Sulfurihydrogenibium_azorense_(strain_Az-Fu1/_DSM_15241/_OCM_825)
Microgenomates_bacterium_OLB22
Microgenomates_bacterium_OLB23
Microgenomates_bacterium_39_6
Microgenomates_bacterium_39_7
candidate_division_WS6_bacterium_OLB20
Leptospira_borgpetersenii_serovar_Hardjo-bovis_(strain_JB197)
Candidatus_Peregrinibacteria_bacterium_GW2011_GWA2_54_9
Candidatus_Peribacter_riflensis
Candidatus_Peribacteria_bacterium_GW2011_GWC2_54_8
Candidatus_Omnitrophus_magneticus
Omnitrophica_WOR_2_bacterium_SM23_29

Omnirothica_WOR_2_bacterium_SM23_72
Omnirothica_WOR_2_bacterium_SM23_72
Rubrobacter_xylanophilus_(strain_DSM_9941/_NBRC_16129)
Pelodictyon_phaeoclathratiforme_(strain_DSM_5477/_BU-1)
Chlorobium_phaeobacteroides_(strain_DSM_266)
Chlorobium_luteolum_(strain_DSM_273/_2530)
Chlorobium_tepidum_(strain_ATCC_49652/_DSM_12025/_NBRC_103806/_TLS)
Akkermansia_muciniphila_(strain_ATCC_BAA-835/_Muc)
Methyloacidophilum_infernorum_(isolate_V4)
Methyloacidophilum_fumariolicum_SoIV
Verrucomicrobia_subdivision_6_bacterium_BACL9_MAG-120820-bin42
Chthoniobacter_flavus_Ellin428
Opitutus_terrae_(strain_DSM_11246/_JCM_15787/_PB90-1)
Coralimargarita_akajimensis_(strain_DSM_45221/_IAM_15411/_JCM_23193/_KCTC_12865/_04OKA01C)
Simkania_negevensis_(strain_ATCC_VR-1471/_Z)
Protochlamydia_naegleriophila
Neochlamydia_sp._EPS4
Waddlia_chondrophila_(strain_ATCC_VR-1470/_WSU_86-1044)
Chlamydia_trachomatis_(strain_D/UW-3/Cx)
Deinococcus_actinosclerus
Deinococcus_deserti_(strain_VCD115/_DSM_17065/_LMG_22923)
Deinococcus_maricopensis_(strain_DSM_21211/_LMG_22137/_NRRL_B-23946/_LB-34)
Deinococcus_actinosclerus
Deinococcus_deserti_(strain_VCD115/_DSM_17065/_LMG_22923)
Deinococcus_maricopensis_(strain_DSM_21211/_LMG_22137/_NRRL_B-23946/_LB-34)
Synechococcus_sp._(strain_ATCC_29403/_PCC_7335)
Gloeobacter_violaceus_(strain_PCC_7421)
Prochlorococcus_marinus_(strain_SARG/_CCMP1375/_SS120)
Candidatus_Entotheonella_sp._TSY1
Bdellovibrio_bacteriovorus_(strain_ATCC_15356/_DSM_50701/_NCIB_9529/_HD100)
Paraburkholderia_phymatum_(strain_DSM_17167/_CIP_108236/_LMG_21445/_STM815)
Ralstonia_pickettii_(strain_12J)
Candidatus_Methyloirabilis_oxyfera
Nitrospira_defluvii
Nitrospira_sp._OLB3
Nitrospira_moscowiensis
Candidatus_Entotheonella_sp._TSY2
Candidatus_Rokubacteria_bacterium_CSP1-6
Thermosulfurimonas_dismutans
Thermodesulfobacterium_commune
Gemmatimonas_sp._SM23_52
Candidatus_Entotheonella_sp._TSY1
Burkholderia_pseudomallei_(strain_1710b)
Anaeromyxobacter_dehalogenans_(strain_2CP-1/_ATCC_BAA-258)
Pseudomonas_putida_(strain_ATCC_700007/_DSM_6899/_BCRC_17059/_F1)
Chlorobium_luteolum_(strain_DSM_273/_2530)
Pelodictyon_phaeoclathratiforme_(strain_DSM_5477/_BU-1)
Chlorobium_phaeobacteroides_(strain_DSM_266)
Chlorobium_tepidum_(strain_ATCC_49652/_DSM_12025/_NBRC_103806/_TLS)
Caldithrix_abyssi_DSM_13497
Methylobium_petroleiphilum_(strain_ATCC_BAA-1232/_LMG_22953/_PM1)

Methylacidiphilum_infernorum_(isolate_V4)
Methylacidiphilum_fumariolicum_SoIV
Sphaerobacter_thermophilus_(strain_DSM_20745/_S_6022)
Thermomicrobium_roseum_(strain_ATCC_27502/_DSM_5159/_P-2)
Sphaerobacter_thermophilus_(strain_DSM_20745/_S_6022)
Sphaerobacter_thermophilus_(strain_DSM_20745/_S_6022)
Chitinispirillum_alkaliphilum
Chitinispirillum_alkaliphilum
Chloroflexi_bacterium_OLB15
Candidatus_Saccharibacteria_oral_taxon_TM7x
Candidatus_Saccharimonas_aalborgensis
Candidatus_Saccharibacteria_bacterium_GW2011_GWC2_44_17
Candidatus_Saccharibacteria_bacterium_GW2011_GWC2_48_9
Candidatus_Saccharibacteria_bacterium_RAAC3_TM7_1
Candidatus_Saccharibacteria_bacterium_GW2011_GWA2_46_10
Symbiobacterium_thermophilum_(strain_T/_IAM_14863)
Lentisphaera_araneosa_HTCC2155
Elusimicrobium_minutum_(strain_Pei191)
Corynebacterium_glutamicum_(strain_ATCC_13032/_DSM_20300/_JCM_1318/_LMG_3730/_NCIMB_100100)
Brachybacterium_faecium_(strain_ATCC_43885/_DSM_4810/_NCIB_9860)
Propionibacterium_acnes_(strain_SK137)
Sulfurovum_sp._(strain_NBC37-1)
Helicobacter_felis_(strain_ATCC_49179/_NCTC_12436/_CS1)
Helicobacter_pylori_(strain_J99/_ATCC_700824)
Helicobacter_pylori_(strain_ATCC_700392/_26695)
Treponema_pallidum_(strain_Nichols)
Sphaerochaeta_pleomorpha_(strain_ATCC_BAA-1885/_DSM_22778/_Grapes)
Atopobium_parvulum_(strain_ATCC_33793/_DSM_20469/_JCM_10300/_VPI_0546)
Clostridium_perfringens_(strain_ATCC_13124/_DSM_756/_JCM_1290/_NCIMB_6125/_NCTC_8237/_Typhimurium)
Thermoanaerobacter_sp._(strain_X514)
Hassallia_byssioidea_VB512170
Bacteroides_thetaiotaomicron_(strain_ATCC_29148/_DSM_2079/_NCTC_10582/_E50/_VPI-5482)
Borrelia_burgdorferi_(strain_ZS7)
Salinispira_pacifica
Planctomycetes_bacterium_SM23_25
Phycisphaerae_bacterium_SG8_4
candidate_division_TM6_bacterium_JCVI_TM6SC1
Streptobacillus_moniliformis_(strain_ATCC_14647/_DSM_12112/_NCTC_10651/_9901)
Leptotrichia_buccalis_(strain_ATCC_14201/_DSM_1135/_JCM_12969/_NCTC_10249/_C-1013-b)
Sorangium_cellulosum_(strain_So_ce56)
Rhodopirellula_baltica_(strain_DSM_10527/_NCIMB_13988/_SH1)
Sorangium_cellulosum_(strain_So_ce56)
Deinococcus_actinosclerus
Deinococcus_deserti_(strain_VCD115/_DSM_17065/_LMG_22923)
Deinococcus_maricopensis_(strain_DSM_21211/_LMG_22137/_NRRL_B-23946/_LB-34)
Rhodopirellula_baltica_(strain_DSM_10527/_NCIMB_13988/_SH1)
Gemmata_sp._SH-PL17
Marinobacter_hydrocarbonoclasticus_(strain_ATCC_700491/_DSM_11845/_VT8)
Syntrophus_aciditrophicus_(strain_SB)
Prochlorothrix_hollandica_PCC_9006
Candidatus_Synechococcus_spongium_142

Prochlorococcus_marinus_subsp._pastoris_(strain_CCMP1986/_NIES-2087/_MED4)
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Acidothermus_cellulolyticus_(strain_ATCC_43068/_11B)
Symbiobacterium_thermophilum_(strain_T/_IAM_14863)
Aminomonas_paucivorans_DSM_12260
Sorangium_cellulosum_(strain_So_ce56)
Opitutus_terrae_(strain_DSM_11246/_JCM_15787/_PB90-1)
Gemmatirosa_kalamazoonesis
Alkaliphilus_metalliredigens_(strain_QYMF)
Gloeobacter_kilaueensis_JS1
Candidatus_Omnitrophus_magneticus
Thermomicrobium_roseum_(strain_ATCC_27502/_DSM_5159/_P-2)
Gemmata_sp._SH-PL17
Latescibacteria_bacterium_DG_63

UniProt entry (except otherwise noted are from NCBI database)

OGI17144.1	NCBI
OGI03137.1	NCBI
OGH96060.1	NCBI
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OGI19184.1	NCBI
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