

Supplementary table 1. Genomes analyzed in this work and the dark matter fraction.

Note: Proteins which were annotated as "hypothetical", "unknown" and "uncharacterized" were counted for column E data. Proteins assigned to arCOGs with category "S" were counted for column F data. The genomes colored in blue were omitted in order to assess the average fraction of dark matter gene content in archaeal genomes reported in the text.

| FTP accession number | Genome Name | Archaeal lineage | Number of proteins | Fraction of dark matter in the submitted annotation |
|----------------------|-----------------------------------------------------------|------------------|--------------------|-----------------------------------------------------|
| GCA_001563335.1 | Candidatus_Thorarchaeota_archaeon_SMTZ1-45_ | Asgard | 3208 | 91% |
| GCA_001761425.1 | Nanohaloarchaea_archaeon_SG9_ | DPANN | 1183 | 90% |
| GCA_001563325.1 | Candidatus_Thorarchaeota_archaeon_SMTZ1-83_ | Asgard | 3029 | 89% |
| GCA_001872325.1 | Candidatus_Pacearchaeota_archaeon_CG1_02_35_32_ | DPANN | 1013 | 88% |
| GCA_001595815.1 | Theionarchaea_archaeon_DG-70-1_ | Theionarchaea | 4270 | 87% |
| GCA_001595795.1 | Theionarchaea_archaeon_DG-70_ | Theionarchaea | 3483 | 86% |
| GCA_001871495.1 | Candidatus_Micrarchaeota_archaeon_CG1_02_51_15_ | DPANN | 1244 | 86% |
| GCA_001872315.1 | Candidatus_Pacearchaeota_archaeon_CG1_02_39_14_ | DPANN | 807 | 85% |
| GCA_001872795.1 | Candidatus_Pacearchaeota_archaeon_CG1_02_32_132_ | DPANN | 872 | 84% |
| GCA_001918715.1 | Crenarchaeota_archaeon_13_1_40CM_3_53_5_ | unclassified | 2419 | 84% |
| GCA_001872125.1 | Candidatus_Pacearchaeota_archaeon_CG1_02_30_18_ | DPANN | 660 | 83% |
| GCA_001871595.1 | Candidatus_Micrarchaeota_archaeon_CG1_02_55_22_ | DPANN | 1162 | 83% |
| GCA_001786415.1 | Candidatus_Pacearchaeota_archaeon_RBG_19FT_COMBO_34_9 | DPANN | 645 | 83% |
| GCA_001787285.1 | Candidatus_Pacearchaeota_archaeon_RBG_13_33_26_ | DPANN | 677 | 82% |
| GCA_001273385.1 | miscellaneous_Crenarchaeota_group-6_archaeon_AD8-1_ | Bathyarchaeota | 1505 | 82% |
| GCA_001873985.1 | Candidatus_Aenigmarchaeota_archaeon_CG1_02_38_14_ | DPANN | 1011 | 82% |
| GCA_002172575.1 | Euryarchaeota_archaeon_TMED103_ | ucEuryarchaeota | 1636 | 81% |
| GCA_001871655.1 | Candidatus_Micrarchaeota_archaeon_CG1_02_60_51_ | DPANN | 849 | 81% |
| GCA_001889985.1 | Candidatus_Micrarchaeum_acidiphilum_ARMAN-1_ | DPANN | 1035 | 81% |
| GCA_001871605.1 | Candidatus_Micrarchaeota_archaeon_CG1_02_55_41_ | DPANN | 768 | 80% |
| GCA_002204695.1 | Thermoplasmatales_archaeon_ARMAN_ | Thermoplasmata | 991 | 79% |
| GCA_001856845.1 | Thermoplasmatales_archaeon_Gpl_ | Thermoplasmata | 1923 | 79% |
| GCA_000496135.1 | Thermoplasmatales_archaeon_E-plasma_ | Thermoplasmata | 1674 | 78% |
| GCA_001872145.1 | Candidatus_Pacearchaeota_archaeon_CG1_02_31_27_ | DPANN | 779 | 78% |
| GCA_002763165.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 1115 | 77% |
| GCA_000220375.1 | Candidatus_Nanosalina_sp_I07AB43_ | DPANN | 1677 | 58% |
| GCA_000730285.1 | Candidatus_Nitrososphaera_evergladensis_SR1_ | Thaumarchaeota | 3499 | 52% |
| GCA_000303155.1 | Candidatus_Nitrososphaera_gargensis_Ga9_2_ | Thaumarchaeota | 3565 | 53% |
| GCA_001940655.1 | Candidatus_Lokiarchaeota_archaeon_CR_4_ | Asgard | 4413 | 62% |
| GCA_001940645.1 | Candidatus_Heimdallarchaeota_archaeon_LC_3_ | Asgard | 5514 | 68% |
| GCA_000200715.1 | Cenarchaeum_symbiosum_A_ | Thaumarchaeota | 2017 | 51% |
| GCA_002794195.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 907 | 71% |
| GCA_000722915.1 | Marine_Group_I_thaumarchaeote_SCGC_AAA799-N04_ | Thaumarchaeota | 1767 | 41% |
| GCA_000220355.1 | Candidatus_Nanosalinarum_sp_I07AB56_ | DPANN | 1407 | 53% |
| GCA_002762735.1 | Candidatus_Pacearchaeota_archaeon_CG11_big_fil_rev_8_21_1 | DPANN | 784 | 74% |
| GCF_000698785.1 | Nitrososphaera_viennensis_EN76 | Thaumarchaeota | 2801 | 57% |
| GCA_000875775.1 | Candidatus_Nitrosopumilus_piranensis_D3C | Thaumarchaeota | 2161 | 51% |

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|-----------------|-----------------------------------------------------------|-----------------|------|-----|
| GCA_002687825.1 | Nanoarchaeota_archaeon_ | DPANN | 935 | 72% |
| GCA_002778455.1 | Candidatus_Micrarchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 1144 | 67% |
| GCA_000416085.1 | halophilic_archaeon_J07HX64_ | Halobacteria | 3026 | 49% |
| GCA_002789435.1 | Candidatus_Pacearchaeota_archaeon_CG_4_9_14_0_8_um_filt | DPANN | 951 | 74% |
| GCA_002763075.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 1077 | 75% |
| GCA_000746745.1 | Marine_Group_I_thaumarchaeote_SCGC_RSA3_ | Thaumarchaeota | 2412 | 39% |
| GCA_002792635.1 | Candidatus_Pacearchaeota_archaeon_CG_4_10_14_0_2_um_filt | DPANN | 950 | 74% |
| GCA_002792675.1 | Candidatus_Pacearchaeota_archaeon_CG_4_10_14_0_2_um_filt | DPANN | 618 | 71% |
| GCA_002788615.1 | Candidatus_Pacearchaeota_archaeon_CG_4_9_14_0_2_um_filt | DPANN | 931 | 74% |
| GCA_000724145.1 | Marine_Group_I_thaumarchaeote_SCGC_AAA799-E16_ | Thaumarchaeota | 1910 | 36% |
| GCA_002794155.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 902 | 75% |
| GCA_002790875.1 | Candidatus_Pacearchaeota_archaeon_CG_4_9_14_3_um_filter_ | DPANN | 740 | 73% |
| GCA_002790905.1 | Candidatus_Pacearchaeota_archaeon_CG_4_9_14_3_um_filter_ | DPANN | 986 | 75% |
| GCA_002784645.1 | Candidatus_Pacearchaeota_archaeon_CG_4_10_14_0_8_um_filt | DPANN | 953 | 74% |
| GCA_000299365.1 | Candidatus_Nitrosopumilus_koreensis_AR1 | Thaumarchaeota | 1890 | 47% |
| GCA_002763155.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 780 | 71% |
| GCA_000746765.1 | Marine_Group_I_thaumarchaeote_SCGC_AAA799-D11_ | Thaumarchaeota | 1732 | 37% |
| GCA_900065925.1 | Candidatus_Nitrosotalea_devanaterrea_ | Thaumarchaeota | 2103 | 44% |
| GCA_002762795.1 | Candidatus_Woearchaeota_archaeon_CG10_big_fil_rev_8_21_ | DPANN | 1463 | 75% |
| GCA_900036045.1 | Methanoculleus_sp_MAB1_ | Methanomicrobia | 3450 | 58% |
| GCA_002794175.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 729 | 69% |
| GCA_002781865.1 | Candidatus_Aenigmarchaeota_archaeon_CG15_BIG_FIL_POST_F | DPANN | 1049 | 70% |
| GCF_000328925.1 | Nitrosopumilus_sp_AR | Thaumarchaeota | 3898 | 42% |
| GCA_002784265.1 | Candidatus_Aenigmarchaeota_archaeon_CG_4_10_14_3_um_fil | DPANN | 1118 | 70% |
| GCA_002792115.1 | Candidatus_Woearchaeota_archaeon_CG_4_10_14_0_2_um_ | DPANN | 1410 | 74% |
| GCA_002791855.1 | Candidatus_Aenigmarchaeota_archaeon_CG_4_10_14_0_8_um_ | DPANN | 1067 | 70% |
| GCF_000956175.1 | Candidatus_Nitrosopumilus_adriaticus_NF5 | Thaumarchaeota | 2037 | 43% |
| GCF_000328945.1 | Nitrosopumilus_sp_SJ | Thaumarchaeota | 1853 | 39% |
| GCA_002792655.1 | Candidatus_Pacearchaeota_archaeon_CG_4_10_14_0_2_um_filt | DPANN | 688 | 66% |
| GCA_000986845.1 | Lokiarchaeum_sp_GC14_75_ | Asgard | 5384 | 47% |
| GCA_000830315.1 | archaeon_GW2011_AR20_ | DPANN | 1010 | 58% |
| GCA_000496235.1 | uncultured_archaeon_A07HR60_ | Halobacteria | 2856 | 40% |
| GCA_000830295.1 | archaeon_GW2011_AR15_ | DPANN | 1308 | 57% |
| GCF_000710605.1 | Haloterrigena_jeotgali_A29 | Halobacteria | 4045 | 40% |
| GCA_002782805.1 | Candidatus_Aenigmarchaeota_archaeon_CG_4_8_14_3_um_filt | DPANN | 1004 | 69% |
| GCF_000299395.1 | Candidatus_Nitrosopumilus_sediminis_AR2 | Thaumarchaeota | 1949 | 41% |
| GCA_002789635.1 | Candidatus_Aenigmarchaeota_archaeon_CG_4_9_14_3_um_filt | DPANN | 1092 | 70% |
| GCA_002763115.1 | Candidatus_Pacearchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 700 | 67% |
| GCA_000204585.1 | Candidatus_Nitrosoarchaeum_limnia_SFB1 | Thaumarchaeota | 2038 | 46% |
| GCA_002762845.1 | Candidatus_Woearchaeota_archaeon_CG10_big_fil_rev_8_21_ | DPANN | 890 | 70% |
| GCF_000337175.1 | Natrinema_gari_JCM_14663 | Halobacteria | 3773 | 40% |
| GCA_002762785.1 | Candidatus_Woearchaeota_archaeon_CG10_big_fil_rev_8_21_ | DPANN | 1259 | 69% |
| GCA_002763205.1 | Candidatus_Micrarchaeota_archaeon_CG10_big_fil_rev_8_21_1 | DPANN | 798 | 69% |
| GCA_000234805.1 | Pyrobaculum_ferrireducens_1860 | Thermoproteales | 2827 | 48% |
| GCA_000007225.1 | Pyrobaculum_aerophilum_str_IM2 | Thermoproteales | 2605 | 47% |
| GCA_000247545.1 | Pyrobaculum_oguniense_TE7 | Thermoproteales | 2835 | 41% |
| GCA_002762985.1 | Candidatus_Woearchaeota_archaeon_CG10_big_fil_rev_8_21_ | DPANN | 1513 | 70% |

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|-----------------|-----------------------------------------------------------------|-----------------|------|-----|
| GCA_002763255.1 | Candidatus_Micrarchaeota_archaeon_CG09_land_8_20_14_0_1 DPANN | | 865 | 68% |
| GCA_002763265.1 | archaeon_CG10_big_fil_rev_8_21_14_0_10_43_11_ | unclassified | 1077 | 70% |
| GCF_001541925.1 | Nitrosopumilus_sp_Nsub | Thaumarchaeota | 1604 | 38% |
| GCA_002792915.1 | Candidatus_Micrarchaeota_archaeon_CG_4_10_14_0_2_um_filt DPANN | | 851 | 66% |
| GCA_002780285.1 | Candidatus_Pacearchaeota_archaeon_CG06_land_8_20_14_3_0 DPANN | | 673 | 68% |
| GCA_000830275.1 | archaeon_GW2011_AR10_ | unclassified | 1339 | 54% |
| GCA_002785565.1 | Candidatus_Micrarchaeota_archaeon_CG10_big_fil_rev_8_21_1 DPANN | | 815 | 66% |
| GCF_001625445.1 | Haladaptatus_sp_R4 | Halobacteria | 4130 | 39% |
| GCF_000710615.1 | Haladaptatus_cibarius_D43 | Halobacteria | 3843 | 39% |
| GCF_001485575.1 | Haloarcula_sp_CBA1127 | Halobacteria | 4130 | 39% |
| GCF_002572525.1 | Natrinema_sp_CBA1119 | Halobacteria | 4647 | 36% |
| GCA_001443365.1 | Thaumarchaeota_archaeon_CSP1-1_ | Thaumarchaeota | 1652 | 41% |
| GCF_000281695.1 | Natrinema_sp_J7-2 | Halobacteria | 3595 | 38% |
| GCF_000025625.1 | Natrialba_magadii_ATCC_43099 | Halobacteria | 4076 | 38% |
| GCF_002156965.1 | Candidatus_Nitrosomarinus_catalina_SPOT01 | Thaumarchaeota | 1591 | 36% |
| GCF_000230715.2 | Natronobacterium_gregoryi_SP2 | Halobacteria | 3588 | 37% |
| GCF_000731985.1 | Natrinema_altunense_AJ2 | Halobacteria | 3588 | 39% |
| GCA_000246735.1 | uncultured_marine_group_II_euryarchaeote_ | Thermoplasmata | 1781 | 34% |
| GCA_001307315.1 | Halolamina_pelagica_CDK2 | Halobacteria | 3485 | 40% |
| GCF_001469955.1 | Haloprofundus_marisrubri_SB9 | Halobacteria | 3845 | 40% |
| GCF_000337115.1 | Haloterrigena_thermotolerans_DSM_11522 | Halobacteria | 3688 | 38% |
| GCF_000337535.1 | Natrialba_aegyptia_DSM_13077 | Halobacteria | 4203 | 37% |
| GCF_000230735.2 | Natrinema_pellirubrum_DSM_15624 | Halobacteria | 4096 | 37% |
| GCF_001647155.1 | Haloarcula_sp_K1 | Halobacteria | 4131 | 38% |
| GCF_000220175.1 | Candidatus_Nitrosoarchaeum_koreensis_MY1 | Thaumarchaeota | 1828 | 37% |
| GCF_000025325.1 | Haloterrigena_turkmenica_DSM_5511 | Halobacteria | 4989 | 35% |
| GCF_000493245.1 | Natrinema_sp_J7-1 | Halobacteria | 3465 | 37% |
| GCF_002494345.1 | Natrinema_ejinorensis_JCM_13890 | Halobacteria | 4203 | 35% |
| GCF_002906575.1 | Salinigranum_rubrum_GX10 | Halobacteria | 4476 | 41% |
| GCF_000217715.1 | Halopiger_xanaduensis_SH-6 | Halobacteria | 4087 | 36% |
| GCF_000337195.1 | Natrinema_versiforme_JCM_10478 | Halobacteria | 3962 | 37% |
| GCF_000337455.1 | Halosimplex_carlsbadense_2-9-1 | Halobacteria | 4274 | 40% |
| GCA_001399795.1 | Candidatus_Bathyarchaeota_archaeon_BA2_ | Bathyarchaeota | 1761 | 43% |
| GCF_001971705.1 | Haloterrigena_daqingensis_ | Halobacteria | 3643 | 36% |
| GCF_000336615.1 | Haloarcula_amylolytica_JCM_13557 | Halobacteria | 3988 | 37% |
| GCF_000336895.1 | Haloarcula_argentinensis_DSM_12282 | Halobacteria | 3981 | 39% |
| GCF_000427685.1 | Haloplanus_natans_DSM_17983 | Halobacteria | 3664 | 41% |
| GCF_000690595.1 | Haloterrigena_mahii_H13 | Halobacteria | 3591 | 35% |
| GCF_000007345.1 | Methanosarcina_acetivorans_C2A | Methanomicrobia | 4567 | 39% |
| GCA_002779235.1 | Candidatus_Woearchaeota_archaeon_CG07_land_8_20_14_0 DPANN | | 975 | 65% |
| GCF_001482285.1 | Haloferax_sp_Q22 | Halobacteria | 3849 | 36% |
| GCF_000283335.1 | Halogramnum_salarium_B-1 | Halobacteria | 4304 | 39% |
| GCF_000011085.1 | Haloarcula_marismortui_ATCC_43049 | Halobacteria | 4144 | 37% |
| GCF_000337555.1 | Natrialba_asiatica_DSM_12278 | Halobacteria | 3996 | 36% |
| GCF_001989615.1 | Halorientalis_sp_IM1011 | Halobacteria | 3720 | 40% |
| GCF_000827835.1 | Haloarcula_sp_CBA1115 | Halobacteria | 3966 | 36% |
| GCA_000496215.1 | uncultured_archaeon_A07HN63_ | Halobacteria | 2507 | 38% |

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|-----------------|-------------------------------------------------------------|-----------------|------|-----|
| GCA_000416025.1 | Halonotius_sp_J07HN6_ | Halobacteria | 2913 | 40% |
| GCF_000337595.1 | Natrialba_taiwanensis_DSM_12281 | Halobacteria | 4135 | 37% |
| GCA_001940755.1 | Candidatus_Heimdallarchaeota_archaeon_AB_125_ | Asgard | 2348 | 59% |
| GCF_000337275.1 | Haloarcula_sinaiensis_ATCC_33800 | Halobacteria | 4185 | 38% |
| GCF_000337495.1 | Haloterrigena_salina_JCM_13891 | Halobacteria | 4332 | 36% |
| GCF_000337475.1 | Haloterrigena_limicola_JCM_13563 | Halobacteria | 3327 | 37% |
| GCA_000328525.1 | Halovivax_ruber_XH-70 | Halobacteria | 3099 | 39% |
| GCF_000237865.1 | Haloquadratum_walsbyi_C23_ | Halobacteria | 2771 | 37% |
| GCA_002763225.1 | Candidatus_Diapherotrites_archaeon_CG10_big_fil_rev_8_21_1_ | DPANN | 1100 | 65% |
| GCF_002025255.1 | Halolamina_sp_CBA1230 | Halobacteria | 3389 | 38% |
| GCA_002763275.1 | Candidatus_Micrarchaeota_archaeon_CG09_land_8_20_14_0_1_ | DPANN | 749 | 64% |
| GCF_000455365.1 | Halopiger_djelfmassiliensis_IH2 | Halobacteria | 3560 | 35% |
| GCF_000383975.1 | Natronorubrum_tibetense_GA33 | Halobacteria | 4557 | 39% |
| GCF_000337515.1 | Halovivax_asiaticus_JCM_14624 | Halobacteria | 3050 | 38% |
| GCF_000337715.1 | Natronorubrum_bangense_JCM_10635 | Halobacteria | 3797 | 37% |
| GCA_000416065.1 | Halonotius_sp_J07HN4_ | Halobacteria | 3226 | 39% |
| GCF_002177135.1 | Natronolimnobius_baerhuensis_CGMCC_1_3597 | Halobacteria | 3654 | 35% |
| GCF_000336635.1 | Haloarcula_japonica_DSM_6131 | Halobacteria | 4057 | 38% |
| GCA_002779075.1 | Candidatus_Diapherotrites_archaeon_CG08_land_8_20_14_0_2_ | DPANN | 782 | 71% |
| GCA_002412065.1 | Candidatus_Parvarchaeum_acidiphilum_ARMAN-4_ | DPANN | 911 | 45% |
| GCF_000784335.1 | Halopiger_salifodinae_KCY07-B2 | Halobacteria | 3978 | 34% |
| GCF_002287175.1 | Methanobacterium_bryantii_M_o_H_ | Methanobacteria | 3204 | 39% |
| GCF_000337775.1 | Haloarcula_vallismortis_ATCC_29715 | Halobacteria | 3825 | 38% |
| GCF_000970145.1 | Methanosarcina_siciliae_C2J | Methanomicrobia | 4269 | 41% |
| GCF_000306765.2 | Haloferax_mediterranei_ATCC_33500_CGMCC_1_2087 | Halobacteria | 3761 | 36% |
| GCF_001861355.1 | Natrialba_sp_SSL1 | Halobacteria | 4149 | 34% |
| GCF_000746075.1 | Methanobacterium_arcticum_M2 | Methanobacteria | 3174 | 41% |
| GCF_000739575.1 | Halobellus_rufus_CBA1103 | Halobacteria | 3533 | 39% |
| GCF_000337415.1 | Halorubrum_tebenquichense_DSM_14210 | Halobacteria | 3113 | 36% |
| GCF_000376445.1 | Haladaptatus_paucihalophilus_DX253 | Halobacteria | 4212 | 36% |
| GCF_000336915.1 | Halococcus_saccharolyticus_DSM_5350 | Halobacteria | 3325 | 35% |
| GCF_000172995.2 | Halogeometricum_borinquense_DSM_11551_PR_3 | Halobacteria | 3774 | 35% |
| GCF_000336875.1 | Halorubrum_californiensis_DSM_19288 | Halobacteria | 3313 | 37% |
| GCA_002412085.1 | Candidatus_Parvarchaeum_acidophilus_ARMAN-5_ | DPANN | 1042 | 46% |
| GCF_000337735.1 | Natronorubrum_sulfidifaciens_JCM_14089 | Halobacteria | 3298 | 36% |
| GCF_001280455.1 | Halorubrum_tropicale_5 | Halobacteria | 3373 | 35% |
| GCF_000226975.2 | Halobiforma_lacisalsi_AJ5 | Halobacteria | 4088 | 36% |
| GCF_001729285.1 | Methanobacterium_sp_A39 | Methanobacteria | 3082 | 39% |
| GCF_001485555.1 | Haloarcula_sp_CBA1128 | Halobacteria | 3947 | 35% |
| GCF_000336755.1 | Haloferax_elongans_ATCC_BAA-1513 | Halobacteria | 3776 | 37% |
| GCF_000969985.1 | Methanosarcina_barkeri_str_Wiesmoor | Methanomicrobia | 3781 | 38% |
| GCF_000196895.1 | Halalkalicoccus_jeotgali_B3 | Halobacteria | 3679 | 36% |
| GCF_000745485.1 | Methanobacterium_veterum_MK4 | Methanobacteria | 3156 | 41% |
| GCA_001189275.1 | Pyrobaculum_sp_WP30 | Thermoproteales | 2216 | 38% |
| GCF_001953745.1 | Haloterrigena_saccharevitans_AB14 | Halobacteria | 3745 | 33% |
| GCF_000969945.1 | Methanosarcina_sp_Kolksee | Methanomicrobia | 3553 | 36% |
| GCF_000022205.1 | Halorubrum_lacusprofundi_ATCC_49239 | Halobacteria | 3456 | 35% |

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|-----------------|-------------------------------------------------------------|-----------------|------|-----|
| GCF_000379085.1 | Halomicrobium_katesii_DSM_19301 | Halobacteria | 3382 | 40% |
| GCF_000337835.1 | Haloferax_sulfurifontis_ATCC_BAA-897 | Halobacteria | 3664 | 36% |
| GCF_000517625.1 | Halostagnicola_larsenii_XH-48 | Halobacteria | 3858 | 35% |
| GCF_000023965.1 | Halomicrobium_mukohataei_DSM_12286 | Halobacteria | 3232 | 35% |
| GCF_000337815.1 | Haloferax_mucosum_ATCC_BAA-1512 | Halobacteria | 3287 | 36% |
| GCF_000337915.1 | Halorubrum_saccharovorum_DSM_1137 | Halobacteria | 3122 | 37% |
| GCF_000455345.1 | Halopiger_goleimassiliensis_IIH3 | Halobacteria | 3705 | 36% |
| GCF_002487355.1 | Candidatus_Methanoperedens_sp_BLZ2_ | Methanomicrobia | 3790 | 45% |
| GCF_000337435.1 | Halorubrum_terrestre_JCM_10247 | Halobacteria | 3180 | 36% |
| GCF_000970285.1 | Methanosarcina_horonobensis_HB-1_JCM_15518 | Methanomicrobia | 4144 | 38% |
| GCA_000007185.1 | Methanopyrus_kandleri_AV19 | Methanopyri | 1687 | 34% |
| GCF_002906215.1 | Candidatus_Nitrosocaldus_islandicus_ | Thaumarchaeota | 1641 | 49% |
| GCF_001542905.1 | Halorubrum_aethiopicum_SAH-A6 | Halobacteria | 3086 | 34% |
| GCF_001488575.1 | Halobacterium_hubeiense_JI20-1 | Halobacteria | 3143 | 38% |
| GCA_000018465.1 | Nitrosopumilus_maritimus_SCM1 | Thaumarchaeota | 1795 | 40% |
| GCA_000336675.1 | Halococcus_hamelinensis_100A6 | Halobacteria | 3400 | 37% |
| GCF_000685395.1 | Candidatus_Nitrosotenuis_chungbukensis_MY2 | Thaumarchaeota | 1951 | 41% |
| GCF_002214165.1 | Candidatus_Micrarchaeota_archaeon_Mia14 | DPANN | 960 | 54% |
| GCA_000496195.1 | uncultured_archaeon_A07HB70_ | unclassified | 2513 | 37% |
| GCA_002737455.1 | Thaumarchaeota_archaeon_ | Thaumarchaeota | 1365 | 34% |
| GCF_000328685.1 | Natronococcus_occultus_SP4 | Halobacteria | 4035 | 35% |
| GCA_001595945.1 | Thermoplasmatales_archaeon_SM1-50_ | Thermoplasmata | 1890 | 72% |
| GCF_002787055.1 | Candidatus_Nitrosotenuis_sp_AQ6f_AQ6F | Thaumarchaeota | 1912 | 37% |
| GCA_002737445.1 | Candidatus_Nitrosoarchaeum_sp_ | Thaumarchaeota | 1389 | 33% |
| GCF_000337095.1 | Halogeometricum_pallidum_JCM_14848 | Halobacteria | 4055 | 34% |
| GCA_001871475.1 | Candidatus_Micrarchaeota_archaeon_CG1_02_47_40_ | DPANN | 1150 | 77% |
| GCF_000337395.1 | Halorubrum_litoreum_JCM_13561 | Halobacteria | 2943 | 35% |
| GCF_000337675.1 | Natronococcus_amylolyticus_DSM_10524 | Halobacteria | 4146 | 35% |
| GCA_000496175.1 | uncultured_archaeon_A07HR67_ | unclassified | 2889 | 34% |
| GCF_000969905.1 | Methanosarcina_vacuolata_Z-761 | Methanomicrobia | 3538 | 36% |
| GCF_000723845.1 | Haloferax_alexandrinus_Arc-Hr | Halobacteria | 3735 | 34% |
| GCF_001190965.1 | Haloferax_gibbonsii_ARA6 | Halobacteria | 3744 | 33% |
| GCF_001469875.2 | Haloferax_sp_SB3 | Halobacteria | 3719 | 34% |
| GCF_000337335.1 | Halorubrum_distributum_JCM_10118 | Halobacteria | 3083 | 35% |
| GCF_000337035.1 | Halorubrum_coriense_DSM_10284 | Halobacteria | 3312 | 37% |
| GCF_000336815.1 | Haloferax_prahovense_DSM_18310 | Halobacteria | 3766 | 35% |
| GCA_000011005.1 | Methanocella_paludicola_SANAE | Methanomicrobia | 3004 | 51% |
| GCF_000337075.1 | Halorubrum_hochstenium_ATCC_700873 | Halobacteria | 2850 | 34% |
| GCF_000723185.1 | Thaumarchaeota_archaeon_N4 | Thaumarchaeota | 1854 | 40% |
| GCF_000025685.1 | Haloferax_volcanii_DS2 | Halobacteria | 3857 | 33% |
| GCA_002762975.1 | Candidatus_Diapherotrites_archaeon_CG11_big_fil_rev_8_21_1_ | DPANN | 1219 | 65% |
| GCF_000337575.1 | Natrialba_hulunbeirensis_JCM_10989 | Halobacteria | 3681 | 36% |
| GCF_001280425.1 | Haloarcula_rubripromontorii_SL3 | Halobacteria | 3817 | 34% |
| GCF_000504565.1 | Haloarcula_hispanica_N601 | Halobacteria | 3742 | 34% |
| GCF_000970045.1 | Methanosarcina_sp_MTP4 | Methanomicrobia | 3422 | 40% |
| GCF_000955905.1 | Candidatus_Nitrosotenuis_cloacae_SAT1 | Thaumarchaeota | 1797 | 40% |
| GCF_002844335.1 | Haloarcula_taiwanensis_Taiwanensis | Halobacteria | 3612 | 33% |

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|-----------------|-----------------------------------------------------------|-----------------|------|-----|
| GCF_000336955.1 | Haloferax_larsenii_JCM_13917 | Halobacteria | 3535 | 36% |
| GCF_002788215.1 | halophilic_archaeon_True-ADL | Halobacteria | 3235 | 37% |
| GCF_000470655.1 | Halorhabdus_tiamatea_SARL4B_type_strain_SARL4B | Halobacteria | 2991 | 35% |
| GCA_002688315.1 | Candidatus_Woearchaeota_archaeon_ | DPANN | 1003 | 63% |
| GCF_000755245.1 | Halococcus_sediminicola_CBA1101 | Halobacteria | 3559 | 34% |
| GCF_002286985.1 | Halorubrum_sp_WN019 | Halobacteria | 3200 | 32% |
| GCF_001593955.1 | Halalkalicoccus_paucihalophilus_DSM_24557 | Halobacteria | 3774 | 33% |
| GCF_000224475.1 | halophilic_archaeon_DL31 | Halobacteria | 3370 | 36% |
| GCF_000336795.1 | Haloferax_lucentense_DSM_14919 | Halobacteria | 3513 | 34% |
| GCF_000230955.2 | Halobacterium_sp_DL1 | Halobacteria | 3180 | 35% |
| GCF_000755225.1 | Halapricum_salinum_CBA1105 | Halobacteria | 3309 | 40% |
| GCA_002686355.1 | Candidatus_Pacearchaeota_archaeon_ | DPANN | 494 | 66% |
| GCF_000495475.1 | Candidatus_Halobonum_tyrrellensis_G22 | Halobacteria | 3293 | 34% |
| GCF_000739555.1 | Halolamina_rubra_CBA1107 | Halobacteria | 2761 | 37% |
| GCF_002355655.1 | Halorubrum_trapanicum_CBA1232 | Halobacteria | 2879 | 31% |
| GCA_002779065.1 | Candidatus_Diapherotrites_archaeon_CG08_land_8_20_14_0_2 | DPANN | 1017 | 64% |
| GCF_000337375.1 | Halorubrum_lipolyticum_DSM_21995 | Halobacteria | 3138 | 35% |
| GCF_001485535.1 | Halobacterium_sp_CBA1132 | Halobacteria | 3024 | 38% |
| GCA_002841105.1 | Candidatus_Altiarchaeales_archaeon_HGW-Altiaarchaeales-1_ | Altiaarchaeales | 2007 | 67% |
| GCF_001368915.1 | Haloferax_massiliensis_Arc-Hr | Halobacteria | 3730 | 30% |
| GCF_000970265.1 | Methanosarcina_lacustris_Z-7289 | Methanomicrobia | 3264 | 36% |
| GCF_000334895.1 | Halococcus_agarilyticus_197A | Halobacteria | 3226 | 34% |
| GCF_000204415.1 | Methanotherix_soehngeni_GP6 | Methanomicrobia | 2899 | 36% |
| GCA_002839605.1 | Methanomicrobiales_archaeon_HGW-Methanomicrobiales-3_ | Methanomicrobia | 2538 | 42% |
| GCF_000336995.1 | Halorubrum_aidingense_JCM_13560 | Halobacteria | 2908 | 34% |
| GCF_000214725.1 | Methanobacterium_paludis_SWAN1 | Methanobacteria | 2367 | 32% |
| GCF_000296615.1 | Halorubrum_sp_T3 | Halobacteria | 2960 | 39% |
| GCF_000744455.1 | Methanobacterium_sp_SMA-27 | Methanobacteria | 2415 | 37% |
| GCF_000979425.1 | Methanosarcina_sp_2_H_T_1A_3 | Methanomicrobia | 3291 | 35% |
| GCF_000979475.1 | Methanosarcina_sp_2_H_T_1A_8 | Methanomicrobia | 3296 | 35% |
| GCF_002252875.1 | Halorubrum_ezzemoulense_Ec15 | Halobacteria | 3017 | 32% |
| GCF_000979455.1 | Methanosarcina_sp_2_H_T_1A_6 | Methanomicrobia | 3295 | 35% |
| GCF_000746205.1 | Halorubrum_sp_BV1 | Halobacteria | 2617 | 34% |
| GCF_000327485.1 | Methanoregula_formicica_SMSP | Methanomicrobia | 2789 | 35% |
| GCF_000063445.1 | Methanocella_arvoryzae_MRE50 | Methanomicrobia | 3058 | 36% |
| GCF_000336975.1 | Haloferax_sp_ATCC_BAA-644 | Halobacteria | 3437 | 32% |
| GCF_000336855.1 | Haloferax_sp_ATCC_BAA-646 | Halobacteria | 3477 | 32% |
| GCA_002839705.1 | Methanobacteriales_archaeon_HGW-Methanobacteriales-1_ | Methanobacteria | 2412 | 39% |
| GCF_000337795.1 | Haloferax_denitrificans_ATCC_35960 | Halobacteria | 3660 | 33% |
| GCF_000336835.1 | Haloferax_sp_ATCC_BAA-645 | Halobacteria | 3475 | 31% |
| GCF_000812185.1 | Candidatus_Nitrosopelagicus_brevis_CN25 | Thaumarchaeota | 1412 | 35% |
| GCF_000023945.1 | Halorhabdus_utahensis_DSM_12940 | Halobacteria | 2919 | 35% |
| GCF_000685155.1 | Candidatus_Methanoperedens_nitroreducens_ANME-2d | Methanomicrobia | 3254 | 47% |
| GCF_000069025.1 | Halobacterium_salinarum_R1_DSM_671_R1 | Halobacteria | 2671 | 35% |
| GCF_000969965.1 | Methanosarcina_sp_WWM596 | Methanomicrobia | 3377 | 36% |
| GCF_000979385.1 | Methanosarcina_sp_2_H_A_1B_4 | Methanomicrobia | 3141 | 34% |
| GCF_002156705.1 | Natrialbaeae_archaeon_JW/NM-HA_15 | Halobacteria | 3608 | 33% |

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|-----------------|---------------------------------------------------------|-------------------|------|-----|
| GCF_001304615.1 | Methanosarcina_flavescens_E03_2 | Methanomicrobia | 2652 | 35% |
| GCA_000145985.1 | Ignisphaera_aggregans_DSM_17230 | Desulfurococcales | 1930 | 43% |
| GCA_002839675.1 | Methanomicrobiales_archaeon_HGW-Methanomicrobiales-1_ | Methanomicrobia | 2456 | 40% |
| GCF_000147875.1 | Methanolacinia_petrolearia_DSM_11571_ | Methanomicrobia | 2777 | 32% |
| GCF_000026045.1 | Natronomonas_pharaonis_DSM_2160_Gabara | Halobacteria | 2738 | 32% |
| GCA_001402855.1 | Methanosarcina_sp_795_ | Methanomicrobia | 2416 | 35% |
| GCF_000591055.1 | Natronomonas_moolapensis_8_8_11 | Halobacteria | 2733 | 34% |
| GCA_000016385.1 | Pyrobaculum_arsenicum_DSM_13514 | Thermoproteales | 2298 | 39% |
| GCA_002688035.1 | Candidatus_Diapherotrites_archaeon_ | DPANN | 786 | 62% |
| GCF_000007065.1 | Methanosarcina_mazei_Go1 | Methanomicrobia | 3347 | 34% |
| GCF_000970005.1 | Methanosarcina_sp_WH1 | Methanomicrobia | 3206 | 35% |
| GCA_001587635.1 | Arc_I_group_archaeon_ADurb1213_Bin02801_ | Methanomicrobia | 1585 | 33% |
| GCF_000148385.1 | Vulcanisaeta_distributa_DSM_14429 | Thermoproteales | 2420 | 38% |
| GCA_002720095.1 | Euryarchaeota_archaeon_ | ucEuryarchaeota | 1559 | 67% |
| GCF_002844195.1 | Haloferacaceae_archaeon_SYSU_A9-0 | Halobacteria | 4243 | 34% |
| GCF_000190315.1 | Vulcanisaeta_moutnovskia_768-28 | Thermoproteales | 2357 | 38% |
| GCA_002083985.1 | Candidatus_Altiarchaeales_archaeon_A3_ | Altiarchaeales | 1305 | 74% |
| GCF_000744315.1 | Methanosarcina_soligelidi_SMA-21 | Methanomicrobia | 3257 | 34% |
| GCF_000403645.1 | Salinarchaeum_sp_Harcht-Bsk1 | Halobacteria | 2978 | 35% |
| GCA_002254565.1 | Candidatus_Altiarchaeales_archaeon_ex4484_2_ | Altiarchaeales | 1481 | 58% |
| GCF_000308215.1 | Methanomassiliicoccus_luminyensis_B10 | Thermoplasmata | 2555 | 49% |
| GCA_000495675.1 | uncultured_Acidilobus_sp_MG_ | Acidilobales | 1787 | 36% |
| GCA_002255055.1 | Candidatus_Aenigmarchaeota_archaeon_ex4484_14_ | DPANN | 880 | 62% |
| GCA_001587595.1 | Arc_I_group_archaeon_ADurb1013_Bin02101_ | Methanomicrobia | 1591 | 33% |
| GCF_000015205.1 | Pyrobaculum_islandicum_DSM_4184 | Thermoproteales | 1966 | 36% |
| GCF_001484195.1 | Thermococcus_celericrescens_DSM_17994 | Thermococci | 2331 | 38% |
| GCF_000011205.1 | Sulfolobus_tokodaii_str_7 | Sulfolobales | 2770 | 38% |
| GCF_000447865.2 | haloarchaeon_3A1_DGR | Halobacteria | 2714 | 43% |
| GCF_000191585.1 | Methanobacterium_lacus_AL-21 | Methanobacteria | 2451 | 31% |
| GCF_001282785.1 | Halolamina_sediminis_halo7 | Halobacteria | 2756 | 34% |
| GCA_001587605.1 | Arc_I_group_archaeon_ADurb1113_Bin01801_ | Methanomicrobia | 1597 | 32% |
| GCA_001587695.1 | Arc_I_group_archaeon_B15fssc0709_Meth_Bin003_ | Methanomicrobia | 1843 | 34% |
| GCA_000495695.1 | uncultured_Acidilobus_sp_CIS_ | Acidilobales | 1671 | 37% |
| GCA_002898395.1 | archaeon_HR02_ | unclassified | 1939 | 55% |
| GCF_002214545.1 | Thermococcus_thioreducens_OGL-20P | Thermococci | 2215 | 37% |
| GCF_001950595.1 | Natronomonas_sp_CBA1134 | Halobacteria | 2620 | 33% |
| GCF_000969885.1 | Methanosarcina_thermophila_TM-1 | Methanomicrobia | 2597 | 32% |
| GCA_000495715.1 | uncultured_Acidilobus_sp_OSP8_ | Acidilobales | 1693 | 36% |
| GCF_000017945.1 | Ignicoccus_hospitalis_KIN4/I | Desulfurococcales | 1448 | 43% |
| GCF_000243255.1 | Methanoplanus_limicola_DSM_2279 | Methanomicrobia | 2967 | 37% |
| GCF_000235565.1 | Methanosaeta_harundinacea_6Ac | Methanomicrobia | 2399 | 35% |
| GCA_000019805.1 | Pyrobaculum_neutrophilum_V24Sta | Thermoproteales | 1966 | 40% |
| GCF_001481685.1 | Ignicoccus_islandicus_DSM_13165 | Desulfurococcales | 1478 | 56% |
| GCA_002785505.1 | Candidatus_Altiarchaeum_sp_CG03_land_8_20_14_0_80_32_61 | Altiarchaeales | 1334 | 59% |
| GCF_002813655.1 | Methanobacterium_sp_MO-MB1 | Methanobacteria | 2280 | 36% |
| GCF_000017625.1 | Methanoregula_boonei_6A8 | Methanomicrobia | 2513 | 33% |
| GCF_000784355.1 | Methanolacinia_paynteri_DSM_2545 | Methanomicrobia | 2664 | 36% |

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|-----------------|-----------------------------------------------------------|-------------------|------|-----|
| GCF_001560915.1 | methanogenic_archaeon_ISO4-H5 | Thermoplasmata | 1795 | 42% |
| GCF_000966265.1 | Palaeococcus_ferrophilus_DSM_13482 | Thermococci | 2246 | 36% |
| GCA_001587655.1 | Arc_I_group_archaeon_B03fssc0709_Meth_Bin005_ | Methanomicrobia | 1802 | 33% |
| GCA_002791795.1 | Candidatus_Altiarchaeum_sp_CG_4_10_14_0_8_um_filter_32_8 | Altiarchaeales | 1116 | 58% |
| GCF_000151205.2 | Thermococcus_sp_AM4 | Thermococci | 2231 | 34% |
| GCF_000504205.1 | Methanobolus_tindarius_DSM_2278 | Methanomicrobia | 2886 | 30% |
| GCF_001571385.1 | Methanofollis_ethanolicus_HASU | Methanomicrobia | 2554 | 38% |
| GCF_002355635.1 | Halopenitus_persicus_CBA1233 | Halobacteria | 2855 | 30% |
| GCF_001548675.1 | Methanobrevibacter_sp_YE315 | Methanobacteria | 2029 | 34% |
| GCA_000437055.1 | Methanobrevibacter_smithii_CAG_186_ | Methanobacteria | 1706 | 39% |
| GCF_001663375.1 | Caldivirga_sp_MU80 | Thermoproteales | 2161 | 48% |
| GCA_001873845.1 | Candidatus_Altiarchaeum_sp_CG2_30_32_3053_ | Altiarchaeales | 1353 | 74% |
| GCF_001412615.1 | Pyrodictium_delaneyi_Su06 | Desulfurococcales | 2013 | 53% |
| GCF_000025285.1 | Archaeoglobus_profundus_DSM_5631 | Archaeoglobi | 1785 | 35% |
| GCF_000243315.1 | Metallosphaera_yellowstonensis_MK1 | Sulfolobales | 2680 | 36% |
| GCF_002201915.1 | Methanopyrus_sp_KOL6 | Methanopyri | 1504 | 46% |
| GCF_000404225.1 | Candidatus_Methanomassiliicoccus_intestinalis_Issoire-Mx1 | Thermoplasmata | 1815 | 35% |
| GCA_002204705.1 | Thermoplasmatales_archaeon_B_DKE_ | Thermoplasmata | 1950 | 62% |
| GCF_000265525.1 | Thermococcus_cleftensis_CL1 | Thermococci | 2033 | 33% |
| GCF_001477655.1 | Methanobrevibacter_millerae_SM9 | Methanobacteria | 2209 | 39% |
| GCF_000213215.1 | Acidianus_hospitalis_W1 | Sulfolobales | 2332 | 36% |
| GCA_001587575.1 | Arc_I_group_archaeon_BMIXfssc0709_Meth_Bin006_ | Methanomicrobia | 1730 | 32% |
| GCF_002287195.1 | Methanosphaera_cuniculi_1R-7 | Methanobacteria | 1605 | 38% |
| GCF_000223395.1 | Pyrolobus_fumarii_1A | Desulfurococcales | 1906 | 45% |
| GCF_000024185.1 | Methanobrevibacter_ruminantium_M1 | Methanobacteria | 2143 | 33% |
| GCF_002813675.1 | Methanobacterium_sp_MZ-A1 | Methanobacteria | 2351 | 35% |
| GCF_002072215.1 | Methanobrevibacter_arboriphilus_JCM_13429_DSM_1125_DH1 | Methanobacteria | 1887 | 38% |
| GCA_000015805.1 | Pyrobaculum_calidifontis_JCM_11548 | Thermoproteales | 2149 | 39% |
| GCF_002813695.1 | Methanobacterium_subterraneum_A8p | Methanobacteria | 2355 | 35% |
| GCF_000009965.1 | Thermococcus_kodakarensis_KOD1 | Thermococci | 2237 | 34% |
| GCA_000495735.1 | uncultured_Acidilobus_sp_JCHS_ | Acidilobales | 1634 | 33% |
| GCA_002855745.1 | Thermofilum_sp_NZ13_ | Thermoproteales | 1930 | 73% |
| GCF_000092465.1 | Staphylothermus_hellenicus_DSM_12710 | Desulfurococcales | 1586 | 36% |
| GCF_001458655.1 | Methanobacterium_formicum_ | Methanobacteria | 2347 | 31% |
| GCF_000328665.1 | Methanomethylovorans_hollandica_DSM_15978 | Methanomicrobia | 2525 | 31% |
| GCF_000769655.1 | Thermococcus_eurythermalis_A501 | Thermococci | 2180 | 35% |
| GCF_000246985.2 | Thermococcus_litoralis_DSM_5473 | Thermococci | 2306 | 35% |
| GCF_001647085.1 | Thermococcus_piezophilus_CDGS | Thermococci | 1856 | 34% |
| GCF_000022365.1 | Thermococcus_gammatolerans_EJ3_DSM_15229 | Thermococci | 2117 | 32% |
| GCA_000437835.1 | Methanoculleus_sp_CAG_1088_ | Methanomicrobia | 1625 | 34% |
| GCF_001305655.1 | Halanaeroarchaeum_sulfurireducens_M27-SA2 | Halobacteria | 2194 | 35% |
| GCF_000015225.1 | Thermofilum_pendens_Hrk_5 | Thermoproteales | 1866 | 40% |
| GCA_002839645.1 | Methanomicrobiales_archaeon_HGW-Methanomicrobiales-2_ | Methanomicrobia | 2624 | 35% |
| GCA_002789105.1 | Candidatus_Altiarchaeum_sp_CG_4_9_14_0_8_um_filter_32_20 | Altiarchaeales | 916 | 56% |
| GCA_001856825.1 | Thermoplasmatales_archaeon_I-plasma_ | Thermoplasmata | 1696 | 77% |
| GCA_001800825.1 | Euryarchaeota_archaeon_RBG_19FT_COMBO_69_17_ | ucEuryarchaeota | 1986 | 73% |
| GCF_000015145.1 | Hyperthermus_butylicus_DSM_5456 | Desulfurococcales | 1676 | 44% |

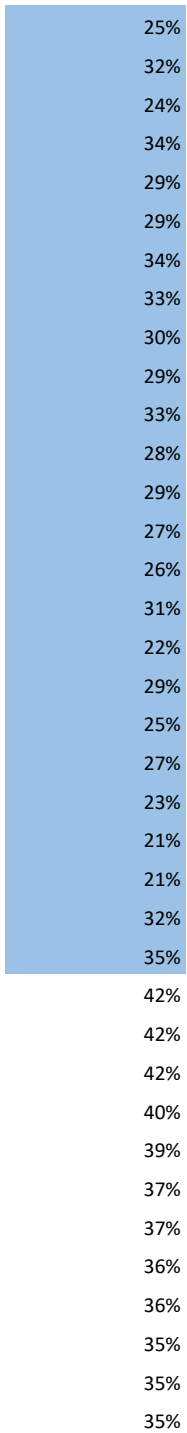
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|-----------------|-----------------------------------------------------------|-------------------|------|-----|
| GCA_002457555.1 | Marine_Group_II_euryarchaeote_MED-G37_ | ucEuryarchaeota | 1089 | 61% |
| GCF_000306725.1 | Methanolobus_psychrophilus_R15 | Methanomicrobia | 2841 | 32% |
| GCF_001484685.1 | Thermococcus_sp_2319x1 | Thermococci | 2017 | 33% |
| GCF_002214465.1 | Thermococcus_barossii_SHCK-94 | Thermococci | 1996 | 30% |
| GCF_000013725.1 | Methanococcoides_burtonii_DSM_6242 | Methanomicrobia | 2406 | 31% |
| GCF_000221185.1 | Thermococcus_sp_4557 | Thermococci | 2085 | 31% |
| GCA_000022445.1 | Sulfolobus_islandicus_M.16.4 | Sulfolobales | 2736 | 37% |
| GCF_000251105.1 | Methanocella_conradii_HZ254 | Methanomicrobia | 2436 | 32% |
| GCF_001748385.1 | Vulcanisaeta_thermophila_CBA1501 | Thermoproteales | 2039 | 35% |
| GCF_000015945.1 | Staphylothermus_marinus_F1 | Desulfurococcales | 1598 | 35% |
| GCF_000015825.1 | Methanoculleus_marisnigri_JR1 | Methanomicrobia | 2430 | 30% |
| GCF_000253055.1 | Thermoproteus_tenax_Kra_1 | Thermoproteales | 1959 | 31% |
| GCF_000585495.1 | Thermococcus_nautili_30-1 | Thermococci | 2132 | 34% |
| GCA_002728275.1 | Candidatus_Heimdallarchaeota_archaeon_ | Asgard | 1355 | 64% |
| GCA_000565255.1 | Sulfolobales_archaeon_AZ1_ | Sulfolobales | 1975 | 37% |
| GCA_001940665.1 | Candidatus_Odinarchaeota_archaeon_LCB_4_ | Asgard | 1584 | 45% |
| GCA_002116695.1 | Acidianus_manzaensis_YN-25 | Sulfolobales | 2644 | 40% |
| GCF_000193375.1 | Thermoproteus_uzoniensis_768-20 | Thermoproteales | 2114 | 35% |
| GCF_001602375.1 | Methanoculleus_horonobensis_T10 | Methanomicrobia | 2375 | 30% |
| GCA_002457155.1 | Marine_Group_II_euryarchaeote_MED-G35_ | ucEuryarchaeota | 1035 | 60% |
| GCF_000304355.2 | Methanoculleus_bourgensis_MS2_MS2T | Methanomicrobia | 2538 | 32% |
| GCA_002254865.1 | Archaeoglobales_archaeon_ex4484_92_ | Archaeoglobi | 3686 | 52% |
| GCF_002214505.1 | Thermococcus_siculi_RG-20 | Thermococci | 2099 | 32% |
| GCF_000430905.1 | Methanocorpusculum_bavaricum_DSM_4179 | Methanomicrobia | 1689 | 33% |
| GCF_000015765.1 | Methanocorpusculum_labreanum_Z | Methanomicrobia | 1799 | 33% |
| GCF_002197185.1 | Thermococcus_sp_5-4 | Thermococci | 1961 | 29% |
| GCF_000021965.1 | Methanosphaerula_palustris_E1-9c | Methanomicrobia | 2696 | 30% |
| GCA_002898355.1 | archaeon_HR01_ | unclassified | 1916 | 51% |
| GCF_000350305.1 | Thermoplasmatales_archaeon_BRNA1 | Thermoplasmata | 1465 | 32% |
| GCF_001729385.1 | Methanobrevibacter_sp_A27 | Methanobacteria | 1744 | 30% |
| GCF_001571405.1 | Methanoculleus_thermophilus_CR-1 | Methanomicrobia | 2171 | 29% |
| GCF_000196655.1 | Methanohalobium_vestigatum_Z-7303 | Methanomicrobia | 2267 | 30% |
| GCF_000632495.1 | Candidatus_Acidianus_copahuensis_ALE1 | Sulfolobales | 2376 | 36% |
| GCF_001433455.1 | Thermococcus_barophilus_CH5 | Thermococci | 2520 | 36% |
| GCA_002762655.1 | Candidatus_Altiarchaeum_sp_CG12_big_fil_rev_8_21_14_0_65_ | Altiarchaeales | 1138 | 56% |
| GCF_000018305.1 | Caldivirga_maquilingensis_IC-167 | Thermoproteales | 2005 | 34% |
| GCA_002457595.1 | Marine_Group_II_euryarchaeote_MED-G36_ | ucEuryarchaeota | 828 | 59% |
| GCF_002214585.1 | Thermococcus_profundus_DT_5432 | Thermococci | 2075 | 31% |
| GCF_000816105.1 | Thermococcus_guaymasensis_DSM_11113 | Thermococci | 2029 | 33% |
| GCA_000011125.1 | Aeropyrum_pernix_K1 | Desulfurococcales | 1700 | 49% |
| GCA_000591035.1 | Aeropyrum_camini_SY1_JCM_12091 | Desulfurococcales | 1645 | 28% |
| GCF_001017125.1 | Methanoculleus_sediminis_S3Fa | Methanomicrobia | 2410 | 29% |
| GCF_000499765.1 | Methanobacterium_sp_MB1_ | Methanobacteria | 1956 | 31% |
| GCF_000013445.1 | Methanospirillum_hungatei_JF-1 | Methanomicrobia | 3294 | 34% |
| GCF_000800805.1 | Candidatus_Methanoplasma_termitum_MpT1 | Thermoplasmata | 1383 | 36% |
| GCA_001742785.1 | Candidatus_Altiarchaeales_archaeon_IMC4_ | Altiarchaeales | 1328 | 70% |
| GCF_000320505.1 | Methanobrevibacter_boviskoreani_JH1 | Methanobacteria | 1706 | 31% |

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|-----------------|----------------------------------------------------|-------------------|------|-----|
| GCF_000025505.1 | Ferroglobus_placidus_DSM_10642 | Archaeoglobi | 2479 | 33% |
| GCF_000235685.2 | Methanolinea_tarda_NOBI-1 | Methanomicrobia | 2010 | 30% |
| GCF_001886955.1 | Halodesulfurarchaeum_formicicum_HSR6 | Halobacteria | 2078 | 32% |
| GCF_000970325.1 | Methanococcoides_methylutens_MM1 | Methanomicrobia | 2245 | 31% |
| GCF_002214565.1 | Thermococcus_radiotolerans_EJ2 | Thermococci | 1984 | 29% |
| GCF_001719125.1 | Sulfolobus_sp_A20 | Sulfolobales | 2593 | 31% |
| GCF_000993805.1 | Thermofilum_uzonense_1807-2 | Thermoproteales | 1641 | 52% |
| GCA_001726015.1 | Methanohalophilus_sp_2-GBenrich_ | Methanomicrobia | 1980 | 30% |
| GCF_000012285.1 | Sulfolobus_acidocaldarius_DSM_639 | Sulfolobales | 2243 | 35% |
| GCA_000258425.1 | Fervidicoccus_fontis_Kam940 | Fervidococcales | 1385 | 34% |
| GCF_002153915.1 | Methanonatronarchaeum_thermophilum_AMET1 | Methanonatronarci | 1481 | 45% |
| GCF_000385565.1 | Archaeoglobus_sulfatcallidus_PM70-1 | Archaeoglobi | 2180 | 34% |
| GCF_002214485.1 | Thermococcus_pacificus_P-4 | Thermococci | 1868 | 29% |
| GCF_001592435.1 | Thermococcus_peptonophilus_OG-1 | Thermococci | 1974 | 33% |
| GCF_000621965.1 | Methanobrevibacter_wolinii_SH | Methanobacteria | 1670 | 32% |
| GCF_000446015.1 | Thermofilum_adornatus_ | Thermoproteales | 1825 | 51% |
| GCF_001266655.1 | Metallosphaera_sedula_ARS50-1 | Sulfolobales | 2297 | 33% |
| GCF_900079115.1 | Sulfolobus_solfataricus_P1 | Sulfolobales | 2944 | 33% |
| GCF_000789255.1 | Geoglobus_acetivorans_SBH6 | Archaeoglobi | 2159 | 39% |
| GCF_000091665.1 | Methanocaldococcus_jannaschii_DSM_2661 | Methanococci | 1762 | 37% |
| GCF_000430485.1 | Thermococcus_sp_PK | Thermococci | 2175 | 32% |
| GCF_000194625.1 | Archaeoglobus_veneficus_SNP6 | Archaeoglobi | 2072 | 31% |
| GCF_002214365.1 | Thermococcus_celer_Vu_13 | Thermococci | 1911 | 30% |
| GCF_000813245.1 | Thermofilum_carboxyditrophus_1505 | Thermoproteales | 1849 | 51% |
| GCF_000018365.1 | Thermococcus_onnurineus_NA1 | Thermococci | 1934 | 29% |
| GCF_001462395.1 | Pyrodictium_occultum_PL-19 | Desulfurococcales | 1617 | 48% |
| GCF_002287215.1 | Methanocorpusculum_parvum_XII | Methanomicrobia | 1688 | 30% |
| GCF_000300255.2 | Candidatus_Methanomethylophilus_alvus_Mx1201 | Thermoplasmata | 1589 | 35% |
| GCF_000275865.1 | Methanofollis_liminatans_DSM_4140 | Methanomicrobia | 2396 | 30% |
| GCF_002214385.1 | Thermococcus_gorgonarius_W-12 | Thermococci | 1774 | 28% |
| GCF_000024625.1 | Methanocaldococcus_vulcanius_M7 | Methanococci | 1695 | 35% |
| GCA_000014945.1 | Methanotherix_thermoacetophila_PT | Methanomicrobia | 1696 | 28% |
| GCF_000517445.1 | Thermococcus_paralvinellae_ES1 | Thermococci | 2054 | 30% |
| GCF_001563245.1 | Methanobrevibacter_olleyae_YLM1 | Methanobacteria | 1778 | 33% |
| GCF_000025525.1 | Methanocaldococcus_sp_FS406-22 | Methanococci | 1790 | 34% |
| GCF_001729965.1 | Methanosphaera_sp_WGK6 | Methanobacteria | 1550 | 36% |
| GCF_000711215.1 | Methanomicrobium_mobile_BP | Methanomicrobia | 1617 | 34% |
| GCF_000008645.1 | Methanothermobacter_thermautotrophicus_str_Delta_H | Methanobacteria | 1756 | 30% |
| GCF_000012545.1 | Methanosphaera_stadtmanae_DSM_3091 | Methanobacteria | 1518 | 32% |
| GCF_000204925.1 | Metallosphaera_cuprina_Ar-4 | Sulfolobales | 1894 | 29% |
| GCF_000007305.1 | Pyrococcus_furiosus_DSM_3638 | Thermococci | 1979 | 29% |
| GCA_002356395.1 | Methanothermobacter_sp_EMTCatA1_ | Methanobacteria | 1814 | 49% |
| GCF_000179575.2 | Methanothermococcus_okinawensis_IH1 | Methanococci | 1576 | 31% |
| GCF_000152265.2 | Ferropasma_acidarmanus_fer1 | Thermoplasmata | 1879 | 31% |
| GCF_000215995.1 | Pyrococcus_yayanosii_CH1 | Thermococci | 1786 | 28% |
| GCA_001875345.1 | Marine_Group_III_euryarchaeote_CG-Epi1_ | ucEuryarchaeota | 1061 | 72% |
| GCF_000006175.1 | Methanococcus_voltae_A3 | Methanococci | 1688 | 32% |

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|-----------------|---------------------------------------------------|-------------------|------|-----|
| GCA_001800815.1 | Euryarchaeota_archaeon_RBG_19FT_COMBO_56_21_ | ucEuryarchaeota | 1672 | 70% |
| GCA_001875465.1 | Marine_Group_III_euryarchaeote_CG-Epi2_ | ucEuryarchaeota | 1115 | 71% |
| GCF_001577775.1 | Pyrococcus_kukulkanii_NCB100 | Thermococci | 2064 | 32% |
| GCF_900012635.1 | Thermococcus_chitonophagus_ | Thermococci | 2076 | 30% |
| GCF_000211475.1 | Pyrococcus_sp_NA2 | Thermococci | 1924 | 31% |
| GCF_000725425.1 | Palaeococcus_pacificus_DY20341 | Thermococci | 1950 | 29% |
| GCF_000828575.1 | Methanothermobacter_sp_CaT2 | Methanobacteria | 1739 | 28% |
| GCF_000949015.1 | Acidiplasma_sp_MBA-1 | Thermoplasmata | 1750 | 38% |
| GCF_000186365.1 | Desulfurococcus_mucosus_DSM_2162 | Desulfurococcales | 1345 | 29% |
| GCF_000019605.1 | Candidatus_Korarchaeum_cryptofilum_OPF8_ | Korarchaeota | 1645 | 33% |
| GCF_001317345.1 | Thermococcus_sp_EP1 | Thermococci | 1909 | 30% |
| GCA_001683555.1 | Methanohalophilus_sp_DAL1_ | Methanomicrobia | 1892 | 34% |
| GCF_000011105.1 | Pyrococcus_horikoshii_OT3 | Thermococci | 1801 | 30% |
| GCF_000011585.1 | Methanococcus_maripaludis_S2 | Methanococci | 1718 | 29% |
| GCA_001515185.1 | Hadesarchaea_archaeon_DG-33_ | Hadesarchaea | 862 | 75% |
| GCF_002078355.1 | Ferroplasma_acidiphilum_Y | Thermoplasmata | 1764 | 34% |
| GCF_000092185.1 | Thermosphaera_aggregans_DSM_11486 | Desulfurococcales | 1368 | 34% |
| GCF_000231015.2 | Desulfurococcus_amylyticus_DSM_16532 | Desulfurococcales | 1422 | 29% |
| GCF_000008665.1 | Archaeoglobus_fulgidus_DSM_4304 | Archaeoglobi | 2369 | 32% |
| GCF_000264495.1 | Thermogladius_calderae_1633 | Desulfurococcales | 1400 | 32% |
| GCA_001875425.1 | Marine_Group_III_euryarchaeote_CG-Bathy1_ | ucEuryarchaeota | 950 | 69% |
| GCF_000739065.1 | Methanocaldococcus_bathoardescens_JH146 | Methanococci | 1614 | 32% |
| GCF_000195935.2 | Pyrococcus_abyssi_GE5_ | Thermococci | 1862 | 28% |
| GCF_000214415.1 | Methanotorris_igneus_Kol_5 | Methanococci | 1751 | 30% |
| GCA_002899815.1 | Candidatus_Korarchaeota_archaeon_ | Korarchaeota | 1564 | 51% |
| GCF_000144915.1 | Acidilobus_saccharovorans_345-15 | Acidilobales | 1478 | 32% |
| GCF_001006045.1 | Geoglobus_ahangari_234 | Archaeoglobi | 1985 | 35% |
| GCA_000270325.1 | Candidatus_Caldiarchaeum_subterraneum_ | Thaumarchaeota | 1730 | 39% |
| GCF_000317795.1 | Caldisphaera_lagunensis_DSM_15908 | Acidilobales | 1491 | 30% |
| GCF_000711905.1 | Methermiococcus_shengliensis_DSM_18856 | Methanomicrobia | 1558 | 37% |
| GCA_001508185.1 | Methanosarcinales_archaeon_56_1174_ | Methanomicrobia | 1462 | 28% |
| GCA_002490245.1 | Candidatus_Bathyarchaeota_archaeon_B24-2_ | Bathyarchaeota | 1404 | 47% |
| GCA_001507975.1 | Euryarchaeota_archaeon_55_53_ | ucEuryarchaeota | 1386 | 28% |
| GCF_000376965.1 | Methanothermococcus_thermolithotrophicus_DSM_2095 | Methanococci | 1624 | 34% |
| GCA_001515215.1 | Hadesarchaea_archaeon_YNP_N21_ | Hadesarchaea | 1238 | 76% |
| GCF_000023985.1 | Methanocaldococcus_fervens_AG86 | Methanococci | 1554 | 31% |
| GCF_000092305.1 | Methanocaldococcus_infernus_ME | Methanococci | 1437 | 28% |
| GCA_001593935.1 | Candidatus_Bathyarchaeota_archaeon_B26-2_ | Bathyarchaeota | 1630 | 39% |
| GCA_001593865.1 | Candidatus_Bathyarchaeota_archaeon_B24_ | Bathyarchaeota | 1576 | 35% |
| GCF_000258515.1 | Thermococcus_zilligii_AN1 | Thermococci | 1789 | 28% |
| GCF_000017165.1 | Methanococcus_vanniellii_SB | Methanococci | 1679 | 28% |
| GCF_000145295.1 | Methanothermobacter_marburgensis_str_Marburg | Methanobacteria | 1701 | 27% |
| GCF_000022545.1 | Thermococcus_sibiricus_MM_739 | Thermococci | 1913 | 27% |
| GCF_000195915.1 | Thermoplasma_acidophilum_DSM_1728 | Thermoplasmata | 1521 | 27% |
| GCF_001889405.1 | Methanohalophilus_halophilus_Z-7982 | Methanomicrobia | 1987 | 27% |
| GCF_000017185.1 | Methanococcus_aeolicus_Nankai-3 | Methanococci | 1489 | 27% |
| GCF_000263735.1 | Pyrococcus_sp_ST04 | Thermococci | 1789 | 27% |

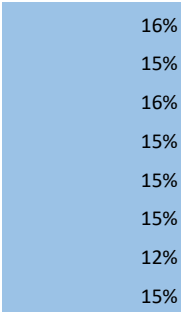
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|-----------------|---------------------------------------------|------------------|------|-----|
| GCF_002813085.1 | Methanobrevibacter_smithii_KB11 | Methanobacteria | 1675 | 27% |
| GCF_002973515.1 | Methanohalophilus_euhalobius_DSM_10369 | Methanomicrobia | 1841 | 27% |
| GCF_000025665.1 | Aciduliprofundum_boonei_T469 | Thermoplasmata | 1521 | 27% |
| GCF_000327505.1 | Aciduliprofundum_sp_MAR08-339 | Thermoplasmata | 1491 | 27% |
| GCF_002214525.1 | Thermococcus_sp_P6 | Thermococci | 1568 | 27% |
| GCF_000011185.1 | Thermoplasma_volcanium_GSS1 | Thermoplasmata | 1545 | 26% |
| GCF_000404165.1 | Methanobrevibacter_sp_AbM4 | Methanobacteria | 1675 | 26% |
| GCF_000371805.1 | Methanocaldococcus_villosus_KIN24-T80 | Methanococci | 1346 | 25% |
| GCF_000217995.1 | Methanosalsum_zhilinae_DSM_4017 | Methanomicrobia | 1955 | 25% |
| GCF_000008265.1 | Picrophilus_torridus_DSM_9790 | Thermoplasmata | 1563 | 25% |
| GCF_000025865.1 | Methanohalophilus_mahii_DSM_5219 | Methanomicrobia | 1955 | 25% |
| GCA_000387965.1 | Candidatus_Nanobsidianus_stetteri_ | DPANN | 647 | 24% |
| GCA_001766815.1 | Candidatus_Syntrophoarchaeum_caldarius_ | Methanomicrobia | 1787 | 24% |
| GCA_001914405.1 | Candidatus_Methanohalarchaeum_thermophilum_ | Methanonatronarc | 2167 | 24% |
| GCF_000166095.1 | Methanothermus_fervidus_DSM_2088 | Methanobacteria | 1296 | 22% |
| GCF_002761295.1 | Methanohalophilus_portucalensis_FDF-1T | Methanomicrobia | 2040 | 22% |
| GCA_000008085.1 | Nanoarchaeum_equitans_Kin4-M_ | DPANN | 536 | 0% |

Fraction of dark matter after arCOG based annotation



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