**SUPPLEMENTARY FILE**

Dame-Teixeira N, Lynch J, Yu X, Cena JA, Do T. **The Caries and Caries-free Archaeome.**

**Supplementary file-1.** Methods details

*Dataset selection process*

Two independent reviewers (ND-T and JAC) selected studies based on the assessment of titles and abstracts while applying the eligibility criteria. In the second stage, same reviewers selected eligible studies based on full-text reading. The availability of sequencing data and metadata from each study were retrieved from their SRA Bioproject. Studies lacking data availability were excluded.

*Bioinformatics (tailored pipeline) and metanalysis*

A full non-redundant archaea database was specifically tailored for this study, extracted from the National Center for Biotechnology Information (NCBI). A total of 519 archaeal genomes were included and made into a database using Diamond (https://github.com/bbuchfink/diamond). The full list of genomes can be found in **Supplementary file 2 (see at the end of this document)**. After downloading each dataset and its corresponding metadata from NCBI, and processing the raw read data using fastqc (https://www.bioinformatics.babraham.ac.uk/projects/fastqc/) and cutadapt (https://cutadapt.readthedocs.io/en/stable/), a count table was generated for each dataset. In brief, the cutadapt parameters used were as follows: quality cutoff was set to trim 10 base pairs at both 5' and 3' from each read before adapter removal; reads shorter than 30 base pairs were discarded. Reads were mapped against a curated archaea genome database using the DIAMOND v2.0.15.153 sequence alignment tool (Buchfink et al. 2021).

One of the most challenging aspects of studying rare microbes is differentiating between genuine rare taxa and sequencing errors, that could normally be removed by setting stringent quality filtering threshold (Jia *et al* 2022). Sequencing data filtering efforts should focus on removing "artefacts", that are non-biological sequences generated during the experimental process. For this reason, stringent filtering parameters were applied, requiring a minimum of 97% sequence similarity and 90% query coverage. We apply a more stringent cut-off in our analysis than usually applied, which, given the nature of this study, allows us to be more confident in attributing the findings to an archaeal origin.

Host-derived sequences were not specifically removed, as anonymization beyond what had already been conducted in the original studies was deemed unnecessary. By employing a targeted database and

implementing rigorous quality control measures, such as trimming low-quality reads and applying stringent mapping parameters, we effectively minimized the presence and influence of host sequences on our downstream analyses.

Archaeal prevalence was determined using an arbitrary post-filtering cut-off point, considering the proportion of samples with over 500 archaeal reads in total. This filter was used to avoid false-positive data. For the metagenomic analysis, after excluding 10 non-caries samples from one dataset under the BioProject PRJNA396840, samples with more than 500 overall archaeal reads from four studies were used for further analysis. The overall prevalence of archaea was meta-analyzed using the restricted likelihood model for crude proportions with 95% confidence interval (CI) (Jamovi software version 1.6 obtained from https://www.jamovi.org/).

For the metatranscriptomic analysis, three studies with available mRNA sequences were included. Count tables were imported into R for visualization with Phyloseq (McMurdie and Holmes 2013) and DESeq2 R packages (Love et al. 2014). For alpha diversity, ANOVA and post hoc Tukey HSD test were used for normally distributed data, while Kruskal-Wallis and post hoc Dunn's test were used when data were not normally distributed. For beta diversity, permutational multivariate analysis of variance tests were used.

A Spearman correlation analysis was conducted using MetaPhlAn 4 (computational tool for profiling microbial communities using 771,500 metagenome-assembled genomes) to identify the top 20 bacterial genera in the same samples, along with *Tannerella* (previously correlated with methanogens) (Matarazzo et al. 2012). These genera were correlated with the top 20 most abundant archaeal genera in post-filtered DNA samples. P-values were adjusted using the Benjamini-Hochberg method. Kyoto Encyclopedia of Genes and Genomes (KEGG) was used to map the methanogenesis within the carbon metabolism pathway (map01200) using KEGG mapper to identify the methanogenesis differentially expressed genes (https://www.genome.jp/kegg-bin/color_pathway_object).

**References**


Buchfink B, Reuter K, Drost HG. 2021. Sensitive protein alignments at tree-of-life scale using diamond. Nat Methods. 18(4):366-368.

Jia, Y., Zhao, S., Guo, W. et al. 2022. Sequencing introduced false positive rare taxa lead to biased microbial community diversity, assembly, and interaction interpretation in amplicon studies. Environmental Microbiome 17(43).

Love MI, Huber W, Anders S. 2014. Moderated estimation of fold change and dispersion for rna-seq data with deseq2. Genome Biol. 15(12):550.

McMurdie PJ, Holmes S. 2013. Phyloseq: An r package for reproducible interactive analysis and graphics of microbiome census data.

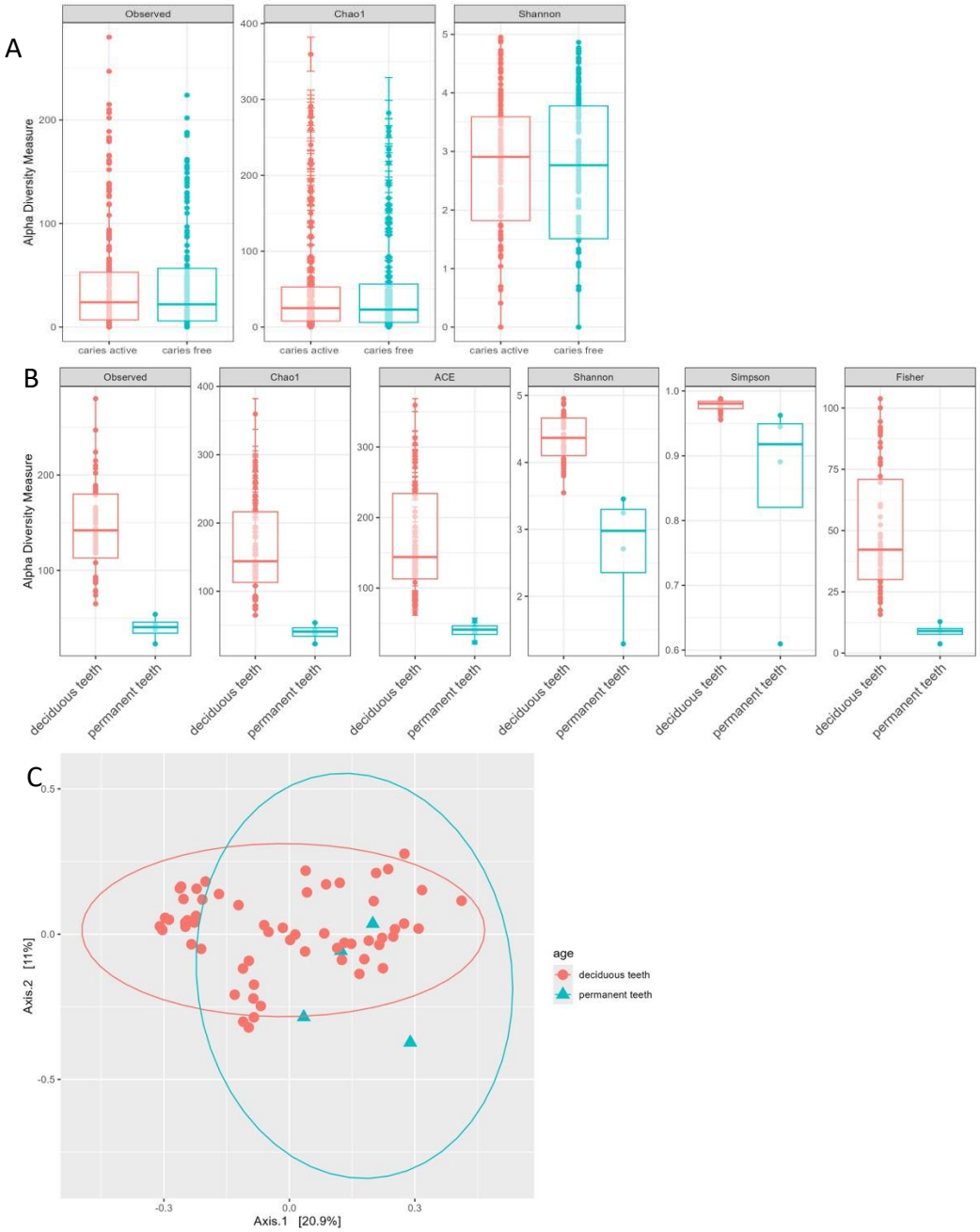
Matarazzo F, Ribeiro AC, Faveri M, Taddei C, Martinez MB, Mayer MP. 2012. The domain archaea in human mucosal surfaces. Clin Microbiol Infect. 18(9):834-840.

**Supplementary table-1.** Acronym PECO (Population; Exposure; Comparator; Outcomes) used to design the research question. Exclusion criteria were the following: (1) in vitro studies, including artificial caries models; (2) studies without available datasets; (3) studies including systemic diseases or syndromes that can change the microbiota (Sjogren, severe hyposalivation, head and neck cancer, HIV, rheumatoid arthritis, asthma, alcoholism, etc.; (4) Reviews, Book chapters, opinions, letters, conference abstracts, study protocols, case reports, case series. Although it was not specified in the protocol, studies analyzing carious dentin samples or root caries were also excluded to reduce sample heterogeneity.

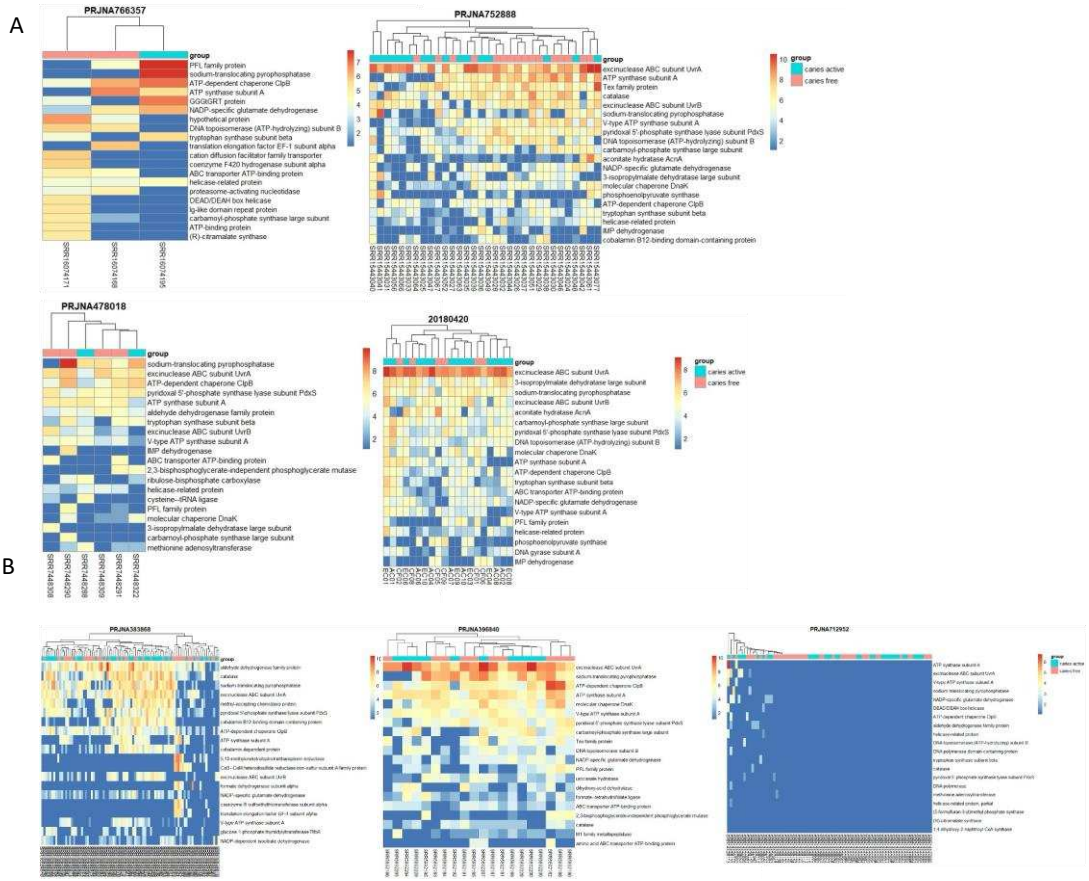
| **PECO** | |
|---|---|
| **P**articipants | Dental plaque, saliva or dentin caries samples from humans |
| Exposition | Dental caries / root caries / Early childhood caries |
| **C**omparison or control | No dental caries |
| **O**utcome measure(s) | Shotgun DNA metagenomic or cDNA metatranscriptomic data available |

**Supplementary table-2.** Complete search strategy using keywords such as “Dental caries” and “Metagenomics”, their synonyms and variations were used as main search terms. No language or interval time restrictions were applied. This comprehensive systematic search was performed on PubMed via Medline in April 2023 to identify studies using DNA or cDNA shotgun sequencing on samples obtained from individuals with dental caries (including dental plaque and saliva). Duplicates were identified through EndNoteWeb (Clarivate Analytics, Mumbai) and then manually identified and removed on Rayyan QCRI® (Qatar Computer Research Institute, Qatar).

| **E**xposition<br>Dental caries / root caries / Early childhood caries | "Dental Caries" OR “Carious Lesions” OR "Root Caries" OR “Dental Decay” OR “caries” OR “Cervical Caries” |
|---|---|
| **O**utcome measure(s) | "Metagenomics" OR "High-Throughput Nucleotide Sequencing" OR “High Throughput Nucleotide Sequencing” OR “Next-Generation Sequencing” OR “Next Generation Sequencing” OR “High Throughput RNA Sequencing” OR “High-Throughput RNA Sequencing” OR “High-Throughput DNA Sequencing” OR “High Throughput DNA Sequencing” OR "Metagenome" OR “Shotgun Metagenomics” |




**Supplementary Figure-1.** Alpha-diversity according to (A) caries status in overall samples (n=379), and (B) according to the type of dentition as a surrogate variable for age (deciduous teeth group-59 samples and the permanent teeth group- 4 samples); (C) Beta-diversity according to the type of dentition as a surrogate variable for age (deciduous teeth group-59 samples and the permanent teeth group- 4 samples).




**Supplementary Figure-2.** A) Heatmaps showing the genes across samples after post-filtering for 4 out of 7 DNAseq datasets with the highest prevalence of archaea-positive samples. B) Heatmaps showing the archaeal gene expression across all samples for 3 RNAseq datasets.

**Supplementary Table-3.** Archaeal genes differentially expressed (RNAseq datasets, total of 186 samples) or present (DNAseq datasets, post-filtered, total of 63 samples) ($p<0.05$) in caries-free vs. caries active subjects, and their potential functions described for archaea.

| RNAseq | | |
|---|---|---|
| | Caries-free | |
| | log2Fold Change | padj |
| DNA-directed RNA polymerase subunit B" | 1.85 | 5.48E-09 |
| CoB--CoM heterodisulfide reductase iron-sulfur subunit A family protein | 1.98 | 6.58E-09 |
| tetrahydromethanopterin S-methyltransferase subunit C | 1.65 | 1.14E-07 |
| tetrahydromethanopterin S-methyltransferase subunit E | 1.54 | 5.83E-07 |
| DNA-directed RNA polymerase subunit A' | 1.49 | 1.51E-06 |
| 2,3-bisphosphoglycerate-independent phosphoglycerate mutase | 1.32 | 9.08E-06 |
| coenzyme F420 hydrogenase subunit beta | 1.34 | 9.08E-06 |
| coenzyme-B sulfoethylthiotransferase subunit gamma | 1.35 | 9.08E-06 |
| Coenzyme F420 hydrogenase/dehydrogenase, beta subunit C-terminal domain | 1.31 | 9.31E-06 |
| formate dehydrogenase subunit alpha | 1.39 | 1.83E-05 |
| 50S ribosomal protein L4 | 1.23 | 3.24E-05 |
| Ig-like domain-containing protein | 1.12 | 8.51E-05 |
| formylmethanofuran dehydrogenase subunit A | 1.15 | 8.51E-05 |
| CTP synthase | 1.10 | 0.0001 |
| elongation factor EF-2 | 1.10 | 0.0002 |
| 50S ribosomal protein L5 | 1.07 | 0.0002 |
| translation initiation factor IF-2 | 1.04 | 0.0003 |
| thermosome subunit alpha | 1.03 | 0.0004 |
| short chain isoprenyl diphosphate synthase IdsA | 0.98 | 0.0005 |
| V-type ATP synthase subunit B | 1.01 | 0.0005 |
| 50S ribosomal protein L13 | 0.97 | 0.0006 |
| formylmethanofuran dehydrogenase subunit B | 0.97 | 0.0008 |
| translation elongation factor EF-1 subunit alpha | 0.92 | 0.0009 |
| TIGR00375 family protein | 0.92 | 0.0011 |
| methanol--corrinoid protein MtaC | 0.89 | 0.0011 |
| 5,10-methenyltetrahydromethanopterin hydrogenase | 0.89 | 0.0012 |
| 30S ribosomal protein S9 | 0.89 | 0.0012 |
| DNA-directed RNA polymerase subunit D | 0.87 | 0.0017 |
| aspartate-semialdehyde dehydrogenase | 0.81 | 0.0036 |
| transcription elongation factor Spt5 | 0.83 | 0.0036 |
| radical SAM protein | 0.79 | 0.0043 |
| 50S ribosomal protein L10 | 0.79 | 0.0044 |
| methanol--corrinoid protein co-methyltransferase MtaB | 0.85 | 0.0044 |
| tetrahydromethanopterin S-methyltransferase subunit H | 0.79 | 0.0062 |

| | | |
|---|---|---|
| ATP synthase subunit B | 0.73 | 0.0071 |
| Gfo/Idh/MocA family oxidoreductase | 0.74 | 0.0071 |
| leucine--tRNA ligase | 0.72 | 0.0085 |
| sodium-extruding oxaloacetate decarboxylase subunit alpha | 0.75 | 0.0089 |
| 50S ribosomal protein L34e | 0.69 | 0.0106 |
| MJ1255/VC2487 family glycosyltransferase | 0.69 | 0.0111 |
| ferritin family protein | 0.69 | 0.0111 |
| hypothetical protein | 0.71 | 0.0111 |
| methyl-coenzyme M reductase operon protein D | 0.69 | 0.0111 |
| CoB--CoM heterodisulfide reductase subunit B | 0.71 | 0.0114 |
| STT3 domain-containing protein | 0.69 | 0.0114 |
| NADP-dependent isocitrate dehydrogenase | 0.79 | 0.0133 |
| cobaltochelatase subunit CobN | 0.65 | 0.0136 |
| F420-dependent methylenetetrahydromethanopterin dehydrogenase | 0.67 | 0.0144 |
| Ig-like domain repeat protein | 0.65 | 0.0172 |
| 30S ribosomal protein S13 | 0.65 | 0.0173 |
| coenzyme-B sulfoethylthiotransferase subunit alpha | 0.75 | 0.0178 |
| transcription initiation factor IIB | 0.63 | 0.0245 |
| DNA topoisomerase I | 0.59 | 0.0282 |
| acyl-CoA carboxylase subunit beta | 0.59 | 0.0282 |
| 30S ribosomal protein S4 | 0.57 | 0.0289 |
| 4-hydroxy-tetrahydrodipicolinate reductase | 0.57 | 0.0289 |
| 50S ribosomal protein L11 | 0.57 | 0.0289 |
| 50S ribosomal protein L30 | 0.57 | 0.0289 |
| DNA polymerase II large subunit | 0.57 | 0.0289 |
| SufD family Fe-S cluster assembly protein | 0.57 | 0.0289 |
| V-type ATP synthase subunit C | 0.57 | 0.0289 |
| V-type ATP synthase subunit I | 0.57 | 0.0289 |
| adhesin | 0.57 | 0.0289 |
| elongation factor 1-beta | 0.57 | 0.0289 |
| hydantoinase/oxoprolinase family protein | 0.57 | 0.0289 |
| hydrogenase iron-sulfur subunit | 0.57 | 0.0289 |
| hydrogenase nickel incorporation protein HypB | 0.57 | 0.0289 |
| methionine--tRNA ligase | 0.57 | 0.0289 |
| methyl-coenzyme M reductase I operon protein C | 0.57 | 0.0289 |
| 50S ribosomal protein L15e | 0.59 | 0.0297 |
| 30S ribosomal protein S3 | 0.55 | 0.0304 |
| biotin-- ligase | 0.53 | 0.0321 |
| O-acetylhomoserine aminocarboxypropyltransferase/cysteine synthase | 0.55 | 0.0326 |
| ferrous iron transport protein B | 0.53 | 0.0349 |

| | | |
|---|---|---|
| GGGtGRT protein | 0.60 | 0.0368 |
| L-sulfolactate dehydrogenase | 0.53 | 0.0368 |
| Ni-sirohydrochlorin a,c-diamide reductive cyclase ATP-dependent reductase subunit | 0.53 | 0.0368 |
| V-type ATP synthase subunit D | 0.53 | 0.0368 |
| phosphoserine phosphatase SerB | 0.53 | 0.0368 |
| pyruvate synthase subunit PorA | 0.53 | 0.0368 |
| DNA-directed RNA polymerase subunit A" | 0.53 | 0.0395 |
| 30S ribosomal protein S5 | 0.51 | 0.0436 |
| agmatinase | 0.51 | 0.0436 |
| tryptophan synthase subunit beta | 0.50 | 0.0436 |
| DUF11 domain-containing protein | 0.51 | 0.0439 |
| 50S ribosomal protein L2 | 0.51 | 0.0451 |

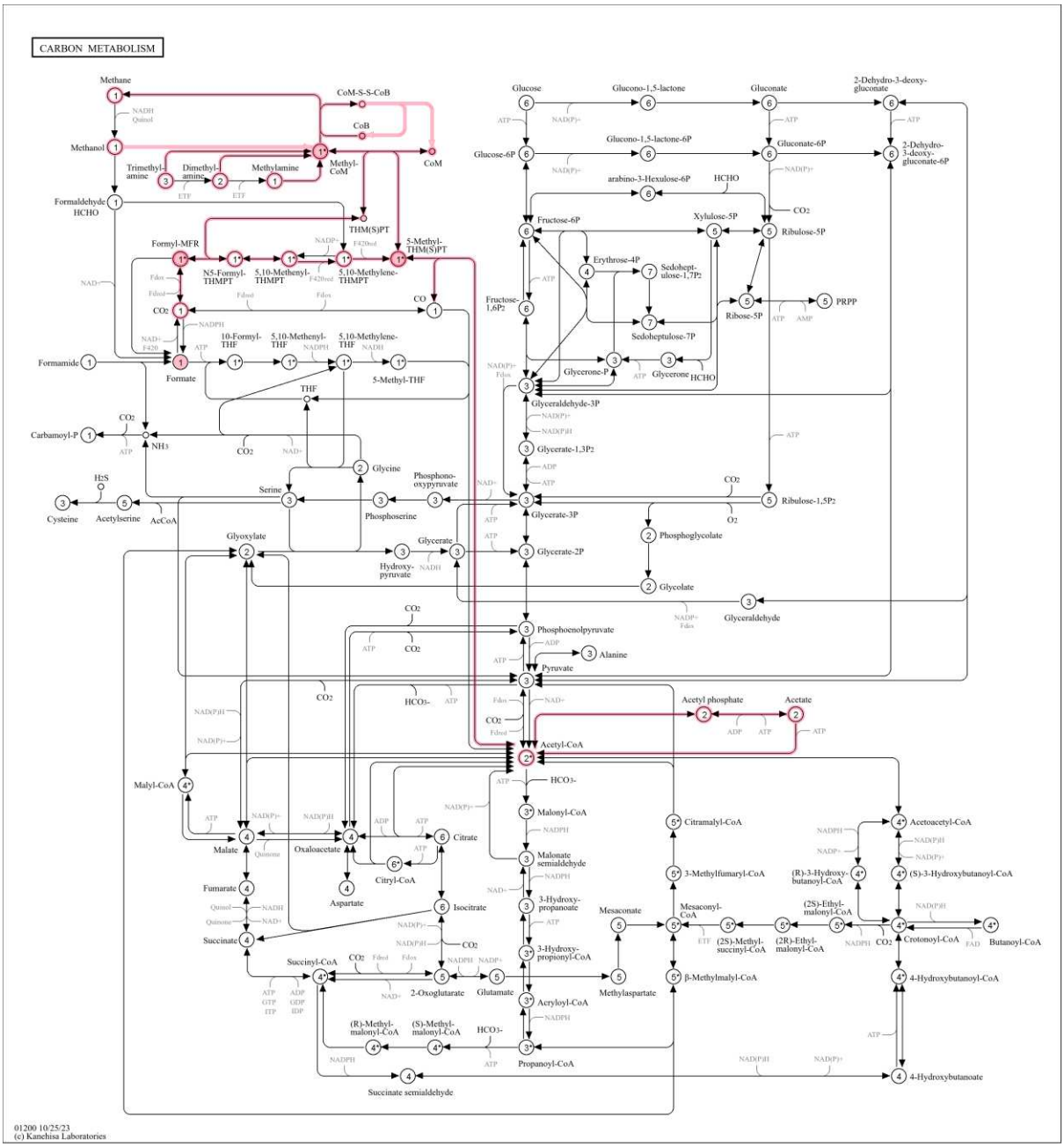
| | **Caries active** | |
|---|---|---|
| | log2Fold Change | padj |
| dihydroxy-acid dehydratase | -1.24 | 3.02E-05 |
| helicase-related protein | -0.86 | 0.0008 |
| cobalamin-dependent protein | -1.20 | 0.0015 |
| formate--tetrahydrofolate ligase | -0.74 | 0.0098 |
| M1 family metallopeptidase | -0.65 | 0.0110 |
| DNA topoisomerase (ATP-hydrolyzing) subunit B | -0.75 | 0.0245 |
| excinuclease ABC subunit UvrA | -1.00 | 0.0263 |
| excinuclease ABC subunit UvrB | -0.85 | 0.0272 |
| catalase | -0.94 | 0.0273 |
| glucose-1-phosphate thymidylyltransferase RfbA | -0.71 | 0.0318 |
| GTP-binding protein | -0.73 | 0.0132 |
| cobalamin B12-binding domain-containing protein | -0.91 | 0.0329 |

**DNAseq (after post-filtering - 500 reads)**

| | **Caries-free** | |
|---|---|---|
| | log2Fold Change | padj |
| None | - | - |

| | **Caries-active** | |
|---|---|---|
| | log2Fold Change | padj |
| cation-transporting P-type ATPase | -2.307 | 0.000 |
| ATP synthase subunit A | 1.777 | 0.007 |
| replication-associated recombination protein A | -1.402 | 0.010 |
| V-type ATP synthase subunit A | 1.481 | 0.014 |

| | | |
|---|---|---|
| pyruvate, phosphate dikinase | -1.463 | 0.014 |
| NAD-dependent protein deacylase | -1.295 | 0.025 |
| cell division protein FtsZ | 1.415 | 0.025 |
| DNA topoisomerase subunit B | -1.362 | 0.033 |
| anthranilate synthase component I | 1.240 | 0.033 |
| 2,3-bisphosphoglycerate-independent phosphoglycerate mutase | -1.270 | 0.038 |




**Supplementary Figure-3.** Kyoto Encyclopedia of Genes and Genomes (KEGG) carbon metabolism pathway highlighting methanogenesis (pink lines) and underexpressed genes in caries-active samples (pink-filled) using KEGG Mapper. C00058 Formate; C01001 Formylmethanofuran; C01217 5,6,7,8-Tetrahydromethanopterin; C03576 Coenzyme M; C03920 2-(Methylthio)ethanesulfonate; C04488 5-Methyl-5,6,7,8-tetrahydromethanopterin; C04628 Coenzyme B; ko:K03388 hdrA2; heterodisulfide reductase subunit A2 [EC:1.8.7.3 1.8.98.4 1.8.98.5 1.8.98.6]; ko:K04480 mtaB; methanol---5-hydroxybenzimidazolylcobamide Co-methyltransferase [EC:2.1.1.90]; ko:K08264 hdrD; heterodisulfide reductase subunit D [EC:1.8.98.1]; ko:K14081 mtaC; methanol corrinoid protein.

**Supplementary file-2.** List of archaeal genomes comprising the full non-redundant archaea database.

*GCF_000006805.1 Halobacterium salinarum NRC-1 (euryarchaeotes)*
*GCF_000007005.1 Saccharolobus solfataricus P2 (crenarchaeotes)*
*GCF_000007065.1 Methanosarcina mazei Go1 (euryarchaeotes)*
*GCF_000007185.1 Methanopyrus kandleri AV19 (euryarchaeotes)*
*GCF_000007225.1 Pyrobaculum aerophilum str. IM2 (crenarchaeotes)*
*GCF_000007305.1 Pyrococcus furiosus DSM 3638 (euryarchaeotes)*
*GCF_000007345.1 Methanosarcina acetivorans C2A (euryarchaeotes)*
*GCF_000008265.1 Picrophilus oshimae DSM 9789 (archaea)*
*GCF_000008645.1 Methanothermobacter thermautotrophicus str. Delta H (euryarchaeotes)*
*GCF_000008665.1 Archaeoglobus fulgidus DSM 4304 (euryarchaeotes)*
*GCF_000009185.1 Haloquadratum walsbyi DSM 16790 (euryarchaeotes)*
*GCF_000009965.1 Thermococcus kodakarensis KOD1 (euryarchaeotes)*
*GCF_000011005.1 Methanocella paludicola SANAE (euryarchaeotes)*
*GCF_000011085.1 Haloarcula marismortui ATCC 43049 (euryarchaeotes)*
*GCF_000011105.1 Pyrococcus horikoshii OT3 (euryarchaeotes)*
*GCF_000011125.1 Aeropyrum pernix K1 (crenarchaeotes)*
*GCF_000011185.1 Thermoplasma volcanium GSS1 (archaea)*
*GCF_000011205.1 Sulfurisphaera tokodaii str. 7 (crenarchaeotes)*
*GCF_000011585.1 Methanococcus maripaludis S2 (euryarchaeotes)*
*GCF_000012285.1 Sulfolobus acidocaldarius DSM 639 (crenarchaeotes)*
*GCF_000012545.1 Methanosphaera stadtmanae DSM 3091 (euryarchaeotes)*
*GCF_000013445.1 Methanospirillum hungatei JF-1 (euryarchaeotes)*
*GCF_000013725.1 Methanococcoides burtonii DSM 6242 (euryarchaeotes)*
*GCF_000014945.1 Methanothrix thermoacetophila PT (euryarchaeotes)*
*GCF_000015145.1 Hyperthermus butylicus DSM 5456 (crenarchaeotes)*
*GCF_000015205.1 Pyrobaculum islandicum DSM 4184 (crenarchaeotes)*
*GCF_000015225.1 Thermofilum pendens Hrk 5 (crenarchaeotes)*
*GCF_000015765.1 Methanocorpusculum labreanum Z (euryarchaeotes)*
*GCF_000015805.1 Pyrobaculum calidifontis JCM 11548 (crenarchaeotes)*
*GCF_000015825.1 Methanoculleus marisnigri JR1 (euryarchaeotes)*
*GCF_000015945.1 Staphylothermus marinus F1 (crenarchaeotes)*
*GCF_000016125.1 Methanococcus maripaludis C5 (euryarchaeotes)*
*GCF_000016385.1 Pyrobaculum arsenaticum DSM 13514 (crenarchaeotes)*
*GCF_000016525.1 Methanobrevibacter smithii ATCC 35061 (euryarchaeotes)*
*GCF_000017165.1 Methanococcus vannielii SB (euryarchaeotes)*
*GCF_000017185.1 Methanococcus aeolicus Nankai-3 (euryarchaeotes)*
*GCF_000017625.1 Methanoregula boonei 6A8 (euryarchaeotes)*
*GCF_000017945.1 Ignicoccus hospitalis KIN4/I (crenarchaeotes)*
*GCF_000018305.1 Caldivirga maquilingensis IC-167 (crenarchaeotes)*
*GCF_000018365.1 Thermococcus onnurineus NA1 (euryarchaeotes)*
*GCF_000018465.1 Nitrosopumilus maritimus SCM1 (archaea)*
*GCF_000019605.1 Candidatus Korarchaeum cryptofilum OPF8 (crenarchaeotes)*
*GCF_000019805.1 Pyrobaculum neutrophilum V24Sta (crenarchaeotes)*
*GCF_000020905.1 Desulfurococcus amylolyticus 1221n (crenarchaeotes)*
*GCF_000021965.1 Methanosphaerula palustris E1-9c (euryarchaeotes)*
*GCF_000022205.1 Halorubrum lacusprofundi ATCC 49239 (euryarchaeotes)*
*GCF_000022365.1 Thermococcus gammatolerans EJ3 (euryarchaeotes)*
*GCF_000022385.1 Sulfolobus islandicus L.S.2.15 (crenarchaeotes)*

*GCF_000022405.1 Sulfolobus islandicus M.14.25 (crenarchaeotes)*
*GCF_000022425.1 Sulfolobus islandicus M.16.27 (crenarchaeotes)*
*GCF_000022445.1 Sulfolobus islandicus M.16.4 (crenarchaeotes)*
*GCF_000022465.1 Sulfolobus islandicus Y.G.57.14 (crenarchaeotes)*
*GCF_000022485.1 Sulfolobus islandicus Y.N.15.51 (crenarchaeotes)*
*GCF_000022545.1 Thermococcus sibiricus MM 739 (euryarchaeotes)*
*GCF_000023945.1 Halorhabdus utahensis DSM 12940 (euryarchaeotes)*
*GCF_000023965.1 Halomicrobium mukohataei DSM 12286 (euryarchaeotes)*
*GCF_000023985.1 Methanocaldococcus fervens AG86 (euryarchaeotes)*
*GCF_000024185.1 Methanobrevibacter ruminantium M1 (euryarchaeotes)*
*GCF_000024625.1 Methanocaldococcus vulcanius M7 (euryarchaeotes)*
*GCF_000025285.1 Archaeoglobus profundus DSM 5631 (euryarchaeotes)*
*GCF_000025325.1 Haloterrigena turkmenica DSM 5511 (euryarchaeotes)*
*GCF_000025505.1 Ferroglobus placidus DSM 10642 (euryarchaeotes)*
*GCF_000025525.1 Methanocaldococcus sp. FS406-22 (euryarchaeotes)*
*GCF_000025625.1 Natrialba magadii ATCC 43099 (euryarchaeotes)*
*GCF_000025665.1 Aciduliprofundum boonei T469 (archaea)*
*GCF_000025685.1 Haloferax volcanii DS2 (Haloferax phenon K)*
*GCF_000025865.1 Methanohalophilus mahii DSM 5219 (euryarchaeotes)*
*GCF_000026045.1 Natronomonas pharaonis DSM 2160 (euryarchaeotes)*
*GCF_000063445.1 Methanocella arvoryzae MRE50 (euryarchaeotes)*
*GCF_000069025.1 Halobacterium salinarum R1 (euryarchaeotes)*
*GCF_000091665.1 Methanocaldococcus jannaschii DSM 2661 (euryarchaeotes)*
*GCF_000092185.1 Thermosphaera aggregans DSM 11486 (crenarchaeotes)*
*GCF_000092305.1 Methanocaldococcus infernus ME (euryarchaeotes)*
*GCF_000092465.1 Staphylothermus hellenicus DSM 12710 (crenarchaeotes)*
*GCF_000144915.1 Acidilobus saccharovorans 345-15 (crenarchaeotes)*
*GCF_000145295.1 Methanothermobacter marburgensis str. Marburg (euryarchaeotes)*
*GCF_000147875.1 Methanolacinia petrolearia DSM 11571 (euryarchaeotes)*
*GCF_000148385.1 Vulcanisaeta distributa DSM 14429 (crenarchaeotes)*
*GCF_000151105.2 Thermococcus barophilus MP (euryarchaeotes)*
*GCF_000151205.2 Thermococcus sp. AM4 (euryarchaeotes)*
*GCF_000152265.2 Ferroplasma acidarmanus Fer1 (archaea)*
*GCF_000166095.1 Methanothermus fervidus DSM 2088 (euryarchaeotes)*
*GCF_000172995.2 Halogeometricum borinquense DSM 11551 (euryarchaeotes)*
*GCF_000179575.2 Methanothermococcus okinawensis IH1 (euryarchaeotes)*
*GCF_000186365.1 Desulfurococcus mucosus DSM 2162 (crenarchaeotes)*
*GCF_000189555.1 Sulfolobus islandicus REY15A (crenarchaeotes)*
*GCF_000189575.1 Sulfolobus islandicus HVE10/4 (crenarchaeotes)*
*GCF_000190315.1 Vulcanisaeta moutnovskia 768-28 (crenarchaeotes)*
*GCF_000191585.1 Methanobacterium lacus (euryarchaeotes)*
*GCF_000193375.1 Thermoproteus uzoniensis 768-20 (crenarchaeotes)*
*GCF_000194625.1 Archaeoglobus veneficus SNP6 (euryarchaeotes)*
*GCF_000195915.1 Thermoplasma acidophilum DSM 1728 (archaea)*
*GCF_000195935.2 Pyrococcus abyssi GE5 (euryarchaeotes)*
*GCF_000196655.1 Methanohalobium evestigatum Z-7303 (euryarchaeotes)*
*GCF_000196895.1 Halalkalicoccus jeotgali B3 (euryarchaeotes)*
*GCF_000204415.1 Methanothrix soehngenii GP6 (euryarchaeotes)*
*GCF_000204925.1 Metallosphaera cuprina Ar-4 (crenarchaeotes)*
*GCF_000211475.1 Pyrococcus sp. NA2 (euryarchaeotes)*
*GCF_000213215.1 Acidianus hospitalis W1 (crenarchaeotes)*

*GCF_000214415.1 Methanotorris igneus Kol 5 (euryarchaeotes)*
*GCF_000214725.1 Methanobacterium paludis (euryarchaeotes)*
*GCF_000215995.1 Pyrococcus yayanosii CH1 (euryarchaeotes)*
*GCF_000217715.1 Halopiger xanaduensis SH-6 (euryarchaeotes)*
*GCF_000217995.1 Methanosalsum zhilinae DSM 4017 (euryarchaeotes)*
*GCF_000220645.1 Methanococcus maripaludis X1 (euryarchaeotes)*
*GCF_000221185.1 Thermococcus sp. 4557 (euryarchaeotes)*
*GCF_000223395.1 Pyrolobus fumarii 1A (crenarchaeotes)*
*GCF_000223905.1 Haloarcula hispanica ATCC 33960 (euryarchaeotes)*
*GCF_000226975.2 Halobiforma lacisalsi AJ5 (euryarchaeotes)*
*GCF_000230715.2 Natronobacterium gregoryi SP2 (euryarchaeotes)*
*GCF_000230735.2 Natrinema pellirubrum DSM 15624 (euryarchaeotes)*
*GCF_000231015.2 Desulfurococcus amylolyticus DSM 16532 (crenarchaeotes)*
*GCF_000234805.1 Pyrobaculum ferrireducens (crenarchaeotes)*
*GCF_000235565.1 Methanothrix harundinacea 6Ac (euryarchaeotes)*
*GCF_000237865.1 Haloquadratum walsbyi C23 (euryarchaeotes)*
*GCF_000246985.2 Thermococcus litoralis DSM 5473 (euryarchaeotes)*
*GCF_000251105.1 Methanocella conradii HZ254 (euryarchaeotes)*
*GCF_000253055.1 Thermoproteus tenax Kra 1 (crenarchaeotes)*
*GCF_000258425.1 Fervidicoccus fontis Kam940 (crenarchaeotes)*
*GCF_000263735.1 Pyrococcus sp. ST04 (euryarchaeotes)*
*GCF_000264495.1 Thermogladius calderae 1633 (crenarchaeotes)*
*GCF_000265525.1 Thermococcus cleftensis (euryarchaeotes)*
*GCF_000275605.1 Pyrococcus furiosus COM1 (euryarchaeotes)*
*GCF_000281695.1 Natrinema sp. J7-2 (euryarchaeotes)*
*GCF_000299365.1 Candidatus Nitrosopumilus koreensis AR1 (archaea)*
*GCF_000299395.1 Candidatus Nitrosopumilus sediminis (archaea)*
*GCF_000300255.2 Candidatus Methanomethylophilus alvi Mx1201 (archaea)*
*GCF_000303155.1 Candidatus Nitrososphaera gargensis Ga9.2 (archaea)*
*GCF_000304355.2 Methanoculleus bourgensis MS2 (euryarchaeotes)*
*GCF_000306765.2 Haloferax mediterranei ATCC 33500 (euryarchaeotes)*
*GCF_000317795.1 Caldisphaera lagunensis DSM 15908 (crenarchaeotes)*
*GCF_000327485.1 Methanoregula formicica SMSP (euryarchaeotes)*
*GCF_000328525.1 Halovivax ruber XH-70 (euryarchaeotes)*
*GCF_000328665.1 Methanomethylovorans hollandica DSM 15978 (euryarchaeotes)*
*GCF_000328685.1 Natronococcus occultus SP4 (euryarchaeotes)*
*GCF_000338775.1 Sulfolobus acidocaldarius Ron12/I (crenarchaeotes)*
*GCF_000340315.1 Sulfolobus acidocaldarius N8 (crenarchaeotes)*
*GCF_000341715.1 Methanosarcina mazei Tuc01 (euryarchaeotes)*
*GCF_000364745.1 Sulfolobus islandicus LAL14/1 (crenarchaeotes)*
*GCF_000385565.1 Archaeoglobus sulfaticallidus PM70-1 (euryarchaeotes)*
*GCF_000403645.1 Salinarchaeum sp. Harcht-Bsk1 (euryarchaeotes)*
*GCF_000404165.1 Methanobrevibacter sp. AbM4 (euryarchaeotes)*
*GCF_000404225.1 Candidatus Methanomassiliicoccus intestinalis Issoire-Mx1 (archaea)*
*GCF_000446015.1 Thermofilum adornatum (crenarchaeotes)*
*GCF_000470655.1 Halorhabdus tiamatea SARL4B (euryarchaeotes)*
*GCF_000504565.1 Haloarcula hispanica N601 (euryarchaeotes)*
*GCF_000517445.1 Thermococcus paralvinellae (euryarchaeotes)*
*GCF_000517625.1 Halostagnicola larsenii XH-48 (euryarchaeotes)*
*GCF_000585495.1 Thermococcus nautili (euryarchaeotes)*
*GCF_000591035.1 Aeropyrum camini SY1 = JCM 12091 (crenarchaeotes)*

*GCF_000591055.1 Natronomonas moolapensis 8.8.11 (euryarchaeotes)*
*GCF_000698785.1 Nitrososphaera viennensis EN76 (archaea)*
*GCF_000725425.1 Palaeococcus pacificus DY20341 (euryarchaeotes)*
*GCF_000730285.1 Candidatus Nitrososphaera evergladensis SR1 (archaea)*
*GCF_000734035.1 Archaeoglobus fulgidus DSM 8774 (euryarchaeotes)*
*GCF_000739065.1 Methanocaldococcus bathoardescens (euryarchaeotes)*
*GCF_000762265.1 Methanobacterium formicicum (euryarchaeotes)*
*GCF_000769655.1 Thermococcus eurythermalis (euryarchaeotes)*
*GCF_000800805.1 Candidatus Methanoplasma termitum (archaea)*
*GCF_000802205.1 Candidatus Nitrosocosmicus oleophilus (archaea)*
*GCF_000812185.1 Candidatus Nitrosopelagicus brevis (archaea)*
*GCF_000813245.1 Thermofilum adornatum 1505 (crenarchaeotes)*
*GCF_000816105.1 Thermococcus guaymasensis DSM 11113 (euryarchaeotes)*
*GCF_000827835.1 Haloarcula sp. CBA1115 (euryarchaeotes)*
*GCF_000828535.1 Methanococcus maripaludis KA1 (euryarchaeotes)*
*GCF_000828555.1 Methanococcus maripaludis OS7 (euryarchaeotes)*
*GCF_000828575.1 Methanothermobacter sp. CaT2 (euryarchaeotes)*
*GCF_000875775.1 Nitrosopumilus piranensis (archaea)*
*GCF_000955905.1 Candidatus Nitrosotenuis cloacae (archaea)*
*GCF_000956175.1 Nitrosopumilus adriaticus (archaea)*
*GCF_000968355.2 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_000968395.2 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_000968435.2 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_000969885.1 Methanosarcina thermophila TM-1 (euryarchaeotes)*
*GCF_000969905.1 Methanosarcina vacuolata Z-761 (euryarchaeotes)*
*GCF_000969925.1 Methanosarcina thermophila CHTI-55 (euryarchaeotes)*
*GCF_000969945.1 Methanosarcina sp. Kolksee (euryarchaeotes)*
*GCF_000969965.1 Methanosarcina sp. WWM596 (euryarchaeotes)*
*GCF_000969985.1 Methanosarcina barkeri str. Wiesmoor (euryarchaeotes)*
*GCF_000970005.1 Methanosarcina sp. WH1 (euryarchaeotes)*
*GCF_000970025.1 Methanosarcina barkeri MS (euryarchaeotes)*
*GCF_000970045.1 Methanosarcina sp. MTP4 (euryarchaeotes)*
*GCF_000970065.1 Methanosarcina barkeri 227 (euryarchaeotes)*
*GCF_000970085.1 Methanosarcina siciliae T4/M (euryarchaeotes)*
*GCF_000970125.1 Methanosarcina siciliae HI350 (euryarchaeotes)*
*GCF_000970145.1 Methanosarcina siciliae C2J (euryarchaeotes)*
*GCF_000970165.1 Methanosarcina mazei WWM610 (euryarchaeotes)*
*GCF_000970185.1 Methanosarcina mazei SarPi (euryarchaeotes)*
*GCF_000970205.1 Methanosarcina mazei S-6 (euryarchaeotes)*
*GCF_000970225.1 Methanosarcina mazei LYC (euryarchaeotes)*
*GCF_000970245.1 Methanosarcina mazei C16 (euryarchaeotes)*
*GCF_000970265.1 Methanosarcina lacustris Z-7289 (euryarchaeotes)*
*GCF_000970285.1 Methanosarcina horonobensis HB-1 = JCM 15518 (euryarchaeotes)*
*GCF_000970305.1 Methanosarcina barkeri 3 (euryarchaeotes)*
*GCF_000970325.1 Methanococcoides methylutens MM1 (euryarchaeotes)*
*GCF_000993805.1 Infirmifilum uzonense (crenarchaeotes)*
*GCF_001006045.1 Geoglobus ahangari (euryarchaeotes)*
*GCF_001011115.1 Halanaeroarchaeum sulfurireducens (euryarchaeotes)*
*GCF_001027005.1 Methanosarcina barkeri CM1 (euryarchaeotes)*
*GCF_001190965.1 Haloferax gibbonsii (euryarchaeotes)*
*GCF_001266655.1 Metallosphaera sedula (crenarchaeotes)*

GCF_001266675.1 Metallosphaera sedula (crenarchaeotes)
GCF_001266695.1 Metallosphaera sedula (crenarchaeotes)
GCF_001266715.1 Metallosphaera sedula (crenarchaeotes)
GCF_001266735.1 Metallosphaera sedula (crenarchaeotes)
GCF_001304615.2 Methanosarcina flavescens (euryarchaeotes)
GCF_001305655.1 Halanaeroarchaeum sulfurireducens (euryarchaeotes)
GCF_001412615.1 Pyrodictium delaneyi (crenarchaeotes)
GCF_001433455.1 Thermococcus barophilus (euryarchaeotes)
GCF_001458655.1 Methanobacterium formicicum (euryarchaeotes)
GCF_001477655.1 Methanobrevibacter millerae (euryarchaeotes)
GCF_001481685.1 Ignicoccus islandicus DSM 13165 (crenarchaeotes)
GCF_001484685.1 Thermococcus sp. 2319x1 (euryarchaeotes)
GCF_001488575.1 Halobacterium hubeiense (euryarchaeotes)
GCF_001548675.1 Methanobrevibacter sp. YE315 (euryarchaeotes)
GCF_001563245.1 Methanobrevibacter olleyae (euryarchaeotes)
GCF_001577775.1 Pyrococcus kukulkanii (euryarchaeotes)
GCF_001592435.1 Thermococcus peptonophilus (euryarchaeotes)
GCF_001647085.1 Thermococcus piezophilus (euryarchaeotes)
GCF_001719125.1 Sulfolobus sp. A20 (crenarchaeotes)
GCF_001767315.1 Halodesulfurarchaeum formicicum (euryarchaeotes)
GCF_001870125.1 Candidatus Nitrosocosmicus hydrocola (archaea)
GCF_001886955.1 Halodesulfurarchaeum formicicum (euryarchaeotes)
GCF_001889405.1 Methanohalophilus halophilus (euryarchaeotes)
GCF_001971705.1 Natronorubrum daqingense (euryarchaeotes)
GCF_001989615.1 Halorientalis sp. IM1011 (euryarchaeotes)
GCF_002025255.2 Halolamina sp. CBA1230 (euryarchaeotes)
GCF_002078355.1 Ferroplasma acidiphilum (archaea)
GCF_002116695.1 Acidianus manzaensis (crenarchaeotes)
GCF_002156705.1 Natrarchaeobaculum aegyptiacum (euryarchaeotes)
GCF_002156965.1 Candidatus Nitrosomarinus catalina (archaea)
GCF_002197185.1 Thermococcus sp. 5-4 (euryarchaeotes)
GCF_002214165.1 Candidatus Mancarchaeum acidiphilum (archaea)
GCF_002214365.1 Thermococcus celer Vu 13 = JCM 8558 (euryarchaeotes)
GCF_002214385.1 Thermococcus gorgonarius (euryarchaeotes)
GCF_002214465.1 Thermococcus barossii (euryarchaeotes)
GCF_002214485.1 Thermococcus pacificus (euryarchaeotes)
GCF_002214505.1 Thermococcus siculi (euryarchaeotes)
GCF_002214525.1 Thermococcus sp. P6 (euryarchaeotes)
GCF_002214545.1 Thermococcus thioreducens (euryarchaeotes)
GCF_002214565.1 Thermococcus radiotolerans (euryarchaeotes)
GCF_002214585.1 Thermococcus profundus (euryarchaeotes)
GCF_002214605.1 Thermococcus chitonophagus (euryarchaeotes)
GCF_002215405.1 Sulfolobus acidocaldarius (crenarchaeotes)
GCF_002215445.1 Sulfolobus acidocaldarius (crenarchaeotes)
GCF_002215485.1 Sulfolobus acidocaldarius (crenarchaeotes)
GCF_002215525.1 Sulfolobus acidocaldarius (crenarchaeotes)
GCF_002215565.1 Sulfolobus acidocaldarius (crenarchaeotes)
GCF_002355635.1 Halopenitus persicus (euryarchaeotes)
GCF_002355655.1 Halorubrum trapanicum (euryarchaeotes)
GCF_002787055.1 Candidatus Nitrosotenuis aquarius (archaea)
GCF_002788215.1 Halohasta litchfieldiae (euryarchaeotes)

*GCF_002813085.1 Methanobrevibacter smithii (euryarchaeotes)*
*GCF_002813655.1 Methanobacterium subterraneum (euryarchaeotes)*
*GCF_002813675.1 Methanobacterium sp. MZ-A1 (euryarchaeotes)*
*GCF_002813695.1 Methanobacterium subterraneum (euryarchaeotes)*
*GCF_002844335.1 Haloarcula taiwanensis (euryarchaeotes)*
*GCF_002906215.1 Candidatus Nitrosocaldus islandicus (archaea)*
*GCF_002906575.1 Salinigranum rubrum (euryarchaeotes)*
*GCF_002945325.1 Methanococcus maripaludis (euryarchaeotes)*
*GCF_002952775.1 Halalkaliarchaeum desulfuricum (euryarchaeotes)*
*GCF_003052125.1 Methanococcus maripaludis (euryarchaeotes)*
*GCF_003058365.1 Halococcoides cellulosivorans (euryarchaeotes)*
*GCF_003201675.2 Metallosphaera hakonensis JCM 8857 = DSM 7519 (crenarchaeotes)*
*GCF_003201765.2 Acidianus sulfidivorans JP7 (crenarchaeotes)*
*GCF_003201835.2 Acidianus brierleyi (crenarchaeotes)*
*GCF_003268005.1 Methanosphaera sp. BMS (euryarchaeotes)*
*GCF_003342675.1 Haloplanus rubicundus (euryarchaeotes)*
*GCF_003342695.1 Haloplanus rubicundus (euryarchaeotes)*
*GCF_003351865.1 Methanofervidicoccus sp. A16 (euryarchaeotes)*
*GCF_003430805.1 Natrarchaeobaculum sulfurireducens (euryarchaeotes)*
*GCF_003430825.1 Natrarchaeobaculum sulfurireducens (euryarchaeotes)*
*GCF_003431325.1 Acidilobus sp. 7A (crenarchaeotes)*
*GCF_003711245.1 Methanomethylophilus alvi (archaea)*
*GCF_003721175.2 Halarchaeum sp. CBA1220 (euryarchaeotes)*
*GCF_003721435.2 Halorubrum sp. CBA1229 (euryarchaeotes)*
*GCF_003852095.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852115.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852135.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852155.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852175.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852195.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003852215.1 Saccharolobus solfataricus (crenarchaeotes)*
*GCF_003856835.1 Haloplanus aerogenes (euryarchaeotes)*
*GCF_003967175.1 Sulfodiicoccus acidiphilus (crenarchaeotes)*
*GCF_003990725.2 Halorubrum sp. PV6 (euryarchaeotes)*
*GCF_004087835.1 Halorussus pelagicus (euryarchaeotes)*
*GCF_004114375.1 Halorubrum sp. BOL3-1 (euryarchaeotes)*
*GCF_004126515.1 Halorubrum ezzemoulense (euryarchaeotes)*
*GCF_004799605.1 Halobacterium salinarum (euryarchaeotes)*
*GCF_004799645.1 Natronorubrum bangense (euryarchaeotes)*
*GCF_004799665.1 Halapricum salinum (euryarchaeotes)*
*GCF_004799685.1 Halobellus limi (euryarchaeotes)*
*GCF_004803735.1 Halomicrobium mukohataei (euryarchaeotes)*
*GCF_005155585.1 Haloprofundus sp. MHR1 (euryarchaeotes)*
*GCF_005222525.1 Metallosphaera prunae (crenarchaeotes)*
*GCF_005310945.1 Haloarcula marismortui ATCC 43049 (euryarchaeotes)*
*GCF_005406325.1 Haloferax mediterranei ATCC 33500 (euryarchaeotes)*
*GCF_005576615.1 Natrinema versiforme (euryarchaeotes)*
*GCF_005890195.1 Natrinema pallidum (euryarchaeotes)*
*GCF_006274605.1 Thermococcus indicus (euryarchaeotes)*
*GCF_006740685.1 Candidatus Nitrosopumilus sp. SW (archaea)*
*GCF_007833275.1 Salarchaeum sp. JOR-1 (euryarchaeotes)*

GCF_008000775.1 Promethearchaeum syntrophicum (archaea)
GCF_008033705.1 Methanothermobacter sp. KEPCO-1 (euryarchaeotes)
GCF_008152015.1 Thermococcus aciditolerans (euryarchaeotes)
GCF_008245085.1 Pyrococcus furiosus DSM 3638 (euryarchaeotes)
GCF_008326385.1 Sulfuracidifex tepidarius (crenarchaeotes)
GCF_008326425.1 Sulfuracidifex tepidarius (crenarchaeotes)
GCF_008831545.1 Halorussus halophilus (euryarchaeotes)
GCF_009217585.1 Halomicrobium sp. ZPS1 (euryarchaeotes)
GCF_009392895.1 Natronorubrum aibiense (euryarchaeotes)
GCF_009601705.1 Sulfolobus sp. E5-1-F (crenarchaeotes)
GCF_009602405.1 Sulfolobus sp. E11-6 (crenarchaeotes)
GCF_009617975.1 Candidatus Nanohalobium constans (archaea)
GCF_009617995.1 Halomicrobium sp. LC1Hm (euryarchaeotes)
GCF_009690625.1 Halorhabdus sp. CBA1104 (euryarchaeotes)
GCF_009729015.1 Acidianus ambivalens (crenarchaeotes)
GCF_009729035.1 Stygiolobus azoricus (crenarchaeotes)
GCF_009729055.1 Sulfurisphaera ohwakuensis (crenarchaeotes)
GCF_009762275.1 Haloplanus rallus (euryarchaeotes)
GCF_009914355.1 Methanothermobacter sp. THM-1 (euryarchaeotes)
GCF_009917665.1 Methanothermobacter sp. THM-2 (euryarchaeotes)
GCF_010692885.1 Halogeometricum borinquense (euryarchaeotes)
GCF_010692905.1 Haloferax volcanii (Haloferax phenon K)
GCF_010706455.1 Methanosarcina mazei (euryarchaeotes)
GCF_013267195.1 Halorubrum salinarum (euryarchaeotes)
GCF_013340765.1 Conexivisphaera calida (archaea)
GCF_013343295.1 Metallosphaera tengchongensis (crenarchaeotes)
GCF_013388255.1 Methanolobus zinderi (euryarchaeotes)
GCF_013391085.1 Natronomonas halophila (euryarchaeotes)
GCF_013391105.1 Natronomonas salina (euryarchaeotes)
GCF_013401515.1 Halorarum halophilum (euryarchaeotes)
GCF_013402815.2 Natrinema halophilum (euryarchaeotes)
GCF_013402875.1 Halorarum salinum (euryarchaeotes)
GCF_013407145.1 Nitrosopumilus cobalaminigenes (archaea)
GCF_013407165.1 Nitrosopumilus oxyclinae (archaea)
GCF_013407185.1 Nitrosopumilus ureiphilus (archaea)
GCF_013407275.1 Candidatus Nitrosotenuis sp. DW1 (archaea)
GCF_013407385.1 Nitrosarchaeum sp. AC2 (archaea)
GCF_013415885.1 Halosimplex rubrum (euryarchaeotes)
GCF_013415905.1 Halosimplex pelagicum (euryarchaeotes)
GCF_013456555.2 Natrinema zhouii (euryarchaeotes)
GCF_014876775.1 Infirmifilum lucidum (crenarchaeotes)
GCF_014962245.1 Thermosphaera aggregans (crenarchaeotes)
GCF_014969745.1 Haloferax gibbonsii (euryarchaeotes)
GCF_015654385.1 Saccharolobus solfataricus (crenarchaeotes)
GCF_016065055.1 Halosimplex litoreum (euryarchaeotes)
GCF_016806735.1 Candidatus Micrarchaeum sp. (archaea)
GCF_016906025.1 Haloterrigena salifodinae (euryarchaeotes)
GCF_016917835.2 Halobacterium sp. BOL4-2 (euryarchaeotes)
GCF_016917855.1 Halobacterium sp. GSL-19 (euryarchaeotes)
GCF_017094445.1 Halapricum desulfuricans (euryarchaeotes)
GCF_017094465.1 Halapricum desulfuricans (euryarchaeotes)

GCF_017094485.1 Natranaeroarchaeum sulfidigenes (euryarchaeotes)
GCF_017094505.1 Halapricum desulfuricans (euryarchaeotes)
GCF_017094525.1 Halapricum desulfuricans (euryarchaeotes)
GCF_017352095.1 Natrinema longum (euryarchaeotes)
GCF_017352155.2 Haloterrigena alkaliphila (euryarchaeotes)
GCF_017357405.1 Halomontanus rarus (euryarchaeotes)
GCF_017357525.1 Methanofollis aquaemaris (euryarchaeotes)
GCF_018128925.1 Nitrosopumilus sp. K4 (archaea)
GCF_018141185.1 Methanobacterium alkalithermotolerans (euryarchaeotes)
GCF_018200015.1 Haloarcula sinaiiensis ATCC 33800 (euryarchaeotes)
GCF_018228765.1 Halorubrum ruber (euryarchaeotes)
GCF_018502485.1 Methanospirillum sp. J.3.6.1-F.2.7.3 (euryarchaeotes)
GCF_018623055.1 Halorubrum sp. 2020YC2 (euryarchaeotes)
GCF_019175305.1 Saccharolobus shibatae (crenarchaeotes)
GCF_019175325.1 Saccharolobus shibatae (crenarchaeotes)
GCF_019175345.1 Saccharolobus shibatae B12 (crenarchaeotes)
GCF_019263745.1 Methanospirillum hungatei (euryarchaeotes)
GCF_019669925.1 Methanobrevibacter arboriphilus (euryarchaeotes)
GCF_019669945.1 Methanosarcina mazei (euryarchaeotes)
GCF_019669965.1 Methanoculleus chikugoensis (euryarchaeotes)
GCF_019693215.1 Salinarchaeum sp. IM2453 (euryarchaeotes)
GCF_019704315.1 Stygiolobus caldivivus (crenarchaeotes)
GCF_019823105.1 Halobaculum magnesiiphilum (euryarchaeotes)
GCF_019879105.1 Natrinema sp. SYSU A 869 (euryarchaeotes)
GCF_019880225.1 Halobaculum rubrum (euryarchaeotes)
GCF_019880245.1 Halobaculum roseum (euryarchaeotes)
GCF_020097815.1 Haloprofundus salinisoli (euryarchaeotes)
GCF_020097835.1 Haloprofundus halobius (euryarchaeotes)
GCF_020150815.1 Haloprofundus salilacus (euryarchaeotes)
GCF_020217425.1 Halomicrobium urmianum (euryarchaeotes)
GCF_020405185.1 Halomicrobium salinisoli (euryarchaeotes)
GCF_020405205.1 Natrinema salinisoli (euryarchaeotes)
GCF_020405225.1 Natrinema sp. DC36 (euryarchaeotes)
GCF_020405245.1 Halomicrobium salinisoli (euryarchaeotes)
GCF_020614375.1 Haladaptatus salinisoli (euryarchaeotes)
GCF_020614395.1 Salarchaeum japonicum (euryarchaeotes)
GCF_020618475.1 Haladaptatus halobius (euryarchaeotes)
GCF_020700235.1 Haladaptatus pallidirubidus (euryarchaeotes)
GCF_020736485.1 Halobacterium salinarum NRC-34001 (euryarchaeotes)
GCF_020885915.1 Candidatus Methanoliparum sp. LAM-1 (euryarchaeotes)
GCF_020886315.1 Saccharolobus caldissimus (crenarchaeotes)
GCF_021184045.1 Methanococcoides orientis (euryarchaeotes)
GCF_021233415.1 Halobacterium litoreum (euryarchaeotes)
GCF_021233435.1 Halobacterium noricense (euryarchaeotes)
GCF_021249345.1 Halobacterium wangiae (euryarchaeotes)
GCF_021249405.1 Halobacterium zhouii (euryarchaeotes)
GCF_021431925.1 Halobaculum sp. CBA1158 (euryarchaeotes)
GCF_021655615.1 Acidianus sp. HS-5 (crenarchaeotes)
GCF_022846155.1 Methanobrevibacter smithii (euryarchaeotes)
GCF_022846175.1 Methanobrevibacter smithii (euryarchaeotes)
GCF_022869805.1 Halosolutus halophilus (euryarchaeotes)

GCF_022870485.1 *Halococcus dombrowskii (euryarchaeotes)*
GCF_023008545.1 *Natribaculum luteum (euryarchaeotes)*
GCF_023016325.1 *Methanonatronarchaeum sp. AMET6-2 (euryarchaeotes)*
GCF_023028105.1 *Halosolutus gelatinilyticus (euryarchaeotes)*
GCF_023028225.1 *Halorientalis litorea (euryarchaeotes)*
GCF_023028345.1 *Halorientalis marina (euryarchaeotes)*
GCF_023093535.1 *Halovivax limisalsi (euryarchaeotes)*
GCF_023115355.1 *Halocatena salina (euryarchaeotes)*
GCF_023167465.1 *Methanothermobacter tenebrarum (euryarchaeotes)*
GCF_023169545.1 *Nanobdella aerobiophila (archaea)*
GCF_023169565.1 *Metallosphaera sedula (crenarchaeotes)*
GCF_023238205.1 *Halorussus limi (euryarchaeotes)*
GCF_023238445.1 *Halorussus gelatinilyticus (euryarchaeotes)*
GCF_023617305.1 *Methanobrevibacter sp. TLL-48-HuF1 (euryarchaeotes)*
GCF_023702125.1 *Halorubrum hochsteinianum (euryarchaeotes)*
GCF_023703775.1 *Haloplanus sp. GDY1 (euryarchaeotes)*
GCF_023703795.1 *Haloplanus sp. HW8-1 (euryarchaeotes)*
GCF_023746595.1 *Thermococcus argininiproducens (euryarchaeotes)*
GCF_023913515.1 *Natronococcus zhouii (euryarchaeotes)*
GCF_023973145.1 *Natronosalvus vescus (euryarchaeotes)*
GCF_024138125.1 *Halorussus salilacus (euryarchaeotes)*
GCF_024138145.1 *Natronosalvus halobius (euryarchaeotes)*
GCF_024138165.1 *Halorussus vallis (euryarchaeotes)*
GCF_024204665.1 *Natronosalvus rutilus (euryarchaeotes)*
GCF_024218775.1 *Haloarcula marina (euryarchaeotes)*
GCF_024218795.1 *Halorussus aquaticus (euryarchaeotes)*
GCF_024218815.1 *Haloarcula marina (euryarchaeotes)*
GCF_024227435.1 *Natrinema caseinilyticum (euryarchaeotes)*
GCF_024227715.1 *Halomarina litorea (euryarchaeotes)*
GCF_024228315.1 *Halomarina pelagica (euryarchaeotes)*
GCF_024266705.1 *Natrinema gelatinilyticum (euryarchaeotes)*
GCF_024296665.1 *Salinilacihabitans rarus (euryarchaeotes)*
GCF_024296685.1 *Natrinema marinum (euryarchaeotes)*
GCF_024298825.1 *Haloglomus salinum (euryarchaeotes)*
GCF_024298845.1 *Natronosalvus amylolyticus (euryarchaeotes)*
GCF_024298865.1 *Halorarius halobius (euryarchaeotes)*
GCF_024298885.1 *Haloglomus halophilum (euryarchaeotes)*
GCF_024298905.1 *Natronomonas marina (euryarchaeotes)*
GCF_024300625.1 *Halovivax gelatinilyticus (euryarchaeotes)*
GCF_024300825.1 *Natronomonas gomsonensis (euryarchaeotes)*
GCF_024362405.1 *Halorarius litoreus (euryarchaeotes)*
GCF_024362485.1 *Natronobeatus ordinarius (euryarchaeotes)*
GCF_024362525.1 *Natrononativus amylolyticus (euryarchaeotes)*
GCF_024498175.1 *Haloplanus salinarum (euryarchaeotes)*
GCF_024498195.1 *Halovivax cerinus (euryarchaeotes)*
GCF_024498335.1 *Halobellus inordinatus (euryarchaeotes)*
GCF_024508235.1 *Halococcus qingdaonensis (euryarchaeotes)*
GCF_024662215.1 *Methanoplanus endosymbiosus (euryarchaeotes)*
GCF_024707485.1 *Thermococcus thermotolerans (euryarchaeotes)*
GCF_024730625.1 *Haloferax larsenii (euryarchaeotes)*
GCF_024760425.1 *Nitrososphaera viennensis (archaea)*

GCF_024972735.1 Halalkaliarchaeum sp. AArc-CO (euryarchaeotes)
GCF_024972755.1 Halanaeroarchaeum sp. HSR-CO (euryarchaeotes)
GCF_025231485.1 Salinirubellus salinus (euryarchaeotes)
GCF_025244945.1 Nitrososphaera viennensis (archaea)
GCF_025397995.1 Methanothermobacter wolfeii (euryarchaeotes)
GCF_025449255.1 Methanococcus aeolicus (euryarchaeotes)
GCF_025913575.1 Halocatena marina (euryarchaeotes)
GCF_025914035.1 Methanoculleus submarinus (euryarchaeotes)
GCF_025947005.1 Halocatena marina (euryarchaeotes)
GCF_025998175.1 Nitrosopumilus zosterae (archaea)
GCF_026000775.1 Vulcanisaeta souniana JCM 11219 (crenarchaeotes)
GCF_026013925.1 Halocatena marina (euryarchaeotes)
GCF_026248685.1 Haladaptatus caseinilyticus (euryarchaeotes)
GCF_026410925.1 Halovenus salina (euryarchaeotes)
GCF_026684035.1 Methanogenium organophilum (euryarchaeotes)
GCF_027554905.1 Methanothermobacter thermautotrophicus (euryarchaeotes)
GCF_027555045.1 Methanothermobacter thermautotrophicus (euryarchaeotes)
GCF_027555065.1 Methanothermobacter marburgensis (euryarchaeotes)
GCF_028471785.1 Thermococcus kodakarensis (euryarchaeotes)
GCF_028471865.1 Thermococcus kodakarensis (euryarchaeotes)
GCF_028472005.1 Sulfolobus islandicus (crenarchaeotes)
GCF_028472365.1 Sulfolobus acidocaldarius DSM 639 (crenarchaeotes)
GCF_028743435.1 Methanobrevibacter smithii ATCC 35061 (euryarchaeotes)
GCF_028747785.1 Halosimplex aquaticum (euryarchaeotes)
GCF_029207715.1 Halorhabdus sp. SVX81 (euryarchaeotes)
GCF_029225785.1 Haloferax volcanii (Haloferax phenon K)
GCF_029229925.1 Halorhabdus sp. BNX81 (euryarchaeotes)
GCF_029278565.1 Haloarcula halophila (euryarchaeotes)
GCF_029338195.1 Haloarcula litorea (euryarchaeotes)
GCF_029338215.1 Haladaptatus sp. YSMS36 (euryarchaeotes)
GCF_029338235.1 Haloarcula rara (euryarchaeotes)
GCF_029338255.1 Haloarcula halobia (euryarchaeotes)
GCF_029338275.1 Haloarcula ordinaria (euryarchaeotes)
GCF_029338295.1 Haladaptatus sp. QDMS2 (euryarchaeotes)
GCF_029338315.1 Haloarcula regularis (euryarchaeotes)
GCF_029338335.1 Halomontanus rarus (euryarchaeotes)
GCF_029338355.1 Halosegnis marinus (euryarchaeotes)
GCF_029338375.1 Halorussus lipolyticus (euryarchaeotes)
GCF_029338395.1 Halorussus caseinilyticus (euryarchaeotes)
GCF_029338515.1 Haloglomus litoreum (euryarchaeotes)
GCF_029338555.1 Halobaculum marinum (euryarchaeotes)
GCF_029338575.1 Halomarina halobia (euryarchaeotes)
GCF_029489995.1 Haladaptatus sp. DYSN1 (euryarchaeotes)
GCF_029490015.1 Halobaculum limi (euryarchaeotes)
GCF_029633915.1 Methanoeremita antiquus (euryarchaeotes)
GCF_029633965.1 Methanogenium sp. S4BF (euryarchaeotes)
GCF_029854155.1 Methanonatronarchaeum sp. AMET-SI (euryarchaeotes)
GCF_900012635.1 Thermococcus chitonophagus (euryarchaeotes)
GCF_900036045.1 Methanoculleus bourgensis (euryarchaeotes)
GCF_900079115.1 Saccharolobus solfataricus (crenarchaeotes)
GCF_900083515.1 Cuniculiplasma divulgatum (archaea)

| | |
|---|---|
| *GCF_900090055.1* | *Cuniculiplasma divulgatum (archaea)* |
| *GCF_900095295.1* | *Methanobacterium congolense (euryarchaeotes)* |
| *GCF_900198835.1* | *Thermococcus henrietii (euryarchaeotes)* |
| *GCF_900248165.1* | *Candidatus Nitrosocaldus cavascurensis (archaea)* |
| *GCF_900696045.1* | *Candidatus Nitrosocosmicus franklandus (archaea)* |
| *GCF_902383905.1* | *Candidatus Methanomassiliicoccus intestinalis (archaea)* |
| *GCF_902384015.1* | *Methanosphaera stadtmanae (euryarchaeotes)* |
| *GCF_902387285.1* | *Methanomethylophilus alvi (archaea)* |
| *GCF_902813195.1* | *Thermococcus sp. 2319x1 (euryarchaeotes)* |
| *GCF_902827225.1* | *Methanocaldococcus lauensis (euryarchaeotes)* |
| *GCF_904067545.1* | *Thermococcus camini (euryarchaeotes)* |
| *GCF_946463545.1* | *Methanothermococcus thermolithotrophicus DSM 2095 (euryarchaeotes)* |