***Supplementary Material***

**Figure S1.** The MDS shows the distribution of Muierilor Cave samples based on their chemical composition. The sediment samples (PM7 and PM11) are separated from the crust samples (PMW and PMB). Kruskal's stress (1) = 0.069.



**Figure S2.** XRD results. (A) X-ray diffraction pattern for PM7 sample with derived quantitative analysis shown in the pie chart. (B) X-ray diffraction pattern for PM11 sample with derived quantitative analysis shown in the pie chart.

**Table S1**. Identified bacteria in sediment and crust samples of Muierilor Cave: bold = first mention in a cave, grey = previously mentioned in bats, guano, and caves or are human related; red = pathogenic potential. References for this table are presented below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Genus** | **Samples** | **Human-related** | **Bats** | **Guano** | **Cave** |
| **PM7** | **PM11** | **PMW** | **PMB** |
| ***[Eubacterium] oxidoreducens group*** |  |  |  |  |  |  |  |
| ***[Ruminococcus] gnavus group*** |  |  |  |  |  |  |  |
| ***966-1*** |   |   |  |   |  |  |  |  |
| ***Abiotrophia*** |  |  |   |  |  |  |  |  |
| ***Achromobacter*** |  |  |   |  |  |  |  |  |
| ***Acidothermus*** |  |  |   |  |  |  |  |  |
| ***Acidovorax*** |   |   |   |   |  |  |  |   |
| *Acinetobacter* |   |   |   |   |  |  |  |   |
| *Actinomyces* |  |  |   |  |  |  |   |   |
| ***Actinophytocola*** |  |  |   |   |  |  |  |  |
| ***Actinorectispora*** |   |   |  |  |  |  |  |  |
| ***Adhaeribacter*** |   |   |   |   |  |  |  |  |
| ***ADurb.Bin063-1*** |  |   |  |  |  |  |  |  |
| ***Aeromicrobium*** |  |  |   |   |  |  |  |  |
| *Aeromonas* |  |   |   |  |  |  |   |  |
| ***Aetherobacter*** |   |   |  |   |  |  |  |  |
| ***Afipia*** |   |   |  |   |  |  |  |  |
| ***Agromyces*** |   |   |  |   |  |  |  |  |
| ***Ahniella*** |   |   |   |   |  |  |  |  |
| ***AKYG587*** |   |   |   |   |  |  |  |  |
| ***Alkanindiges*** |   |   |   |  |  |  |  |  |
| ***Alloprevotella*** |  |  |   |  |  |  |  |  |
| ***Allorhizobium-Neorhizobium-Pararhizobium-Rhizobium*** |   |  |   |   |  |  |  |  |
| ***Amaricoccus*** |   |   |  |   |  |  |  |  |
| ***Aminobacter*** |   |   |  |   |  |  |  |  |
| ***Amphiplicatus*** |   |   |  |  |  |  |  |  |
| ***Anaerococcus*** |  |   |   |  |  |  |  |  |
| ***Anaerocolumna*** |   |  |  |  |  |  |  |  |
| ***Anaeromyxobacter*** |   |   |   |  |  |  |  |  |
| ***Aphanizomenon NIES81*** |  |   |  |  |  |  |  |
| ***Aquabacterium*** |   |  |   |  |  |  |  |  |
| ***Aquicella*** |   |   |   |   |  |  |  |  |
| ***Arenimonas*** |   |  |   |   |  |  |  |  |
| ***Arsenicitalea*** |   |   |  |  |  |  |  |  |
| ***Arthrobacter*** |   |   |  |   |  |  |  |  |
| *Asanoa* |   |  |  |  |  |   |  |  |
| ***Atopostipes*** |  |   |   |  |  |  |  |  |
| ***Aurantisolimonas*** |   |  |   |  |  |  |  |  |
| ***Aureibacillus*** |  |  |   |  |  |  |  |  |
| ***Aureimonas*** |  |  |   |  |  |  |  |  |
| ***Bacillus*** |   |   |   |   |  |  |  |  |
| ***Bacteriovorax*** |   |   |  |   |  |   |   |   |
| ***Bacteroides*** |  |   |   |   |  |  |  |  |
| ***Bauldia*** |   |   |  |   |  |  |  |  |
| ***BD1-7 clade*** |   |  |  |  |  |  |  |  |
| ***Bdellovibrio*** |   |   |   |   |  |  |  |  |
| ***Blastocatella*** |   |  |  |  |  |  |  |  |
| ***Blastopirellula*** |   |  |   |  |  |  |  |  |
| ***Bosea*** |   |   |   |   |  |  |  |  |
| ***Bradyrhizobium*** |  |   |   |   |  |  |  |  |
| ***Brevundimonas*** |   |   |  |   |  |  |  |  |
| ***Brochothrix*** |  |   |  |  |  |  |  |   |
| ***Bryobacter*** |   |   |   |   |  |  |  |  |
| ***Buchnera*** |  |  |   |  |  |  |  |  |
| ***Bythopirellula*** |   |  |   |   |  |  |  |  |
| ***Calorithrix*** |  |  |   |  |  |  |  |  |
| ***Campylobacter*** |  |  |   |  |  |  |  |  |
| ***Candidatus Alysiosphaera*** |   |   |  |   |  |  |  |   |
| ***Candidatus Arcanobacter*** |   |  |  |  |  |  |  |
| ***Candidatus Berkiella*** |   |  |   |  |  |  |  |  |
| ***Candidatus Chloroploca*** |  |   |  |  |  |  |  |
| ***Candidatus Methylomirabilis*** |   |   |  |   |  |  |  |  |
| ***Candidatus Midichloria*** |   |  |  |  |  |  |  |
| ***Candidatus Nucleicultrix*** |  |   |  |  |  |  |  |
| ***Candidatus Omnitrophus*** |   |   |   |   |  |  |  |  |
| ***Candidatus Ovatusbacter*** |   |   |   |   |  |  |  |  |
| ***Candidatus Paracaedibacter*** |   |   |  |   |  |  |  |  |
| ***Candidatus Protochlamydia*** |   |   |   |   |  |  |  |  |
| ***Candidatus Solibacter*** |   |   |   |   |  |  |  |  |
| ***Candidatus Trichorickettsia*** |   |  |  |  |  |  |  |
| ***Candidatus Xiphinematobacter*** |   |   |   |   |  |  |  |  |
| ***Capnocytophaga*** |  |   |   |  |  |  |  |  |
| ***Catonella*** |  |  |   |  |  |  |  |  |
| ***Caulobacter*** |   |  |  |   |  |  |  |  |
| ***Cavicella*** |   |   |  |   |  |  |  |  |
| ***Cellulomonas*** |  |  |   |  |  |  |  |  |
| ***Cellvibrio*** |  |  |   |  |  |  |  |  |
| ***Cereibacter*** |   |   |   |   |  |  |  |  |
| ***Chryseobacterium*** |  |   |   |   |  |  |  |  |
| ***Chryseolinea*** |   |   |   |   |  |  |  |  |
| ***Chthoniobacter*** |   |   |   |   |  |  |  |  |
| ***Chthonomonas*** |  |   |  |  |  |  |  |  |
| ***Chujaibacter*** |  |   |  |  |  |  |  |  |
| ***CL500-29 marine group*** |   |  |   |   |  |  |  |  |
| ***Cloacibacterium*** |  |  |   |  |  |  |  |  |
| *Clostridium sensu stricto 1* |   |   |  |   |  |  |  |  |
| *Clostridium sensu stricto 13* |   |  |  |  |  |  |   |  |
| *Clostridium sensu stricto 5* |   |  |  |  |  |  |   |  |
| *Clostridium sensu stricto 9* |   |  |  |  |  |  |   |  |
| *Cohnella* |   |   |   |   |  |  |   |  |
| ***Comamonas*** |  |  |   |  |  |  |  |  |
| ***Commensalibacter*** |  |  |   |  |  |  |  |   |
| ***Conexibacter*** |   |   |   |   |  |  |  |  |
| ***Conyzicola*** |   |   |   |   |  |  |  |  |
| ***Corallococcus*** |   |   |  |  |  |  |  |  |
| ***Corynebacterium*** |  |   |   |  |  |  |  |  |
| ***Coxiella*** |   |   |   |   |  |  |  |  |
| ***Crossiella*** |  |  |   |   |  |  |  |  |
| *Cupriavidus* |  |   |   |  |  |  |  |   |
| *Cutibacterium* |   |   |   |   |  |  |  |   |
| ***Deefgea*** |   |  |  |  |  |  |  |  |
| ***Defluviimonas*** |   |   |  |  |  |  |  |  |
| ***Delftia*** |  |   |   |  |  |  |  |  |
| ***Dermacoccus*** |  |   |   |   |  |  |  |  |
| ***DEV114*** |  |   |  |  |  |  |  |  |
| ***Devosia*** |   |   |   |   |  |  |  |  |
| ***Dinghuibacter*** |   |   |  |  |  |  |  |   |
| ***Dokdonella*** |  |   |  |  |  |  |  |  |
| ***Domibacillus*** |   |  |  |   |  |  |  |  |
| ***Dongia*** |   |   |   |   |  |  |  |  |
| ***Duganella*** |  |  |   |  |  |  |  |  |
| ***Dyadobacter*** |   |   |  |   |  |  |  |  |
| ***Edaphobaculum*** |  |  |  |   |  |  |  |  |
| ***Eikenella*** |  |  |   |  |  |  |  |  |
| ***Ellin6055*** |   |  |  |   |  |  |  |  |
| ***Ellin6067*** |   |   |   |   |  |  |  |  |
| ***Enhydrobacter*** |   |   |   |   |  |  |  |  |
| ***Enterobacter*** |  |   |   |   |  |  |  |  |
| *Enterococcus* |  |  |   |  |  |   |   |   |
| ***Epulopiscium*** |  |  |  |  |  |   |   |  |
| ***Erysipelotrichaceae UCG-003*** |   |  |  |  |  |  |  |
| *Escherichia-Shigella* |  |  |   |  |  |   |   |  |
| ***Faecalibacterium*** |  |  |   |   |  |  |  |  |
| ***Ferruginibacter*** |   |   |   |  |  |  |  |  |
| ***Fimbriiglobus*** |   |   |   |   |  |  |  |  |
| ***Flavihumibacter*** |   |   |  |   |  |  |  |  |
| *Flavobacterium* |   |   |   |   |  |  |  |   |
| ***Fonticella*** |   |  |  |  |  |  |  |  |
| ***Frederiksenia*** |  |   |  |  |  |  |  |  |
| ***Friedmanniella*** |  |   |   |  |  |  |  |  |
| ***Frondihabitans*** |   |   |  |   |  |  |  |  |
| ***Fusobacterium*** |  |  |   |   |  |  |  |  |
| ***Ga0074140*** |   |   |   |  |  |  |  |  |
| *Gaiella* |   |   |   |   |  |  |  |   |
| ***Galbitalea*** |  |  |   |  |  |  |  |  |
| ***Gemella*** |  |  |   |  |  |  |  |  |
| ***Gemmata*** |   |   |   |   |  |  |  |  |
| ***Gemmatimonas*** |   |   |  |   |  |  |  |  |
| ***Gemmobacter*** |  |  |   |  |  |  |  |  |
| ***Glutamicibacter*** |  |  |   |  |  |  |  |  |
| ***Gracilibacillus*** |  |   |   |  |  |  |  |  |
| ***Granulicatella*** |  |  |   |  |  |  |  |  |
| ***Haemophilus*** |  |  |   |   |  |  |  |  |
| ***Haliangium*** |   |   |   |   |  |  |  |  |
| ***Halobacillus*** |  |  |   |  |  |  |  |  |
| ***Haloechinothrix*** |  |   |  |  |  |  |  |  |
| ***Halomonas*** |  |  |   |  |  |  |  |  |
| ***Hassallia*** |   |  |   |   |  |  |  |  |
| *Herbaspirillum* |  |   |   |  |  |  |  |   |
| ***Herbiconiux*** |  |  |   |  |  |  |  |  |
| ***Hirschia*** |   |   |  |  |  |  |  |  |
| ***HSB OF53-F07*** |  |   |  |  |  |  |  |  |
| ***Hydrogenophaga*** |  |  |   |   |  |  |  |   |
| *Hyphomicrobium* |   |   |  |   |  |  |  |   |
| ***Iamia*** |   |   |   |   |  |  |  |  |
| ***Ilumatobacter*** |   |   |   |  |  |  |  |  |
| ***IMCC26207*** |   |   |   |  |  |  |  |  |
| ***Intrasporangium*** |   |  |   |   |  |  |  |  |
| ***IS-44*** |   |   |   |   |  |  |  |  |
| *Janthinobacterium* |   |   |  |   |  |  |  |   |
| ***Jatrophihabitans*** |  |  |   |   |  |  |  |  |
| ***JdFR-76*** |   |   |   |   |  |  |  |  |
| ***Jeongeupia*** |   |  |  |  |  |  |  |  |
| ***JGI 0001001-H03*** |   |   |   |   |  |  |  |  |
| ***Kaistia*** |   |  |  |  |  |  |  |  |
| ***Kineosporia*** |  |   |   |  |  |  |  |  |
| ***Kingella*** |  |  |   |  |  |  |  |  |
| ***Klenkia*** |  |  |   |  |  |  |  |  |
| ***Knoellia*** |   |   |  |   |  |  |  |  |
| *Kocuria* |  |   |   |  |  |  |  |   |
| ***Kribbella*** |  |  |  |   |  |  |  |   |
| ***Lachnoclostridium*** |  |  |   |   |  |  |  |  |
| ***Lacibacter*** |   |  |  |  |  |  |  |  |
| *Lactobacillus* |   |  |   |   |  |   |   |  |
| ***Lacunisphaera*** |   |  |   |  |  |  |  |  |
| ***Lapillicoccus*** |  |   |  |  |  |  |  |  |
| ***Latilactobacillus*** |  |   |  |  |  |  |  |  |
| ***Lawsonella*** |  |   |   |  |  |  |  |  |
| ***LD29*** |   |   |   |   |  |  |  |  |
| ***Legionella*** |   |   |   |   |  |  |  |  |
| ***Leptospirillum*** |   |   |  |  |  |  |  |  |
| *Leptothrix* |   |  |  |  |  |  |  |   |
| ***Leucobacter*** |  |   |  |  |  |  |  |  |
| ***Litorilinea*** |   |   |  |   |  |  |  |  |
| ***Longispora*** |  |  |   |   |  |  |  |  |
| ***Luedemannella*** |   |   |  |   |  |  |  |  |
| ***Luteimonas*** |  |  |   |   |  |  |  |  |
| ***Luteitalea*** |   |   |   |   |  |  |  |  |
| ***Luteococcus*** |  |   |  |  |  |  |  |  |
| *Luteolibacter* |   |   |   |   |  |  |  |  |
| *Lysinibacillus* |   |   |  |   |  |  |   |  |
| ***Lysinimonas*** |  |   |   |  |  |  |  |  |
| *Lysobacter* |   |   |   |   |  |  |  |   |
| ***Marinomonas*** |  |  |   |  |  |  |  |  |
| ***Marmoricola*** |   |   |  |   |  |  |  |  |
| *Massilia* |   |   |   |   |  |  |  |   |
| ***Mesorhizobium*** |  |  |   |   |  |  |  |  |
| ***Methylobacterium-Methylorubrum*** |   |   |  |  |  |  |  |
| ***Methylocapsa*** |   |   |   |   |  |  |  |  |
| *Methylocella* |  |   |   |  |  |  |  |   |
| ***Methylotenera*** |   |  |  |  |  |  |  |  |
| ***Methylovirgula*** |  |   |   |  |  |  |  |  |
| *Microbacterium* |  |  |   |  |  |  |   |  |
| *Micrococcus* |  |   |   |   |  |   |   |   |
| ***Microlunatus*** |   |   |  |   |  |  |  |  |
| ***Microvirga*** |   |   |  |   |  |  |  |  |
| ***MIZ17*** |   |   |   |  |  |  |  |  |
| ***mle1-7*** |   |   |   |   |  |  |  |  |
| ***MND1*** |   |   |   |   |  |  |  |  |
| ***Mucilaginibacter*** |  |  |   |  |  |  |  |  |
| ***Mycobacterium*** |   |   |   |   |  |  |  |  |
| ***Myxococcus*** |   |  |  |  |  |  |  |  |
| ***Nakamurella*** |  |   |   |   |  |  |  |  |
| ***Nannocystis*** |   |   |   |   |  |  |  |  |
| ***Neisseria*** |  |  |   |  |  |  |  |  |
| ***Neochlamydia*** |   |   |   |   |  |  |  |  |
| *Nitrosomonas* |   |   |  |   |  |  |  |   |
| ***Nitrosospira*** |   |   |   |   |  |  |  |  |
| *Nitrospira* |   |   |   |   |  |  |  |   |
| ***NK4A214 group*** |  |  |   |  |  |  |  |  |
| *Nocardia* |   |   |  |   |  |   |  |  |
| ***Nocardioides*** |   |   |   |   |  |  |  |  |
| ***Nordella*** |   |   |   |   |  |  |  |  |
| ***Noviherbaspirillum*** |   |  |  |   |  |  |  |  |
| ***Novosphingobium*** |   |   |   |   |  |  |  |   |
| ***Oceanicella*** |   |   |  |   |  |  |  |  |
| ***Oerskovia*** |   |  |  |  |  |  |  |  |
| ***Ohtaekwangia*** |  |  |   |  |  |  |  |  |
| ***Oikopleura*** |  |   |  |   |  |  |  |  |
| ***OLB12*** |   |  |  |  |  |  |  |  |
| ***OLB13*** |  |   |  |  |  |  |  |  |
| ***OLB17*** |   |  |   |   |  |  |  |  |
| ***Oligoflexus*** |   |  |   |  |  |  |  |  |
| ***OM27 clade*** |   |   |   |   |  |  |  |  |
| ***OM60(NOR5) clade*** |   |   |  |   |  |  |  |  |
| ***Opitutus*** |   |   |   |   |  |  |  |  |
| ***Oxalicibacterium*** |   |   |   |   |  |  |  |  |
| ***P3OB-42*** |   |   |   |   |  |  |  |  |
| *Paenibacillus* |   |   |   |   |  |  |   |   |
| ***Paeniclostridium*** |   |   |  |  |  |  |  |  |
| ***Paeniglutamicibacter*** |   |   |   |   |  |  |  |  |
| ***Paenisporosarcina*** |   |   |   |   |  |  |  |  |
| ***Pajaroellobacter*** |   |   |  |   |  |  |  |  |
| *Pantoea* |  |  |   |  |  |   |   |   |
| *Paracoccus* |  |   |   |  |  |  |  |   |
| ***Paucibacter*** |  |  |   |  |  |  |  |  |
| ***Pedobacter*** |   |   |   |   |  |  |  |   |
| ***Pedococcus-Phycicoccus*** |  |   |   |  |  |  |  |
| ***Pedomicrobium*** |   |   |   |   |  |  |  |  |
| ***Pelomonas*** |  |  |   |  |  |  |  |  |
| ***Pelosinus*** |   |  |  |  |  |  |  |  |
| ***Peptoniphilus*** |  |  |   |  |  |  |  |  |
| ***Peptostreptococcus*** |  |  |   |  |  |  |  |  |
| ***Peredibacter*** |   |   |   |   |  |  |  |  |
| ***Phaselicystis*** |   |   |  |   |  |  |  |  |
| ***Phenylobacterium*** |  |  |   |   |  |  |  |  |
| ***Phreatobacter*** |   |   |  |   |  |  |  |  |
| ***Phycisphaera*** |  |  |   |  |  |  |  |  |
| ***Phyllobacterium*** |  |  |   |  |  |  |  |  |
| ***Pir4 lineage*** |   |   |   |   |  |  |  |  |
| ***Pirellula*** |   |   |   |   |  |  |  |  |
| ***Piscinibacter*** |  |   |  |   |  |  |  |  |
| ***Planctomicrobium*** |   |   |   |  |  |  |  |  |
| ***Planctopirus*** |   |   |   |   |  |  |  |  |
| ***Planktothrix NIVA-CYA 15*** |  |   |  |  |  |  |  |
| ***Planomonospora*** |  |   |  |   |  |  |  |  |
| ***Plasticicumulans*** |  |   |  |  |  |  |  |  |
| ***Pleomorphomonas*** |  |  |   |  |  |  |  |  |
| *Polaromonas* |   |   |   |   |  |  |  |   |
| ***Polycyclovorans*** |   |   |   |   |  |  |  |  |
| ***Porphyromonas*** |  |  |   |  |  |  |  |  |
| *Prevotella* |  |  |   |  |  |  |  |   |
| *Prevotella\_7* |  |  |   |  |  |  |  |   |
| ***Pseudaminobacter*** |   |   |   |   |  |  |  |  |
| ***Pseudarthrobacter*** |   |   |   |   |  |  |  |  |
| ***Pseudenhygromyxa*** |  |  |   |  |  |  |  |  |
| ***Pseudoalteromonas*** |  |  |   |  |  |  |  |  |
| *Pseudomonas* |   |   |   |   |  |   |   |   |
| *Pseudonocardia* |   |   |  |   |  |  |  |   |
| ***Pseudorhodobacter*** |   |  |   |  |  |   |  |  |
| ***Pseudorhodoplanes*** |   |  |   |   |  |  |  |  |
| ***Pseudoxanthomonas*** |   |   |   |   |  |  |  |  |
| ***Psychrobacillus*** |   |   |  |   |  |  |  |  |
| ***Psychrobacter*** |  |   |   |  |  |  |  |  |
| ***Psychromonas*** |  |  |   |  |  |  |  |  |
| *Rahnella1* |  |  |   |  |  |  |   |  |
| *Ralstonia* |  |   |   |  |  |  |  |   |
| ***Ramlibacter*** |   |   |  |  |  |  |  |  |
| ***Rathayibacter*** |  |  |   |  |  |  |  |  |
| ***RB41*** |   |   |   |   |  |  |  |  |
| ***Reyranella*** |   |   |   |   |  |  |  |  |
| ***Rheinheimera*** |  |  |   |  |  |  |  |  |
| ***Rhizobacter*** |   |   |   |   |  |  |  |  |
| ***Rhizorhapis*** |   |   |  |  |  |  |  |  |
| ***Rhodobaculum*** |   |   |  |  |  |  |  |  |
| *Rhodococcus* |   |   |   |   |  |   |   |   |
| *Rhodoferax* |   |  |   |  |  |  |  |   |
| ***Rhodomicrobium*** |   |   |  |   |  |  |  |  |
| ***Rhodopirellula*** |   |  |   |   |  |  |  |  |
| ***Rhodoplanes*** |  |   |  |  |  |  |  |  |
| ***Rickettsiella*** |   |  |  |   |  |  |  |  |
| ***Romboutsia*** |   |  |  |  |  |  |  |  |
| ***Roseimicrobium*** |  |  |   |   |  |  |  |  |
| ***Roseobacter clade CHAB-I-5 lineage*** |   |  |  |  |  |  |
| ***Roseomonas*** |  |  |   |   |  |  |  |  |
| ***Rothia*** |  |  |   |  |  |  |  |  |
| ***Rubellimicrobium*** |   |   |   |  |  |  |  |  |
| ***Rubrivivax*** |  |  |   |   |  |  |  |  |
| ***Rubrobacter*** |  |   |   |  |  |  |  |   |
| ***Rugamonas*** |   |  |  |  |  |  |  |  |
| ***Salinispora*** |  |   |  |  |  |  |  |  |
| ***Sandaracinus*** |  |   |  |   |  |  |  |  |
| ***Schlesneria*** |  |  |   |  |  |  |  |  |
| ***Serinibacter*** |  |  |   |  |  |  |  |  |
| ***SH3-11*** |  |   |  |  |  |  |  |  |
| ***Shinella*** |   |   |  |   |  |  |  |  |
| ***SH-PL14*** |   |   |   |   |  |  |  |  |
| ***Silvanigrella*** |   |  |   |  |  |  |  |  |
| ***Simplicispira*** |  |  |   |  |  |  |  |  |
| ***Singulisphaera*** |   |   |  |  |  |  |  |  |
| ***SM1A02*** |   |   |   |  |  |  |  |  |
| ***Solibacillus*** |   |   |  |   |  |  |  |  |
| ***Solirubrobacter*** |   |   |  |   |  |  |  |  |
| ***Solitalea*** |   |   |   |   |  |  |  |  |
| ***Sorangium*** |  |   |  |   |  |  |  |  |
| *Sphingobacterium* |  |  |   |  |  |  |  |   |
| ***Sphingobium*** |   |   |   |  |  |  |  |  |
| *Sphingomonas* |   |   |   |   |  |  |  |   |
| ***Sphingopyxis*** |   |   |   |   |  |  |  |   |
| ***Sphingorhabdus*** |   |  |  |   |  |  |  |  |
| ***Sphingosinicella*** |   |   |   |   |  |  |  |  |
| ***Sporichthya*** |  |  |   |  |  |  |  |  |
| ***Sporocytophaga*** |   |   |  |   |  |  |  |  |
| *Sporosarcina* |   |   |   |   |  |  |  |   |
| *Staphylococcus* |  |   |   |   |  |   |   |  |
| ***Stenotrophobacter*** |   |  |   |  |  |  |  |  |
| *Stenotrophomonas* |  |   |   |  |  |  |  |   |
| *Steroidobacter* |   |   |   |   |  |  |  |   |
| *Streptococcus* |  |   |   |   |  |   |   |  |
| *Streptomyces* |   |  |  |   |  |  |   |   |
| ***Subgroup 10*** |   |   |   |   |  |  |  |  |
| *Sulfurifustis* |   |   |  |   |  |  |  |   |
| ***Sumerlaea*** |   |  |   |  |  |  |  |  |
| ***SWB02*** |   |   |  |   |  |  |  |  |
| ***Tabrizicola*** |  |  |   |  |  |  |  |  |
| ***Tepidimonas*** |  |  |   |  |  |  |  |  |
| ***Terrimicrobium*** |  |   |   |  |  |  |  |  |
| ***Terrimonas*** |   |   |   |   |  |  |  |  |
| ***Thermomonas*** |   |   |   |  |  |  |  |  |
| ***Thioalkalimicrobium*** |  |  |   |  |  |  |  |  |
| *Thiobacillus* |   |   |  |  |  |  |  |   |
| ***TM7a*** |   |   |   |   |  |  |  |  |
| ***Tomitella*** |   |   |  |   |  |  |  |  |
| ***Treponema*** |  |  |   |  |  |  |  |  |
| ***Tumebacillus*** |  |   |  |  |  |  |  |  |
| ***Tundrisphaera*** |  |  |   |  |  |  |  |  |
| ***Urania-1B-19 marine sediment group*** |   |   |  |  |  |  |
| ***UTBCD1*** |   |  |  |   |  |  |  |  |
| ***UTCFX1*** |   |   |   |   |  |  |  |  |
| *Variovorax* |  |   |  |   |  |  |  |   |
| ***Veillonella*** |  |  |   |  |  |  |  |  |
| ***Verrucomicrobium*** |  |   |   |  |  |  |  |  |
| ***Vibrio*** |  |   |   |  |  |  |  |  |
| *Vicinamibacter* |  |   |  |  |  |  |  |   |
| ***Virgibacillus*** |  |  |   |  |  |  |  |  |
| ***Vulgatibacter*** |   |   |  |  |  |  |  |  |
| ***wb1-A12*** |   |   |   |   |  |  |  |  |
| *wb1-P19* |   |   |   |   |  |  |  |   |
| *Weissella* |  |   |  |   |  |  |   |  |
| ***Woeseia*** |   |   |   |   |  |  |  |  |
| ***Youhaiella*** |   |  |  |  |  |  |  |  |

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