**Supplementary Table S1** Characteristics of microbial isolates obtained from the deep-sea hydrothermal vent environment

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Taxon | Type strain | Isolation site | Opt T(°C) | Electron  donor(s) | Electron acceptor(s) | Carbon source | References |
| Bacteria |  |  |  |  |  |  |  |
| Aquificae |  |  |  |  |  |  |  |
| *Balnearium lithotrophicum* | 17S | Chimney, Izu-Bonin Arc, Japan | 70-75 | Hydrogen | Elemental sulfur | Carbon dioxide | (Takai et al. 2003) |
| *Desulfurobacterium indicum* | K6013 | Sulfides, Indian ridge | 65 | Hydrogen | Thiosulfate, sulfur, and nitrate | Carbon dioxide | (Cao et al. 2017) |
| *Desulfurobacterium atlanticum* | SL22 | Chimney, Mid-Atlantic Ridge | 70-75 | Hydrogen | Thiosulfate, nitrate | Carbon dioxide | (Lharidon et al. 2006) |
| *Desulfurobacterium crinifex* | NE1206 | Animal (Tube worm), Juan de Fuca Ridge | 60–65 | Hydrogen | Sulfur, nitrate | Carbon dioxide | (Alain et al. 2003) |
| *Desulfurobacterium pacificum* | SL17 | Chimney, Guaymas Basin | 75 | Hydrogen | Sulfur, thiosulphate and nitrate | Carbon dioxide | (Lharidon et al. 2006) |
| *Desulfurobacterium*  *thermolithotrophum* | BSA | Chimney, mid-Atlantic ridge | 70 | Hydrogen | Elemental sulfur, thiosulphate, sulphite | Carbon dioxide | (Lharidon et al. 1998) |
| *Hydrogenivirga okinawensis* | LS12-2 | Chimney, Southern Okinawa Trough | 70-75 | Elemental sulfur, thiosulfate | Nitrate, oxygen | Carbon dioxide | (Nunoura et al. 2008a) |
| *Persephonellamarina* | EX-H1 | Chimney, East Pacific rise | 73 | Elemental sulfur, thiosulfate, hydrogen | Nitrate, oxygen | Carbon dioxide | (Gotz et al. 2002) |
| *Persephonella guaymasensis* | EX-H2 | Chimney, Guaymas Basin | 70 | Elemental sulfur, thiosulfate, hydrogen | Nitrate, oxygen | Carbon dioxide | (Gotz et al. 2002) |
| *Persephonella hydrogeniphila* | 29W | Chimney, Izu-Bonin Arc | 70 | Hydrogen, elemental sulfur | Nitrate, oxygen | Carbon dioxide | (Nakagawa et al. 2003) |
| *Thermovibrio guaymasensis* | SL19 | Chimney, Guaymas Basin | 75-80 | Hydrogen | Sulfur, nitrate | Carbon dioxide | (Lharidon et al. 2006) |
| *Thermovibrio ammonificans* | HB-1 | Chimney, East Pacific Rise | 75 | Hydrogen | Nitrate, sulfur | Carbon dioxide | (Vetriani et al. 2004) |
| *Thermosulfidibactertakaii* | ABI70S6 | *In situ* colonization system in sediments, Southern Okinawa Trough. | 70 | Hydrogen | Elemental sulfur | Carbon dioxide | (Nunoura et al. 2008b) |
| Calditrichaeota |  |  |  |  |  |  |  |
| *Caldithrixabyssi* | LF13 | Chimney, Mid Atlantic Ridge. | 60 | Hydrogen, acetate | Nitrate | Carbon dioxide,  proteinaceous substrates | (Miroshnichenko et al. 2003b) |
| Campylobacterota |  |  |  |  |  |  |  |
| *Caminibacter hydrogeniphilus* | AM1116 | Animal (Pompeii worm), East Pacific Rise | 60 | Hydrogen | Elemental sulfur, nitrate | Carbon dioxide | (Alain et al. 2002a) |
| *Caminibacter mediatlanticus* | TB-2 | Chimney, Mid-Atlantic Ridge | 55 | Hydrogen | Elemental sulfur,nitrate | Carbon dioxide | (Voordeckers et al. 2005) |
| *Caminibacter profundus* | CR | In situ growth chamber or vent cap, Mid-Atlantic Ridge | 55 | Hydrogen | Sulfur, nitrate,oxygen | Carbon dioxide | (Miroshnichenko et al. 2004) |
| *Cetia pacifica* | TB-6 | Chimney, East Pacific Rise | 55-60 | Hydrogen | Elemental sulfur and nitrate | Carbon dioxide | (Grosche et al. 2015) |
| *Hydrogenimonas thermophila* | EP1-55-1% | *In-situ* colonization system in Fluids, Central Indian Ridge | 55 | Hydrogen | Molecular oxygen, nitrate, elemental sulfur | Carbon dioxide | (Takai et al. 2004b) |
| *Lebetimonas acidiphila* | Pd55 | In situ colonization system in a diffusing flow, Mariana Arc. | 50 | Hydrogen | Elemental sulfur | Carbon dioxide | (Takai et al. 2005) |
| *Lebetimonas natsushimae* | HS1857 | Animal (polychaetes), Mid-Okinawa Trough | 55 | Hydrogen, formate | Elemental sulfur, nitrate, selenate | Carbon dioxide | (Nagata et al. 2017) |
| *Nautilia abyssi* | PH1209 | Chimney, East Pacific Rise | 60 | Hydrogen, peptone, and yeast extract | Elemental sulfur | Carbon dioxide | (Alain et al. 2009) |
| *Nautilia lithotrophica* | 525 | Chimney, East Pacific Rise | 53 | Hydrogen, formate | Elemental sulfur | Carbon dioxide | (Miroshnichenko et al. 2002) |
| *Nautilia nitratireducens* | MB-1 | Chimney, East Pacific Rise | 55 | Hydrogen, organic acids, sugar, yeast extract | Nitrate, thiosulfate, sulfur, selenate | Carbon dioxide | (Perezrodriguez et al. 2010) |
| *Nautilia profundicola* | AmH | Animal(Tube worm), East Pacific Rise | 40 | Hydrogen, formate | Elemental sulfur | Carbon dioxide | (Smith et al. 2008)) |
| *Nitratiruptor tergarcus* | MI55-1 | Chimney, Mid-Okinawa Trough | 55 | Hydrogen | Nitrate, sulfur, oxygen (low concentrations) | Carbon dioxide | (Nakagawa et al. 2005) |
| *Nitratifractor salsuginis* | E9I37-1 | Chimney, Mid-Okinawa Trough | 37 | Hydrogen | Nitrate, sulfur, oxygen (low concentrations) | Carbon dioxide | (Nakagawa et al. 2005) |
| *Sulfurovum lithotrophicum* | 42BK | Sediment, Mid-Okinawa Trough | 28-30 | Elemental sulfur, thiosulfate | Oxygen, nitrate | Carbon dioxide | (Inagaki et al. 2004) |
| *Sulfurovum aggregans* | Monchim33 | Chimney,  Central Indian Ridge | 33 | Hydrogen | Elemental sulfur, nitrate, thiosulfate | Carbon dioxide | (Mino et al. 2014) |
| *Sulfurovum riftiae* | 1812E | Animal(tube worm), East Pacific Rise | 35 | Elemental sulfur, thiosulfate | Nitrate | Carbon dioxide | (Giovannelli et al. 2016) |
| *Sulfurovum denitrificans* | eps51 | Surface rock, Izu-Bonin Arc | 30 | Elemental sulfur, thiosulfate | Oxygen, nitrate | Carbon dioxide | (Mori et al. 2018) |
| *Sulfurimonas autotrophica* | OK10 | Sediment, Mid-Okinawa Trough | 25 | Elemental sulfur, sulfide, thiosulfate | Oxygen | Carbon dioxide | (Inagaki et al. 2003) |
| *Sulfurimonas paralvinellae* | GO25 | Animal (tube worm), Mid-Okinawa Trough | 30 | Hydrogen, sulfur | Nitrate, oxygen (up to 10 %) | Carbon dioxide | (Takai et al. 2006) |
| *Sulfurimonas indica* | NW8N | Chimney,  Carlsberg Ridge | 33 | Elemental sulfur, sulfide, thiosulfate,  hydrogen | Oxygen | Carbon dioxide | (Hu et al.2020) |
| *Thiofractor thiocaminus* | 496Chim | Chimney, Mariana Arc | 37 | Hydrogen | Elemental sulfur | Carbon dioxide | (Makita et al. 2012) |
| Deferribacteres |  |  |  |  |  |  |  |
| *Deferribacter abyssi* | JR | In situ incubation in emission, Mid Atlantic Ridge | 60 | Hydrogen, acetate, succinate, pyruvate, proteinaceous compounds | Elemental sulfur, nitrate, Fe(III) | Complex organic compounds,  amino acids, carbohydrates,  organic acids | (Miroshnichenko et al. 2003a) |
| *Deferribacter autotrophicus* | SL50 | Chimney, Mid Atlantic Ridge | 60 | Hydrogen, acetate, lactate, succinate, pyruvate, proteinaceous compounds | Fe(III), Mn(IV), nitrate | Complex organic compounds,  amino acids, carbohydrates,  organic acids | (Slobodkina et al. 2009a) |
| *Deferribacter desulfuricans* | SSM1 | Chimney, Izu-Bonin Arc, Japan | 60-65 | proteinaceous compounds ethanol, organic acids | Elemental sulfur, nitrate or arsenate | Complex organic compounds,  ethanol, organic acids | (Takai et al. 2003) |
| Deinococcus-Thermus | | | | | | | |
| *Marinithermus hydrothermalis* | T1 | Chimney, Izu-Bonin Arc | 67.5 | proteinaceous substrates, organic acids, amino acids | Oxygen | Proteinaceous substrates,  organic acids, amino acids | (Sako et al. 2003) |
| *Oceanithermus profundus* | 506 | Chimney, East Pacific Rise | 60 | Carbohydrates, peptides, organic acids, alcohols, Hydrogen | Oxygen (<6%), nitrate | Organics | (Miroshnichenko et al. 2003c) |
| *Oceanithermus desulfurans* | St55B | Chimney, Izu-Bonin Arc | 60 | Peptides, amino acids, organic acids | Oxygen (<5%), nitrate, nitrite, Sulfur | Organics | (Mori et al. 2004) |
| *Rhodothermus profundi* | PRI 2902 | Chimney, East Pacific Rise | 70-75 | Proteinaceous substrates, organic acids, amino acids | Oxygen | Organics | (Marteinsson et al. 2010) |
| *Rhabdothermus arcticus* | 2M70-1 | Chimney, Soria Moria vent field in the Norwegian–Greenland Sea | 65 | Complex organic substrates | Oxygen, Nitrate,elemental sulfur | Organics | (Steinsbu et al. 2011) |
| *Thermus thermophilus* | Gy1211 | Chimney, Guaymas Basin | 75 | Proteinaceous substrates, organic acids | Oxygen | Proteinaceous substrates, organic acids | (Marteinsson et al. 1999) |
| *Vulcanithermus mediatlanticus* | TR | Chimney, Mid-Atlantic Ridge | 70 | Peptides, carbohydrates, organic acids, alcohols, Hydrogen | Oxygen (4-8%), nitrate | Organics | (Miroshnichenko et al. 2003d) |
| Firmicutes |  |  |  |  |  |  |  |
| *Anoxybacter fermentans* | DY22613 | Sulfides, East Pacific Rise | 60-62 | Proteinaceous substrates | Elemental sulfur, Fe(III) | Complex organic compounds,  amino acids, sugars ,organic acids | (Zeng et al. 2015b) |
| *Caminicella sporogenes* | AM1114 | Animal (Tube worm), East Pacific Rise | 55-60 | Amino acids, carbohydrates |  | Amino acids, proteinaceous substrates,  carbohydrates | (Alain et al. 2002b) |
| *Caloranaerobacter azorensis* | MV1087 | Chimney, Mid Atlantic Ridge | 55 | Peptides, sugars, polysaccharides |  | Peptides, sugars, polysaccharides | (Wery et al. 2001b) |
| *Caloranaerobacter ferrireducens* | DY22619 | Sulfides, East Pacific Rise | 60 | Proteinaceous substrates | Fe(III) | Complex organic compounds,  amino acids, carbohydrates,  organic acids | (Zeng et al. 2015a) |
| *Desulfohalotomaculum tongense* | TGB60-1 | Sediment, Tofua Arc in the Tonga Trench | 50 | Pyruvate, hydrogen | Sulfate, sulfite, thiosulfate | Complex organic compounds,  amino acids, carbohydrates ,organic acids | (Cha et al. 2013) |
| *Vulcanibacillus modesticaldus* | BR | Sediment, Mid Atlantic Ridge | 55 | Carbohydrates, proteinaceous substrates, organic acids | Nitrate | Organics | (Lharidon et al. 2006) |
| *Wukongibacter baidiensis* | DY30321 | Sulfides, Southwest indian ridge | 30 | Proteinaceous substrates | Fe(III) | Complex organic compounds,  amino acids, sugars,organic acids | (Li et al. 2016) |
| Proteobacteria |  |  |  |  |  |  |  |
| *Alphaproteobacteria* | | | | | | | |
| *Piezobacter thermophilus* | 108 | Chimney, Mid Atlantic Ridge | 50 | Hydrogen, elemental sulfur, thiosulfate, organics matters, organic acids | Nitrate,oxygen | Carbon dioxide ,  proteinaceous substrate,  organic acids | (Takai et al. 2009) |
| *Deltaproteobacteria* | | | | | | | |
| *Deferrisoma camini* | S3R1 | Chimney, Eastern Lau Spreading Centre | 50 | Organics | ferrihydrite, ferric citrate, ferric nitrilotriacetate), elemental sulfur | Organic acids | (Slobodkina et al. 2012) |
| *Desulfovibrio hydrothermalis* | AM13 | Chimney, East Pacific Rise | 35 | Hydrogen, lactate, formate, ethanol, choline, glycerol | Sulfate, sulfite, thiosulfate | Carbon dioxide, organic acids | (Alazard et al.2003) |
| *Desulfonauticus submarinus* | 6N | Animal(Tube worm), East-Pacific Rise | 45 | Hydrogen, formate | Sulfate, sulfite, thiosulfate, elemental sulfur | Carbon dioxide | (Audiffrin et al. 2003) |
| *Desulfothermus okinawensis* | TFISO9 | Chimney, Southern Okinawa Trough | 50 | Organics | sulfate | Organics | (Nunoura et al. 2007a) |
| *Dissulfuribacter thermophilus* | S69 | Chimney, Valu Fa Ridge, Pacific Ocean | 61 | Elemental sulfur, thiosulfate, sulfite | Elemental sulfur, thiosulfate ,sulfite | Bicarbonate, carbon dioxide | (Slobodkin et al. 2013) |
| *Geothermobacter ehrlichii* | ss015 | Fluid, Juan de Fuca Ridge | 55 | Organics | poorly crystalline Fe(III) oxide, nitrate, nitrite | Organic acids | (Kashefi et al. 2003) |
| *Pseudodesulfovibrio indicus* | J2 | Serpentinized peridotite, central Indian ridge | 30-35 | Hydrogen, organic acids | Sulfate, thiosulfate, sulfite, fumarate, nitrate | Organic acids | (Cao et al. 2016) |
| *Gammaproteobacteria* | | | | | | | |
| *Hydrogenovibrio crunogena* | TH-55 | Animal (Tube worm), East Pacific Rise | 25 | Sulfide, thiosulfate, elemental sulfur | Oxygen | Carbon dioxide | (Jannasch et al. 1985) |
| *Hydrogenovibrio thermophilus* | I78 | *In situ* colonization system in a hydrothermal diffusing flow, Mariana Arc | 35-40 | Thiosulfate, elemental sulfur, sulfide | Oxygen | Carbon dioxide, proteinaceous compounds,  carbohydrates, organic acids, amino acids, sugars | (Takai et al. 2004d) |
| *Thiomicrorhabdus indica* | 13-15A | Sea water, northwestern Indian Ridge | 28 | Thiosulfate, sulfide, elemental sulfur, tetrathionate | Oxygen | Carbon dioxide | (Liu et al. 2020) |
| *Thioprofundum lithotrophicum* | 106 | Chimney, Mid Atlantic Ridge | 50 | Elemental sulfur, thiosulfate, tetrathionate, sulfite | Nitrate, oxygen | Carbon dioxide | (Takai et al. 2009) |
| *Thioprofundum hispidum* | gps61 | Surface rock, Suiyo Seamount in Izu-Bonin Arc | 39 | Thiosulfate, sulfur, tetrathionate | Oxygen, nitrate | Carbon dioxide | (Mori et al. 2011) |
| *Thiolapillus brandeum* | Hiromi 1 | Chimney, Okinawa Trough | 40 | Thiosulfate, sulfur, tetrathionate | Oxygen, nitrate | Carbon dioxide | (Nunoura et al. 2014) |
| *Guyparkeria hydrothermalis* | R3 | Chimney, Fiji Basin | 35 | Thiosulphate, tetrathionate, sulfide, sulfur | Oxygen | Carbon dioxide, Proteinaceous compounds,  carbohydrates, organic acids, amino acids, sugars | (Durand et al. 1993) |
| *Salinisphaera hydrothermalis* | EPR70 | Fluids, East Pacific Rise | 30-35 | Thiosulfate, acetate, *n*-alkanes | Oxygen | Carbon dioxide, acetate, *n*-alkanes | (Crespomedina et al. 2009) |
| *Halomonas neptunia* | Eplume1 | HT plume, Juan de Fuca Ridge | 30 | Organics | Oxygen | organics | (Kaye et al. 2004) |
| *Halomonas sulfidaeris* | Esulfide1 | Sulfide rock, Juan de Fuca Ridge | 20-35 | Organics | Oxygen | organics | (Kaye et al. 2004) |
| *Halomonas axialensis* | Althf1 | Low-T HT fluid, Southern East Pacific Rise | 30 | Organics | Oxygen | Organics | (Kaye et al. 2004) |
| *Halomonas hydrothermalis* | Slthf2 | Low-T HT fluid, Southern East Pacific Rise | 20-35 | Organics | Oxygen | Organics | (Kaye et al. 2004) |
| *Vibrio diabolicus* | HE800 | Animal(Tube worm), East Pacific Rise | 40 | Organics | Oxygen | Organics | (Raguénès et al. 1997) |
| *Zetaproteobacteria* |  |  |  |  |  |  |  |
| *Ghiorsea bivora* | TAG-1 | An iron mat, Mid-Atlantic Ridge | 20 | Ferrous iron, hydrogen | Oxygen | Carbon dioxide | (Mori et al. 2017) |
| *Mariprofundus ferrooxydans* | PV-1 | An iron mat, Loihi seamount vent field | 30 | Ferrous iron | Oxygen | Carbon dioxide | (Emerson and Moyer 2002) |
| *Mariprofundus micogutta* | ET2 | Sediment, Izu-Ogasawara arc. | 25 | Ferrous iron | Oxygen | Carbon dioxide | (Emerson et al. 2007) |
| Thermodesulfobacteria | | | | | | | |
| *Thermodesulfatator atlanticus* | AT1325 | Chimney, Mid Atlantic Ridge | 65-70 | Hydrogen | Sulfate | Carbon dioxide, methylamine,  proteinaceous substrates | (Alain et al. 2010) |
| *Thermodesulfatator indicus* | CIR29812 | Chimney, Central Indian Ridge | 70 | Hydrogen | Sulfate | Carbon dioxide | (Moussard et al.2004) |
|  |  |  |  |  |  |  |  |
| *Thermodesulfatator*  *autotrophicus* | S606 | Chimney, Indian ridge | 65-70 | Hydrogen | Sulfate | Carbon dioxide | (Lai et al. 2016) |
| *Thermodesulfobacterium*  *hydrogeniphilum* | SL6 | Sediment, Guaymas Basin | 75 | Hydrogen | Sulfate | Carbon dioxide | (Jeanthon et al. 2002) |
| *Thermosulfurimonas dismutans* | S95 | Chimney, Eastern Lau Spreading Center | 74 | Elemental sulfur, thiosulfate, sulfite | Elemental sulfur, thiosulfate, sulfite | Bicarbonate, carbon dioxide | (Slobodkin et al.2012) |
| *Thermosulfuriphilus ammonigenes* | ST65 | Chimney, Eastern Lau Spreading Center | 65 | Elemental sulfur, thiosulfate, sulfite | Nitrate, elemental sulfur, thiosulfate, sulfite | Bicarbonate, carbon dioxide | (Slobodkina et al. 2017) |
| Thermotogae |  |  |  |  |  |  |  |
| *Marinitoga camini* | MV1075 | Chimney, Mid Atlantic Ridge | 55 | Carbohydrates, proteinaceous substrate | Elemental sulfur  Fe(III) | Carbohydrates, proteinaceous substrate | (Wery et al. 2001a) |
| *Marinitoga piezophila* | KA3 | Chimney, East Pacific Rise | 65 | Carbohydrates, proteinaceous substrate | Elemental sulfur, cystine | carbohydrates, proteinaceous substrate | (Alain et al. 2002) |
| *Marinitoga hydrogenitolerans* | AT1271 | Chimney, Mid Atlantic Ridge. | 60 | Carbohydrates, proteinaceous substrate | Sulfur, thiosulfate, cystine | carbohydrates, proteinaceous substrate | (Postec et al. 2005) |
| *Marinitoga okinawensis* | TFS10-5 | Chimney, Southern Okinawa Trough | 55-65 | Carbohydrates, proteinaceous substrate | Sulfur, cystine | carbohydrates, proteinaceous substrate | (Nunoura et al. 2007b) |
| *Kosmotoga pacifica* | SLHLJ1 | Sediment, Pacific | 70 | Carbohydrates, proteinaceous substrate | Elemental sulfur, L-cystine | carbohydrates, proteinaceous substrate | (L'Haridon et al. 2013) |
| *Thermosipho atlanticus* | DV1140 | Chimney, Mid-Atlantic Ridge. | 65 | Carbohydrates, proteinaceous substrate | Elemental sulfur | carbohydrates, proteinaceous substrate | (Urios et al. 2004) |
| *Thermosipho globiformans* | MN14 | In situ cultivation device in fluids, Izu-Bonin Arc | 68 | Carbohydrates, proteinaceous substrate | Elemental sulfur | carbohydrates, proteinaceous substrate | (Tomohiko et al. 2011) |
| *Thermosipho japonicus* | IHB1 | Chimney, Iheya Basin, Japan | 72 | Carbohydrates, proteinaceous substrate | Elemental sulfur, thiosulfate | proteinaceous substrate | (Takai and Horikoshi 2000) |
| *Thermosipho melanesiensis* | BI429 | Animal(Mussel), Lau Basin | 70 | Carbohydrates, proteinaceous substrate | Elemental sulfur | carbohydrates, proteinaceous substrate | (Antoine et al. 1997) |
| Archaea |  |  |  |  |  |  |  |
| Euryarchaeota |  |  |  |  |  |  |  |
| *Aciduliprofundum boonei* | T469 | Sulfides, Lau basin | 70 | Proteinaceous substrates | Elemental sulfur, sulfate, ferric iron. | Carbon dioxide, organics | (Reysenbach et al. 2006) |
| *Geoglobus ahangari* | 234 | Chimney, Guaymas Basin | 88 | Hydrogen, fatty acids, organic acids, peptides | Ferric iron | Carbon dioxide, organics | (Kashefi et al. 2002) |
| *Geoglobus acetivorans* | SBH6 | Chimney, Mid-Atlantic Ridge | 81 | Hydrogen, fatty acids, organic acids, peptides | Poorly crystalline Fe(III) oxide, Fe(III) citrate | Carbon dioxide, organics | (Slobodkina et al. 2009b) |
|  |  |  |  |  |  |  |  |
| *Methanocaldococcus fervens* | AG86 | Chimney, East Pacific Rise | 85 | Hydrogen | Carbon dioxide | Carbon dioxide | (Jeanthon et al. 1999) |
| *Methanocaldococcus indicus* | SL43 | Chimney, Central Indian Ridge | 85 | Hydrogen | Carbon dioxide | Carbon dioxide | (Lharidon et al. 2003) |
| *Methanocaldococcus infernus* | ME | Chimney, Mid-Atlantic ridge | 85 | Hydrogen | Carbon dioxide | Carbon dioxide | (Jeanthon et al. 1998) |
| *Methanocaldococcus vulcanius* | M7 | Chimney, East Pacific Rise | 80 | Hydrogen | Carbon dioxide | Carbon dioxide | (Bellack et al. 2011) |
| *Methanocaldococcus bathoardescens* | JH146 | Fluid, Axial Seamount, northeastern Pacific Ocean | 82 | Hydrogen | Carbon dioxide | Carbon dioxide | (Stewart et al. 2015) |
| *Methanocaldococcus jannaschii* | JAL-1 | Sediment, East Pacific Rise | 85 | Hydrogen | Carbon dioxide | Carbon dioxide | (Jones et al. 1983) |
| *Methanopyrus kandleri* | AV19 | Chimney, Gulf of California. | 98 | Hydrogen | Carbon dioxide | Carbon dioxide | (Kurr et al. 1991) |
|  | Mc-S-70 | Chimney, Central Indian Ridge. | 75 | Hydrogen, formate | Carbon dioxide | Carbon dioxide | (Takai et al. 2004a) |
| *Methanothermococcus okinawensis* | IH1 | Chimney, Okinawa Trough | 60-65 | Hydrogen, formate | Carbon dioxide | Carbon dioxide | (Takai et al. 2002) |
| *Methanofervidicoccus abyssi* | HHB | Chimney, Mid-Cayman Spreading Center, | 70 | Hydrogen | Carbon dioxide | Carbon dioxide | (Sakai et al. 2019) |
| *Thermococcus guaymasensis* | TYS | Sediment, Guaymas Basin | 88 | Proteinaceous substrates,organic acids | Elemental sulfur | Proteinaceous substrates | (Canganella et al. 1998) |
| *Thermococcus aggregans* | TY | Sediment, Guaymas Basin | 88 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Canganella et al. 1998) |
| *Thermococcus siculi* | RG-20 | Fluid, Mid-Okinawa Trough | 85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Grote et al. 1999) |
| *Thermococcus hydrothermalis* | AL662 | Rock, East Pacific Rise | 85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Godfroy et al. 1997) |
| *Thermococcus gammatolerans* | EJ3 | Chimney, Guaymas Basin | 88 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Jolivet et al. 2003) |
| *Thermococcus marinus* | EJ1 | Chimney, Mid-Atlantic Ridge | 88 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Jolivet et al. 2004) |
| *Thermococcus radiotolerans* | EJ2 | Chimney, Guaymas Basin | 88 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Jolivet et al. 2004) |
| *Thermococcus atlanticus* | MA898 | Chimney, Mid-Atlantic Ridge. | 85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Cambonbonet al. 2003) |
| *Thermococcus peptonophilus* | OG-1 | Fluids, Izu-Bonin fore arc | 85-90 | Proteinaceous substrates, organic acids | elemental sulfur | Proteinaceous substrates | (Gonzalez et al. 1995) |
| *Thermococcus thioreducens* | OGL-20P | Chimney, Mid-Atlantic Ridge | 83-85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Pikuta et al. 2007) |
| *Thermococcus celericrescens* | TS2 | Fluid, Izu-Bonin Arc | 80 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Kuwabara et al. 2007) |
| *Thermococcus barophilus* | MP | Chimney, Mid-Atlantic Ridge | 85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Marteinsson et al. 1999) |
| *Thermococcus eurythermalis* | A501 | Chimney, Guaymas Basin. | 85 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Zhao et al. 2015) |
| *Thermococcus prieurii* | Bio-pl-0405IT2 | Chimney, East Pacific Rise | 80 | Proteinaceous substrates, organic acids | Elemental sulfur,  organic compounds | Proteinaceous substrates | (Gorlas et al. 2013) |
| *Thermococcus paralvinellae* | ES1 | Animal(Tube worm), north-eastern Pacific Ocean | 82 | Proteinaceous substrates,  organic acids | Elemental sulfur | Proteinaceous substrates | (Hensley et al. 2014) |
| *Thermococcus cleftensis* | CL1 | Animal(Tube worm), north-eastern Pacific Ocean | 88 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Hensley et al. 2014) |
| *Thermococcus piezophilus* | CDGS | Chimney, Cayman Trough | 75 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Jolivet et al. 2016) |
| *Thermococcus indicus* | IOH1 | Sediment, Central Indian Ocean ridge. | 80 | proteinaceous substrates, organic acids | Elemental sulfur, Fe(III)-citrate | Proteinaceous substrates | (Lim et al. 2020) |
| *Palaeococcus ferrophilus* | DMJ | Chimney, Ogasawara-Bonin Arc | 80 | proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Takai et al. 2000) |
| *Palaeococcus pacificus* | DY20341 | Sediment, East Pacific Rise | 80 | proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Zeng et al. 2013) |
| *Pyrococcus abyssi* | GE5 | Fluid, North Fiji basin | 96 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Erauso et al. 1993) |
| *Pyrococcus horikoshii* | OT3 | Fluid, Okinawa Trough | 98 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (González et al. 1998) |
| *Pyrococcus glycovorans* | AL585 | Chimney, East Pacific Rise | 95 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Barbier et al. 1999) |
| *Pyrococcus yayanosii* | CH1 | Chimney, Mid-Atlantic Ridge | 95 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Birrien et al. 2011) |
| *Pyrococcus kukulkanii* | NCB100 | Flange, Guaymas basin | 105 | Proteinaceous substrates, organic acids | Elemental sulfur | Proteinaceous substrates | (Callac et al. 2016) |
| Crenarchaeota |  |  |  |  |  |  |  |
| *Aeropyrum camini* | SY1 | Chimney, Izu-Bonin Arc, Japan | 85 | Proteinaceous substrates | Oxygen | Proteinaceous substrates | (Nakagawa et al. 2004) |
| *Geogemma barossii* | 121 | Chimney, Juan de Fuca Ridge | 100 | Hydrogen | Ferric iron | Carbon dioxide | (Kashefi and Lovley 2003) |
| *Ignicoccus pacificus* | lpc33 | Chimney, East Pacific Rise | 90 | Hydrogen | Elemental sulfur | Carbon dioxide | (Huber et al. 2000) |
| *Pyrodictium delaneyi* | Su06 | chimney, north-eastern Pacific Ocean | 90-92 | Hydrogen | Fe(III) oxide, Nitrate | Carbon dioxide | (Lin et al. 2016) |
| *Pyrolobus fumarii* | 1A | Chimney, Mid Atlantic Ridge | 106 | Hydrogen | Nitrate, thiosulfate, oxygen (≤0.3% v/v) | Carbon dioxide | (Blochl et al. 1997) |

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