

**Supplementary Table 1.** Orthologs of PMA1 (orthology group K01535) listed in KEGG.

Code	Organism		K01535 (PMA1)[2937]	Notes
B.Gam E	<i>Citrobacter amalonaticus</i> Y19	cama	F384_26755	Can use citrate as a sole carbon source; Isolated from an anaerobic digester
B.Gam	<i>Pseudomonas triclosanedens</i> ZM23	ptrl	OU419_16645	Able to degrade an emerging pollutant, triclosan.
B.Gam	<i>Acinetobacter equi</i> 114	aei	AOY20_12360	Isolated from faeces of a horse collected in Minsleben (Germany)
B.Gam	<i>Pseudoalteromonas arctica</i> A 37-1-2	part	PARC_b0344	Found in the oceans.
B.Gam	<i>Pseudoalteromonas distincta</i> 16-SW-7	pdv	FFU37_19015	Strictly aerobic strain. Isolated from a seawater sample collected near Island Paramushir (Kuril Islands), the Okhotsk Sea.
B.Gam	<i>Moritella</i> sp. 36	moq	HWV03_02080	Isolated in Te Terina at a depth of 1148m on 18 October, 2017.
B.Gam	<i>Microbulbifer thermotolerans</i> DAU221	mthd	A3224_13140	Cold-adapted; Isolated from the marine sediment samples collected from the eastern coast (35 deg 29.70 min N, 129 deg 26.11 min E) in the Republic of Korea.
B.Gam	<i>Microbulbifer agarilyticus</i> GP101	maga	Mag101_16915	Isolated from the gut of a marine invertebrate <i>Turbo cornutus</i> and capable of degrading polysaccharide such as agar, alginate, and kappa-carrageenan constituting algal cell wall.
B.Gam	<i>Microbulbifer</i> sp. A4B17	mii	BTJ40_19650	Capable of producing secondary metabolites such as 4-hydroxybenzoic acid (4HBA) and esters of 4HBA (parabens). Isolated from an ascidian in the coastal waters of Palau.
B.Gam	<i>Microbulbifer</i> sp. THAF38	mict	FIU95_18410	
B.Gam	<i>Microbulbifer</i> sp. GL-2	micz	GL2_18400	Produces cellulase(s). Isolated from the intestine of a teleost, <i>Girella melanichthys</i> .
B.Gam	<i>Microbulbifer variabilis</i> SCSIO 43006	mvb	MJO52_18635	
B.Gam	<i>Microbulbifer spongiae</i> MI-G	mvpn	M8T91_02450	Aerobic bacterium. Isolated from a sample of marine sponge <i>Diacarnus erythraeanus</i> , collected from mesophotic and shallow reefs in front of the interuniversity institute for marine sciences in Eilat, Israel.
B.Gam	<i>Legionella micdadei</i> ATCC 33218 ( <i>Tatlockia micdadei</i> ATCC 33218)	tmc	LMI_2297	Rarely isolated from humans.
B.Gam	<i>Methylomonas methanica</i> MC09	mmt	Metme_3586	<b>Methanotroph.</b> Mesophilic, halotolerant, aerobic, methanotrophic member of the Gammaproteobacteria. Isolated from a methane enrichment culture inoculated with seawater obtained from the coast of Penarth, United Kingdom.
B.Gam	<i>Methyloprofundus</i> sp. INp10_methR40d	mein	methR_P1239	Isolated from the gill tissue of <i>Bathymodiolus japonicus</i> .
B.Gam	<i>Methylomarinum roseum</i> Ch1-1 ( <i>Methylomarinum</i> sp. Ch1-1)	mech	Q9L42_007685 Q9L42_017690	Methanotroph. Halophilic <b>methanotroph.</b> Isolated from the sediment sample collected in August 2022 from beneath shallow water (temperature 19 deg C, pH 7.5, total salt content 30 g L <sup>-1</sup> ) at the flowing of the river Chernavka into the hypersaline Lake Elton, Volgograd region, Russia (49.2085 N, 46.68024 E).
B.Gam	<i>Hydrogenovibrio thermophilus</i> JR-2	htr	EPV75_05345	Obligate aerobe. Grow <b>chemolithoautotrophically</b> on reduced sulfur compounds. Isolated from Northeast Pacific deep-sea hydrothermal vent. [PMID: <a href="#">29521452</a> ]
B.Gam	<i>Hydrogenovibrio marinus</i> MH-110	hmar	HVMH_0186	Aerobic, mesophilic, obligately <b>chemolithoautotrophic</b> , and hydrogen-oxidizing bacterium. Isolated from seawater of the Shonan Coast, Japan.
B.Gam	<i>Thiomicrospira</i> sp. S5	thio	AYJ59_08540	

B.Gam	<i>Thiomicrothabodus xiamenensis</i> G2	txa	HQN79_07945	Obligate <b>chemolithoautotroph</b> . Capable of using thiosulfate, sulfide, elemental sulphur or tetrathionate as an energy source. Isolated from a sediment sample collected from the coast of Xiamen, PR China.
B.Gam	<i>Thiosulfativibrio zosterae</i> AKT22	tzo	THMIRHAT_11150	Aerobic, obligately <b>chemolithoautotrophic</b> thiosulfate-oxidizing bacteria. Isolated from leaf of eelgrass ( <i>Zostera marina</i> ) collected in a brackish lake in Japan (Lake Akkeshi).
B.Gam	<i>Candidatus Thiodictyon syntrophicum</i> Cad16T	tsy	THSYN_31270	Anoxygenic photosynthesis; Photoautotrophic purple sulfur bacterium. Isolated from a sulfidic chemocline in the alpine Lake Cadagno in Switzerland.
B.Gam	<i>Thiohalocapsa</i> sp. PB-PSB1 PB-PSB1-LS01-2011a	thip	N838_27940 N838_29210	Isolated from the pink berry aggregates which were sampled in July 2011 from Little Sippewissett Salt Marsh (Falmouth, MA, USA).
B.Gam	<i>Caldichromatium japonicum</i> No.7	cjap	GWK36_12755	Thermophilic phototrophic purple sulphur bacterium. Isolated from microbial mats (56 deg C) at Nakabusa hot springs, Nagano prefecture, Japan.
B.Gam	<i>Thiocapsa bogorovii</i> BBS	tbog	LT988_06085 LT988_20830	Anoxygenic photosynthesis; Purple sulfur bacterium.
B.Gam	<i>Acidihalobacter aeolianus</i> V6	aaeo	BJI67_06800	Iron oxidation, Sulfur compound oxidation. Halotolerant <b>acidophile</b> . Isolated from shallow pools of acidic, salty water in the Aeolian islands, Italy.
B.Gam	<i>Acidihalobacter ferrooxydans</i> V8	afy	BW247_04450	Iron oxidation, Sulfur compound oxidation. Halotolerant <b>acidophile</b> . Isolated from shallow pools of acidic, salty water in Vulcano, Italy.
B.Gam	<i>Halothiobacillus neapolitanus</i> c2	hna	Hneap_0971 Hneap_1402	
B.Gam	<i>Halothiobacillus diazotrophicus</i> LS2 ( <i>Halothiobacillus</i> sp. LS2)	haz	A9404_06480	Sulfur compound oxidation; Sulphur-oxidizing and nitrogen-fixing bacterium. Isolated from freshwater collected from the Pearl River in Guangzhou, PR China.
B.Gam	<i>Thiopalillus brandeum</i> Hiromi 1	tbn	TBH_C1777	Isolated from a hydrothermal vent chimney in the Okinawa Trough.
B.Gam	<i>Sedimenticola thioaurini</i> SIP-G1 ( <i>Sedimenticola</i> sp. SIP-G1)	seeds	AAY24_12975	Sulfur compound oxidation. Has the capacity to couple the oxidation of reduced sulfur compounds with autotrophic growth under hypoxic and anaerobic conditions. Isolated from sediments of the Sippewissett Salt Marsh, Falmouth, MA, USA.
B.Gam	<i>Sulfurifustis variabilis</i> skN76	sva	SVA_3176	Sulfur compound oxidation. Autotrophic sulfur-oxidizing bacteria. Isolated from sediments of Lake Mizugaki in Japan. <b>Chemolithoautotroph</b> . ( <a href="https://doi.org/10.1186/s40793-016-0196-0">https://doi.org/10.1186/s40793-016-0196-0</a> )
B.Gam	<i>Acidiferrobacter</i> sp. SPIII_3	acii	C4901_02335 C4901_07915	Obtained from an <b>acid</b> mine drainage in Cartagena (Murcia, Spain).
B.Gam	<i>Acidiferrobacter thiooxydans</i> ZJ	aty	A9R16_001935 A9R16_008575	Iron oxidation, Sulfur compound oxidation. Iron and sulfur oxidizer. Isolated from the acid mine drainage (AMD) sample of Zijinshan Copper Mine (25 deg 10 min 41 sec N - 25 deg 11 min 44 sec N, 116 deg 24 min 00 sec E - 116 deg 25 min 22 sec E), Fujian Province, China. <b>Acidophile. Chemolithotrophic</b> . <a href="https://doi.org/10.1007/s00792-011-0359-2">https://doi.org/10.1007/s00792-011-0359-2</a> ; <a href="https://doi.org/10.1186/s40793-016-0196-0">https://doi.org/10.1186/s40793-016-0196-0</a>
B.Gam	<i>Salinisphaera</i> sp. LB1	saln	SALB1_2944	Halo- <b>acidophilic</b> bacterium. Isolated from surface water from Lake Brown, Western Australia.
B.Gam	<i>Candidatus Competibacteraceae bacterium</i> Lyne_18-Q3-R50-59_BATAC.383_cln	cbly	IPM89_14765	Isolated from fresh activated sludge (AS) samples were received from 23 Danish wastewater treatment plant (WWTP) in August and September 2018.
B.Bet	<i>Ralstonia insidiosa</i> FC1138	rin	ACS15_1804	Isolated from a fresh-cut produce-processing plant.
B.Bet	<i>Prb</i>	reu	Reut_A1185	Hydrogen oxidation. Facultative <b>chemolithoautotrophic</b> hydrogen-oxidizing bacterium.

	<i>pinatubonensis</i> JMP134 ( <i>Ralstonia</i> <i>eutropha</i> JMP134)			<a href="https://doi.org/10.1099/ijs.0.63922-0">https://doi.org/10.1099/ijs.0.63922-0</a>
B.Bet	<i>Cupriavidus</i> sp. USMAA2-4	cuu	BKK79_30240	Capable of producing polyhydroxyalkanoate (PHA).
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> E264	bte	BTH_II1311	Non-pathogenic saprophyte of <i>Burkholderia</i> .
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> 2002721723	btq	BTQ_4595	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> E444	btj	BTJ_5578	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> H0587	btz	BTL_4045	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> MSMB59	btv	BTHA_3836	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> E254	bthe	BTN_3622	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> USAMRU Malaysia #20	bthm	BTRA_4321	
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> 2003015869	btha	DR62_3656	Isolated from human in United States.
B.Bet	<i>Burkholderia</i> <i>thailandensis</i> 2002721643	bthl	BG87_4052	
B.Bet	<i>Burkholderia</i> <i>oklahomensis</i> E0147 (BDU)	bok	DM82_5259	Isolated from human in United States.
B.Bet	<i>Burkholderia</i> <i>oklahomensis</i> C6786	boc	BG90_5350	
B.Bet	<i>Burkholderia</i> <i>vietnamiensis</i> LMG 10929	bve	AK36_3953	
B.Bet	<i>Burkholderia</i> <i>contaminans</i> MS14	bcon	NL30_35935	Isolated from soil in Mississippi.
B.Bet	<i>Burkholderia</i> <i>anthina</i> BJQ0011 t	bann	JFN94_25320	
B.Bet	<i>Burkholderia</i> sp. PAMC 28687	bui	AX768_19400 AX768_20490	Isolated from the lichen <i>Useea</i> sp. collected on Barton Peninsula, King George Island, Antarctica (62 deg 13 min S, 58 deg 47 min W).
B.Bet	<i>Paraburkholderia</i> <i>xenovorans</i> LB400 ( <i>Burkholderia</i> <i>xenovorans</i> LB400)	bxe	Bxe_A3829 Bxe_B1515	PCB degrader; Isolated from a PCB-contaminated landfill in New York State.
B.Bet	<i>Paraburkholderia</i> <i>xenovorans</i> LB400 ( <i>Burkholderia</i> <i>xenovorans</i> LB400)	bxh	DR64_1506 DR64_6822	Isolated from soil in United States in 1985.
B.Bet	<i>Paraburkholderia</i> <i>phytofirmans</i> OLGA172	buz	AYM40_36455	Isolated from an uncontaminated Boreal forest soil in northwestern Russia.
B.Bet	<i>Paraburkholderia</i> <i>dioscoreae</i> Msb3	pdio	PDMSB3_0726 PDMSB3_1594.1	Isolated in December 2017 from leaf acumens of <i>Dioscorea</i> <i>bulbifera</i> .
B.Bet	<i>Pandoraea</i> <i>pnomenusa</i> RB38	ppno	DA70_04395	Isolated from a former sanitary landfill site.
B.Bet	<i>Pandoraea</i> <i>pnomenusa</i> DSM 16536	ppnm	LV28_01880	Human pathogen. Isolated from the sputum of a cystic fibrosis patient originating from Edinburgh, United Kingdom.
B.Bet	<i>Pandoraea</i> <i>pnomenusa</i> RB-44 ( <i>Pandoraea</i> sp. RB-44)	prb	X636_22705	Isolated from an exlandfill dumping ground.

B.Bet	<i>Pandoraea thiooxydans</i> DSM 25325	ptx	ABW99_04605 ABW99_07255	Isolated from the rhizosphere soils of cultivated <i>Sesamum indicum</i> in Jung ha-dong, Republic of Korea.
B.Bet	<i>Pandoraea</i> sp. NE5	pann	PanNE5_13230	Arsenite-oxidizing bacterium. Isolated from the rhizosphere of an arsenic hyperaccumulator fern ( <i>Pteris vittata</i> ).
B.Bet	<i>Pandoraea</i> sp. XJJ-1	panx	OYT13_00190	Isolated from soil samples collected from chlorobenzene (CB) contaminated of a pesticide plant in the Anhui Province of China.
B.Bet	<i>Caballeronia</i> sp. SBC2	caba	SBC2_80670	Isolated from serial cryoturbated peat circle sediment (62 deg 57 min E, 67 deg 03 min N).
B.Bet	<i>Bordetella avium</i> 197N	bav	BAV3245	Animal pathogen. Pathogen of poultry. Isolated from a diseased turkey in a commercial flock in the early 1980s in Ohio.
B.Bet	<i>Oxalobacter formigenes</i> HC-1	ofa	BRW83_1116	Anaerobe, with a substrate-specificity for oxalate. Isolated from an individual residing in Iowa, USA.
B.Bet	<i>Thiomonas intermedia</i> K12	tin	Tint_1807 Tint_1818	
B.Bet	<i>Thiomonas arsenitoxydans</i> 3As	thi	THI_2234 THI_2245	Obtained from the <b>acidic</b> waters draining the Carnoules mine tailings, southeastern France. <b>Chemolithoautotroph</b> <a href="https://doi.org/10.1007/s00203-011-0684-y">https://doi.org/10.1007/s00203-011-0684-y</a>
B.Bet	<i>Burkholderiales bacterium</i> GJ-E10	bbag	E1O_04100	Isolated from the Tamagawa River in Akita Prefecture, Japan.
B.Bet	<i>Nitrosomonas</i> sp. Is79A3	nii	Nit79A3_1859 Nit79A3_2670	Ammonia oxidation. Enriched and isolated from freshwater sediment.
B.Bet	<i>Thiobacillus sedimenti</i> SCUT-2	tsw	VA613_00460	Sulfur compound oxidation. <b>Chemolithoautotrophic</b> sulphur-oxidizing bacterium. Isolated from surface sediment sample collected from the Pearl River in Guangzhou, PR China (23 deg 8 min N 113 deg 17 min E) at a water depth of 100 cm.
B.Bet	<i>Sideroxydans lithotrophicus</i> ES-1	slt	Slit_0161	Dissimilatory sulfate reduction. Isolated from ferruginous groundwater in Michigan. [PMID: <a href="https://pubmed.ncbi.nlm.nih.gov/24062729/">24062729</a> ] Adapted for <b>chemolithoautotrophy</b>
B.Bet	<i>Sideroxydans</i> sp. CL21	side	SIDCL21_0128 SIDCL21_3410	Iron oxidation. Aerobic Fe(II)-oxidizing bacterium. Isolated from peat sediment from the Fe-rich, moderately acidic Schloppnerbrunnen fen (northern Bavaria, Germany).
B.Bet	<i>Sideroxyarcus emersonii</i> MIZ01	seme	MIZ01_1511	Iron oxidation. Neutrophilic iron-oxidizing bacterium. Isolated from an iron-rich floc in a wetland near the Mizube Park, Tsukuba, Japan. It grew microaerobically and <b>chemolithoautotrophically</b> <a href="https://doi.org/10.1099/ijsem.0.005347">https://doi.org/10.1099/ijsem.0.005347</a>
B.Bet	<i>Sulfuriferula</i> sp. AH1	sulf	CAP31_13500	Sulfur compound oxidation. Includes a partial Sox system for inorganic sulfur oxidation and a complete nitrogen fixation pathway. isolated from weathered mine tailings generated during pilot-plant processing of rock from copper-nickel deposits in the Duluth Complex, northeastern Minnesota. <b>Chemolithotrophic</b> growth <a href="https://doi.org/10.1128/genomea.00673-17">https://doi.org/10.1128/genomea.00673-17</a>
B.Bet	<i>Sulfuriferula plumbiphila</i> Gro7	splb	SFPGR_23390	Isolated from an uranium mine in Germany.
B.Bet	<i>Sulfuriferula nivalis</i> SGTM	sniv	SFSGTM_30340	Isolated from wet snow collected in Japan.
B.Bet	<i>Sulfurimicrobium lacus</i> skT11	slac	SKTS_23270 SKTS_28800	Sulfur compound oxidation. Sulfur-oxidizing bacterium. Isolated from anoxic lake water of a stratified freshwater lake, Lake Mizugaki in Japan (35 deg 51 min 35 sec N, 138 deg 29 min 58 sec E). <b>chemolithoautotrophic</b> growth <a href="https://doi.org/10.1007/s00203-020-02029-0">https://doi.org/10.1007/s00203-020-02029-0</a>

B.Bet	<i>Nitrogeniibacter mangrovi</i> M9-3-2	azq	G3580_19370	Denitrification Benzo[a]pyrene (BaP)-tolerant, anaerobic and aerobic denitrifying bacterium. Isolated from a mangrove sediment sample collected in Yunxiao Mangrove National Nature Reserve (24 deg 52 min N 117 deg 35 min E), located in the Zhangjiang Estuary in south-eastern PR China.
B.Bet	<i>Ferrovum myxofaciens</i> MI1A	fmy	HO273_11985	<b>chemolithoautotrophic</b> , and psychrotolerant <b>acidophile</b> <a href="https://doi.org/10.1128/genomea.00834-14">https://doi.org/10.1128/genomea.00834-14</a>
B.Bet	<i>Candidatus Desulfobacillus denitrificans</i> 317325-3	ddz	DSYM_17530	Denitrification Obtained from the anammox bacterial community (ABC) metagenome.
B.Alp	<i>Rhodospseudomonas</i> sp. BAL398	rhol	RBJ75_27275	Anoxygenic photosynthesis Anoxygenic phototrophic, purple non-sulfur bacterium (PNSB). Isolated from low-salinity surface waters of the Baltic Sea.
B.Alp	<i>Azorhizobium caulinodans</i> ORS 571	azc	AZC_0191	Plant endosymbiont Host is a fast-growing, submergence-tolerant tropical legume. Rhizobia. Nitrogen-fixing nodules. Isolated from stem nodules.
B.Alp	<i>Ancylobacter</i> sp. TS-1	anc	GBB76_14435	
B.Alp	<i>Aquabacter</i> sp. L1139	aqi	J5J86_17345	Isolated in 2014 from the rhizosphere of a salt-tolerant pokkali rice cultivated in water-logged brackish tidal environments of coastal Kerala, Kumbalangi (9 deg 52 min 06.4 sec N, 76 deg 16 min 58.3 sec E) India.
B.Alp	<i>Methylocella tundrae</i> T4	mtun	MTUNDRAET4_0390	Methanotroph Facultative aerobic methanotroph. Isolated from an acidic Sphagnum tundra peatland in northern Russia. <b>acidophilic</b> , methanotrophic bacteria <a href="https://doi.org/10.1128/jb.187.13.4665-4670.2005">https://doi.org/10.1128/jb.187.13.4665-4670.2005</a>
B.Alp	<i>Methylovirgula ligni</i> BW863	mlg	CWB41_13415	
B.Alp	<i>Methylocapsa</i> sp. D3K7	medk	QEV83_11005	Methanotroph, Carbon fixation Isolated from a sub-Arctic sandy loam soil of northern Russia, Krasnoyarsk Krai in July 2019 (69.4162 N, 86.5324 E).
B.Alp	<i>Candidatus Filomicrobium marinum</i> W	fil	BN1229_v1_3335	Isolated from an enrichment from North Atlantic surface seawater. Novel marine <b>Methylotroph</b> doi:10.1128/genomeA.00160-15.
B.Alp	<i>Candidatus Filomicrobium marinum</i> Y	fiy	BN1229_v1_2587	Isolated from an enrichment from North Atlantic surface seawater Novel marine <b>Methylotroph</b> doi:10.1128/genomeA.00160-15.
B.Alp	<i>Methyloceanibacter caenitepidi</i> Gela4	mcg	GL4_1342	Obtained a methane-oxidizing enrichment culture from marine sediments of Kagoshima Bay, Japan and isolated a novel facultative <b>methylotroph</b> .
B.Alp	<i>Methylocystis</i> sp. SC2	msc	BN69_2442	<b>Methanotroph</b> , Ammonia oxidation Aerobic type II methanotroph. Expresses two particulate methane monooxygenases. A large repertoire of genes involved in nitrogen metabolism (transport and assimilation of ammonia, hydroxylamine detoxification, nitrogen fixation, and denitrification) was detected. Isolated from a highly polluted aquifer in Germany.
B.Alp	<i>Methylocystis bryophila</i> S285	mbry	B1812_06330	<b>Methanotroph</b> Isolated from a methanotrophic enrichment culture that was established from an <b>acidic</b> peat soil (pH 3.8) sampled at a depth of 10cm from Sphagnum peat bog Staroselsky moss (56 deg 34 min N, 32 deg 46 min E), Tver region, Russia, in August 2008.
B.Alp	<i>Methylocystis rosea</i> GW6	mros	EHO51_13630	<b>Methanotroph</b> Aerobic facultative methanotroph. Common inhabitant of peatland ecosystems. Utilizes methane and methanol. Capable of slow growth on acetate. Isolated from the <b>acidic</b> (pH 4.3) Sphagnum peat bog lake Teufelssee in Germany.

B.Alp	<i>Methylocystis heyeri</i> H2	mhey	H2LOC_004685	
B.Alp	<i>Methylocystis</i> sp. SB2	mesz	LNB28_11030	<b>Methanotroph</b> Facultative methanotroph. Isolated from a spring bog near Ann Arbor, Michigan, in 2006.
B.Alp	<i>Methylosinus trichosporium</i> OB3b	mtw	CQW49_03300	<b>Methanotroph</b> Obligately aerobic methanotroph. Capable of degrading hydrocarbons.
B.Alp	<i>Methylosinus</i> sp. C49	mecq	MSC49_27460	<b>Methanotroph</b> Methane-oxidizing bacterium (MOB). Isolated from an enriched biomass with an inoculum from paddy field soil emitting highly concentrated methane from underground.
B.Alp	<i>Marteella endophytica</i> YC6887	mey	TM49_21520	Isolated from the root of a halophyte, <i>Rosa rugosa</i> , collected at a tidal flat in South Korea.
B.Alp	<i>Marteella</i> sp. AD-3	maad	AZF01_04845	Isolated from a petroleum-contaminated soil with high salinity in China.
B.Alp	<i>Marteella mediterranea</i> DSM 17316 MACL11	mmed	Mame_02006	Marine rhizobium. Isolated from the subterreanean Lake Martel in the Dragon Cave on the Spanish island Mallorca. <b>Saline-tolerant</b> <a href="https://doi.org/10.1099/ijs.0.63438-0">https://doi.org/10.1099/ijs.0.63438-0</a>
B.Alp	<i>Marteella lutitoris</i> ZRK001	mlut	JET14_05885	<b>Saline-tolerant</b> DOI 10.1007/s12275-019-9259-4
B.Alp	<i>Pseudorhodoplanes sinuspersici</i> R1P110	psin	CAK95_26715	Facultatively anaerobic. Isolated from a soil sample collected from an oil-contaminated site on Siri Island, Persian Gulf, Iran. [PMID: <a href="https://pubmed.ncbi.nlm.nih.gov/26420766/">26420766</a> ]
B.Alp	<i>Pseudovibrio</i> sp. FO-BEG1	psf	PSE_2034	Denitrification Isolated from a coral.
B.Alp	<i>Rhodovulum sulfidophilum</i> DSM 2351	rsu	NHU_00702	Nonsulfur photosynthetic bacterium that efficiently releases nucleic acids into the extracellular milieu, which leads to flocculation.
B.Alp	<i>Rhodovulum</i> sp. MB263	rhm	B5V46_04395	Isolated from a pink mudflat (Yatsuhigata, Narashino (35 deg 40 min 3 sec N, 140 deg 00 min 17 sec E).
B.Alp	<i>Rhodovulum</i> sp. P5	rhc	RGUI_0482	Heterotrophic bacteria. Isolated from surface seawater off Kueishantao Island, northeast Taiwan.
B.Alp	<i>Thioclava nitratireducens</i> 25B10_4	thw	BMG03_09365	Isolated from surface seawater of the Bering Sea (59 deg 41 min 18 sec N 179 deg 20 min 31.2 sec E).
B.Alp	<i>Thioclava electrotropha</i> Elox9	tec	AKL02_008540	Sulfur compound oxidation Facultatively anaerobic with the ability to utilize nitrate as an electron acceptor. Autotrophic growth with H <sub>2</sub> and S <sub>0</sub> (oxidized to sulfate). Isolated from a bacterial consortium enriched on electrodes poised at electron donating potentials in Catalina Harbor sediment. A bacterium that is capable of <b>chemolithoautotrophic</b> growth <a href="https://doi.org/10.1099/ijssem.0.002723">https://doi.org/10.1099/ijssem.0.002723</a>
B.Alp	<i>Novosphingobium</i> sp. PP1Y	npp	PP1Y_AT23059	Isolated from a surface seawater sample collected from a closed bay in the harbour of Pozzuoli (Naples, Italy).
B.Alp	<i>Croceibacterium atlanticum</i> 26DY36 ( <i>Altererythrobacter atlanticus</i> 26DY36)	aay	WYH_01223	Isolated from a deep-sea sediment from the North Atlantic Mid-Ocean Ridge.
B.Alp	<i>Gluconobacter oxydans</i> H24	goh	B932_1802	Industrial strain with high L-sorbose productivity
B.Alp	<i>Gluconobacter albidus</i> TMW2.1191	gal	A0U94_09520	
B.Alp	<i>Acetobacter vaccinii</i> KACC 21233	acek	FLP30_08815	Strictly aerobic strain. Isolated from blueberry fruit collected from Damyang in the Republic of Korea in 2018.
B.Alp	<i>Acidiphilium cryptum</i> JF-5	acr	Acry_3206	<b>Acidophilic</b> heterotrophic bacteria <a href="https://doi.org/10.1099/00207713-31-3-327">https://doi.org/10.1099/00207713-31-3-327</a>
B.Alp	<i>Acidiphilium multivorum</i> AIU301	amv	ACMV_P2_00300	<b>Acidophilic chemoorganotrophic</b> <a href="https://doi.org/10.2323/jgam.40.143">https://doi.org/10.2323/jgam.40.143</a>

B.Alp	<i>Rhodospirillum rubrum</i> ATCC 11170	rru	Rru_A2263	Anoxygenic <b>phototroph</b> . Produces extracellular elemental sulfur (instead of oxygen) while harvesting light.
B.Alp	<i>Rhodospirillum rubrum</i> F11	rrf	F11_11640	Mutant strain that cannot grow anaerobically and does not synthesize Rhodoquinone (RQ).
B.Alp	<i>Defluviicoccus</i> sp. SSA4	dex	HWD60_12075	Isolated from a microbial community from an enrichment bioreactor targeting polyphosphate accumulating organisms (PAO).
B.Alp	<i>Hypericibacter</i> <i>adhaerens</i> R5959	hadh	FRZ61_46140	Isolated from the rhizosphere of <i>Hypericum perforatum</i> retrieved from a greenhouse of the Leibniz Institute of Plant Biochemistry (IPB), Halle, Germany (51 deg 29 min 42.23 sec N 11 deg 56 min 36.56 sec E).
B.Alp	<i>Thalassospira marina</i> CSC3H3	thac	CSC3H3_20075	Isolated from seawater under the surface at 1 m depth at sites CSC3 (21 deg 18 min 9.43 sec N, 117 deg 42 min 39.35 sec E) in the north-east of the South China Sea in October 2016.
B.Alp	<i>Thalassospira indica</i> PB8BT	tii	DY252_00960	
B.Alp	<i>Thalassospira</i> sp. A40-3	thai	IT893_19775	
B.Alp	<i>Thalassospira</i> <i>tepidiphila</i> IFOP_LL337	ttb	MACH01_38630	
B.Alp	<i>Varunaivibrio</i> <i>sulfuroxidans</i> TC8	vsu	P3M64_05560	Sulfur compound oxidation Mesophilic, facultatively anaerobic, facultatively <b>chemolithoautotrophic</b> alphaproteobacterium. Isolated from a sulfidic shallow-water marine gas vent located at Tor Caldara, Tyrrhenian Sea, Italy.
B.Gam	<i>Acidithiobacillus</i> <i>ferrooxidans</i> ATCC 23270	afr	AFE_0818 AFE_3086	Iron oxidation. <b>Chemolithoautotrophic</b> , gamma-proteobacterium. Uses energy from the oxidation of iron- and sulfur-containing minerals for growth. Thrives at <b>extremely low pH</b> (pH 1-2) and fixes both carbon and nitrogen from the atmosphere.
B.Gam	<i>Acidithiobacillus</i> <i>ferrooxidans</i> ATCC 53993	afe	Lferr_0959 Lferr_2687	Iron oxidation
B.Gam	<i>Acidithiobacillus caldus</i> SM-1	acu	Atc_2720	Sulfur compound oxidation Moderately <b>thermoacidophilic</b> and obligately <b>chemolithotrophic</b> gamma-Proteobacterium. One of the dominant sulfur-oxidizing bacteria in bioleaching reactors. Grows optimally temperature of 40-45deg C and pH of 2-2.5. Isolated from a pilot bioleaching reactor.
B.Gam	<i>Acidithiobacillus caldus</i> ATCC 51756	acz	Acaty_c2568	<b>Acidophilic</b> , moderately thermophilic, <b>chemolithoautotrophic</b> gammaproteobacterium that derives energy from the oxidation of sulfur and reduced inorganic sulfur compounds.
B.Gam	<i>Acidithiobacillus</i> <i>ferrivorans</i> SS3	afi	Acife_0797 Acife_3093	Iron oxidation, Sulfur compound oxidation Psychrotolerant <b>acidophile</b> . Capable of growth in the range of 5 to 30 deg C (optimum, 25 deg C). Gains energy from the oxidation of ferrous iron and inorganic sulfur compounds and obtains organic carbon from carbon dioxide. Isolated from Norilsk, Russia.
B.Gam	<i>Acidithiobacillus</i> <i>ferridurans</i> JCM 18981	afj	AFERRID_00560 AFERRID_16250 AFERRID_20580 AFERRID_20630	Iron oxidation <b>Acidophilic chemolithotrophic</b> bacterium. Originally isolated in 1976 from drainage water at a uranium mine in Japan.
B.Gam	<i>Acidithiobacillus</i> <i>ferriphilus</i> GT2	afp	K1Y48_06050 K1Y48_06640	<b>Acidophile</b> strain. Isolated from gold mill tailings (Colorado, USA).
B.Gam	<i>Acidithiobacillus</i> sp. YTS05	acyi	MQE22_01340 MQE22_05685	
B.Eps	<i>Sulfurimonas</i> <i>autotrophica</i> DSM 16294	sua	Saut_1355	Carbon fixation, Sulfur compound oxidation. Aerobic <b>chemolithoautotroph</b> . Oxidizes sulfur compounds to sulfate. Isolated from the surface of a deep-sea hydrothermal sediment on the Hatoma Knoll in the Mid-Okinawa Trough hydrothermal field

B.Eps	<i>Sulfurimonas parvalinellae</i> GO25	spal	FM071_05610	
B.Eps	<i>Halarcobacter anaerophilus</i> DSM 24636	aana	AANAER_0086	Obligate anaerobe. Isolated from estuarine sediment samples.
B.Eps	<i>Hydrogenimonas</i> sp. MAG	hyo	NNO_1249 NNO_1597	Denitrification Shows a respiratory N <sub>2</sub> O reduction with H <sub>2</sub> as an electron donor. Obtained from a deep-sea hydrothermal vent in the Southern Mariana Trough. <b>Chemolithoautotroph</b> DOI: 10.3389/fbioe.2018.00184
B.Eps	<i>Nitratifractor salsuginis</i> DSM 16511	nsa	Nitsa_0958 Nitsa_0960	Anaerobic to microaerophilic and <b>chemolithoautotrophic</b> bacterium. Grows by respiratory nitrate reduction with H <sub>2</sub> as the electron donor, forming N <sub>2</sub> as a metabolic end product. Isolated from a deep-sea hydrothermal vent chimney at the Iheya North hydrothermal field in the Mid-Okinawa Trough in Japan.
B.Eps	<i>Sulfurovum</i> sp. NBC37-1	sun	SUN_1289	Isolated from in situ samplers deployed on the actively venting sulfide mound in the Iheya North hydrothermal field, Japan.
B.Eps	<i>Sulfurovum lithotrophicum</i> ATCC BAA-797	slh	YH65_05935	Sulfur-oxidizing <b>chemolithoautotrophic</b> bacterium. Isolated from deep-sea hydrothermal sediments in Okinawa, Japan.
B.Eps	<i>Nitratiruptor</i> sp. SB155-2	nis	NIS_0930	Denitrification. Isolated from in situ samplers deployed on the actively venting sulfide mound in the Iheya North hydrothermal field, Japan.
B.Eps	<i>Nautilia profundicola</i> AmH	nam	NAMH_0768	Originally isolated from the biomass of an <i>Alvinella pompejana</i> epibiont community collected at 13 degrees N along the East Pacific Rise Axial Caldera.
B.Eps	<i>Nautilia</i> sp. PV-1	nap	C3L23_03965	Piezophilic, moderately thermophilic, <b>chemolithoautotrophic</b> anaerobe. Isolated from hydrothermal fluids released from an <i>Alvinella pompejana</i> -colonized active vent at 9 deg N on the East Pacific Rise (9 deg 50.3981 N; 104 deg 17.4942 W) in January 2014.
B.Eps	<i>Caminibacter mediatlanticus</i> TB-2	cmcd	FE773_06025	Thermophilic, anaerobic, <b>chemolithoautotrophic</b> bacterium. Isolated from the walls of an active deep-sea hydrothermal vent chimney on the Mid-Atlantic Ridge.
B.Eps	<i>Caminibacter pacificus</i> TB6 ( <i>Cetia pacifica</i> TB6)	cpaf	C6V80_04555	Thermophilic, anaerobic, <b>chemolithoautotrophic</b> bacterium. Isolated from chimney fragments sampled from an active deep-sea hydrothermal vent on the East Pacific Rise at Bio 9' site (9 deg 49 min N 104 deg 17 min W). [PMID: 25604337]
B.Eps	<i>Hippea maritima</i> DSM 10411	hmr	Hipma_0132	First isolated from shallow-water hot vents in Matipur Harbor, Papua New Guinea.
B.Eps	<i>Desulfurella acetivorans</i> A63	dav	DESACE_01520	
B.Del	<i>Geobacter sulfurireducens</i> KN400	gsk	KN400_2296	Rare <i>Geobacter</i> variant that is capable of unprecedented current production at an electrode. <b>Electrotoph</b> <a href="https://www.sciencedirect.com/science/article/pii/S0960852421018952">https://www.sciencedirect.com/science/article/pii/S0960852421018952</a> <b>Chemolithoautotrophic</b> growth <a href="https://doi.org/10.1038/s41396-020-0673-8">https://doi.org/10.1038/s41396-020-0673-8</a>
B.Del	<i>Geobacter metallireducens</i> GS-15	gme	Gmet_3497	Dissimilatory Fe(III)- and Mn(IV)-reducing microorganism. Isolated from freshwater sediments of the Potomac River, Maryland. <b>Electrotoph</b> <a href="https://www.sciencedirect.com/science/article/pii/S0960852421018952">https://www.sciencedirect.com/science/article/pii/S0960852421018952</a>
B.Del	<i>Geobacter</i> sp. 60473	gec	GEO60473_06130	Electrochemically active bacterium (EAB). Isolated from mud taken from the shore of lake Suwa (36 deg 03 min N 138 deg 04 min E, Okaya, Nagano, Japan).
B.Del	<i>Citri fermentans bremense</i> R4	gbn	GEOBRER4_13360	Electrogenic bacterial strain. Graphene oxide (GO)-reducing bacterium. Isolated from river sediments.

B.Del	<i>Oceanidesulfovibrio marinus</i> CS1	dms	E8L03_08600	
B.Del	<i>Pseudodesulfovibrio mercurii</i> ND132 ( <i>Desulfovibrio desulfuricans</i> ND132)	ddn	DND132_1528	Dissimilatory sulfate reduction. Anaerobic sulfate-reducing bacterium. Isolated from mesohaline Chesapeake Bay sediments, which are moderately Hg contaminated and support de novo MeHg production
B.Del	<i>Pseudodesulfovibrio methanolicus</i> 5S69	pmen	V8V93_18150	Isolated from an injection water sample obtained in June 2016 at Vostochno-Anzirkoe oil field (55 deg 66 min 69 sec N, 51 deg 49 min 84.00 sec E), located in Yelabuga district, Tatarstan (Russia).
B.Del	<i>Desulfotalea psychrophila</i> LSv54	dps	DP0982	Dissimilatory sulfate reduction. Marine sulfate-reducing delta-proteobacterium. Isolated from permanently cold Arctic sediments off the coast of Svalbard.
B.Del	<i>Desulfosarcina ovata</i> subsp. <i>sediminis</i> 28bB2T	dov	DSCO28_38660	Dissimilatory sulfate reduction Sulfate-reducing bacterium. Isolated from a tidal flat sediment of Tokyo Bay, Japan, via a series of enrichment cultures with successive changes of growth substrates, crude oil, p-xylene, benzoate, and toluene.
B.Del	<i>Desulfosarcina widdellii</i> PP31	dwd	DSCW_63180	Capable of anaerobic degradation of p-xylene. Obtained from oil-polluted marine sediments of Shuaiba, Kuwait. [PMID: <a href="#">28820122</a> ]
B.Del	<i>Desulfobacca</i>	dao	Desac_1181	Dissimilatory sulfate reduction. Sulfate or other inorganic sulfur components serve as electron acceptors via reduction to H <sub>2</sub> S. Degrades acetate (as the common carbon source and electron donor) completely to CO <sub>2</sub> via the acetyl-CoA/CO-dehydrogenase pathway. Has a temperature range for growth between 27 and 47 deg C, with an optimum at 36-40 deg C. The pH range for growth is 6.5-8.3, with an optimum of pH 7.1-7.5. Several more putative electron donors were tested but not found to be utilized by strain ASRB2T, such as: propionate, butyrate, lactate, H <sub>2</sub> /CO <sub>2</sub> , formate, ethanol, propanol, butanol, pyruvate, fumarate, glucose, crotonate, benzoate, phenol, aspartate and glutamate. Isolated from granular sludge of a laboratory-scale upflow anaerobic sludge bed (UASB) reactor fed with acetate and sulfate.
B.Del	<i>Desulfomonile tiedjei</i> DSM 6799	dti	Desti_1932	Dissimilatory sulfate reduction.
B.Del	<i>Desulfoferula mesophila</i> 12FAK ( <i>Desulfoferula mesophilus</i> 12FAK)	dmp	FAK_36950	Dissimilatory sulfate reduction. Isolated from the sediment of a non-eelgrass zone (43 deg 03 min 40 sec N, 144 deg 51 min 35 sec E) of Lake Akkeshi, a brackish lake in Japan, in August 2020.
B.Chl	<i>Simkania negevensis</i> Z	sng	SNE_A12910	Human pathogen H01064- <i>Simkania negevensis</i> infection. Pathogen causing respiratory infections. Originally discovered as a contaminant of a human cell culture.
B.Ver	<i>Ruficoccus</i> sp. ZRK36	rufi	K0V07_15225	
B.Ver	<i>Rubellicoccus peritrichatus</i> CR14	puo	RZN69_13290	Aerobic strain. Isolated from crustose coralline algae in a coral aquarium.
B.Ver	<i>Methylacidiphilum infernorum</i> V4	min	Minf_0743	Methanotroph, Ammonia oxidation. Extremely <b>acidophilic</b> methanotrophic, autotrophic bacterium. Isolated from a soil sample in Hell's Gate (Tikitere), a methane-emitting geothermal field in the North Island of New Zealand.
B.Ver	<i>Methylacidiphilum kamchatkense</i> Kam1	mkc	kam1_1566	Methanotroph. <b>Thermoacidophilic</b> aerobic methane oxidizer. Isolated from an acid hot spring in Kamchatka, Russia
B.Ver	<i>Candidatus Methylacidiphilum fumarolicum</i>	mfh	MFUM_1856	
B.Ver	<i>Methylacidiphilum caldifontis</i> IT6	mcao	IT6_02935	Methanotroph. <b>Thermoacidophilic</b> and facultative methane-oxidizing bacterium. Isolated from a subaqueous mud sample taken from Pisciarelli hot spring (40 deg 49 min 45.1 sec N 14 deg 08 min 49.7 sec E) in Pozzuoli, Italy.
B.Pla	<i>Bremerella volcania</i> Pan97	bvo	Pan97_16180	Isolated on the 9th of September 2013 from a red biofilm sampled in a hydrothermal vent close to the island Panarea in Italy (sampling site 38.5568 N, 15.1097 E).

B.Pla	<i>Rubripirellula lacrimiformis</i> K22_7	rlc	K227x_05150	Isolated from the epiphytic biofilm community of brown algae of the genus <i>Fucus</i> which were collected during low tide on the north shore of Helgoland Island, Germany on 5 June 2013 (exact sampling location 54.188 deg N, 7.875 deg E, water temperature 13 deg C).
B.Pla	<i>Gimesia panarensis</i> Pan110	gpn	Pan110_30180 Pan110_34570	Isolated from sediments near a newly formed hot lake gas escape at Panarea Island, Italy.
B.Pla	<i>Gimesia fumaroli</i> Enr17	gfm	Enr17x_17320	Isolated from white aggregates on sediment and seaweed in fumerole in Panarea, Italy (38.6401 N 15.1097 E) on 2013-9-5.
B.Pla	<i>Gimesia alba</i> Pan241w	gaz	Pan241w_16690	Isolated from yellow-gray fringes at point 21, hydrothermal area in Panarea, Italy (38.6387 N 15.1068 E), on 2013-9-10.
B.Pla	<i>Gimesia aquarii</i> V144	gaw	V144x_43680	Isolated from a filter of a sea water fish tank in Braunschweig, Germany (52.2689 N 10.5268 E) on 2013-6-13.
B.Pla	<i>Frigoriglobus tundricola</i> PL17	ftj	FTUN_2183	Isolated from water collected from a shallow littoral wetland in a forested tundra, Nadym region, Yamalo-Nenets Autonomous Okrug, Russia (N65 deg 35 min 03 sec, E73 deg 04 min 20 sec).
B.Pla	<i>Telmatocola sphagniphila</i> SP2	tsph	KIH39_14055	Isolated from an acidic Sphagnum-dominated boreal peat bog.
B.Pla	<i>Poriferisphaera corsica</i> KS4	pcor	KS4_16440	Isolated from the calcareous sponge <i>Clathrina. clathrus</i> close to the island Corsica, France, in September 2015.
B.Aci	<i>Granulicella mallensis</i> MP5ACTX8	gma	AciX8_2808	Isolated from Arctic tundra soil.
B.Bct	<i>Microbacter</i> sp. GSS18	mica	POL94_09545	
B.Bct	<i>Arachidicoccus</i> sp. BS20	arb	A9P82_11365	
B.Bct	<i>Hymenobacter psoromatis</i> PAMC 26554 ( <i>Hymenobacter</i> sp. PAMC 26554)	hyp	A0257_23030	Isolated from the lichen <i>Usnea</i> sp., collected from Barton Peninsula, King George Island, Antarctica (62 deg 13 min S, 58 deg 47 min W).
B.Bct	<i>Fulvitalea axinellae</i> DSM 100852	fax	FUAX_42550	
B.Bct	<i>Aureibacter tunicatorum</i> NBRC 107587	atk	AUTU_47980	
B.Bct	<i>Chryseobacterium gleum</i> NCTC11432	cgle	NCTC11432_04605	
B.Gsb	<i>Chlorobaculum parvum</i> NCIB 8327	cpc	Cpar_0506	Anoxygenic photosynthesis, Carbon fixation
B	<i>Ignavibacterium album</i> JCM 16511	ial	IALB_0171	Non-phototrophic organism. Isolated from microbial mats associated with the sulfide-rich waters of Yumata Hot Spring in Japan.
B.Hyp	<i>Hydrogenobaculum</i> sp. Y04AAS1	hya	HY04AAS1_1374	<b>Thermoacidophilic</b> isolate from a stream adjacent to Obsidian Pool in Yellowstone National Park, United States.
B.Hyp	<i>Hydrogenobaculum</i> sp. HO	hho	HydHO_1357	Isolated from the outflow channel of Dragon Spring, Norris Geyser Basin, in Yellowstone National Park, WY.
B.Hyp	<i>Hydrogenobaculum</i> sp. SN	hys	HydSN_1394	Isolated from the outflow channel of Dragon Spring, Norris Geyser Basin, in Yellowstone National Park, WY.
B.Hyp	<i>Sulfurihydrogenibium</i> sp. YO3AOP1	sul	SYO3AOP1_0133	Carbon fixation. Unable to oxidize hydrogen although hydrogen oxidation was thought to be universal in this group. Isolated from near-neutral-pH terrestri
B.Hyp	<i>Thermovibrio ammonificans</i> HB-1	tam	Theam_0995	Carbon fixation. Isolated from an active, high temperature deep-sea hydrothermal vent on the East Pacific Rise.
B	<i>Caldisericum exile</i> AZM16c01	cex	CSE_01410	Anaerobic, thermophilic, thiosulfate-reducing bacterium. Isolated from a hot spring in Otari, Nagano Prefecture, Japan.
B	<i>Leptospirillum ferrooxidans</i> C2-3	lfc	LFE_1747	Iron oxidation. <b>Acidophilic</b> , obligate <b>chemolithoautotrophic</b> ferrous-iron-oxidizing bacterium. Known to have nitrogenase-encoding genes. Isolated from a 7.6-year-old volcanic ash deposit on Mount Oyama in the island of Miyake, Japan by chemostat enrichment.
B.Del	<i>Dissulfurimicrobium hydrothermale</i> Sh68	dhr	LGS26_07735	Carbon fixation, Dissimilatory sulfate reduction. Thermophilic, anaerobic, <b>chemolithoautotrophic</b> microorganism. Isolated from a hydrothermal pond at Uzon caldera, Kamchatka, Russia

B.FirB	<i>Lactobacillus johnsonii</i> F19785	ljf	F19785_799	Their probiotic properties, including attachment to epithelial cells, immunomodulation, and competitive exclusion of pathogens. Strain which prevents the colonization of specific-pathogen-free chicks by <i>Clostridium perfringens</i> . <b>Acidophile</b> <a href="https://www.mdpi.com/2304-8158/12/15/2965">https://www.mdpi.com/2304-8158/12/15/2965</a>
B.FirB	<i>Lactobacillus johnsonii</i> DPC 6026	ljh	LJP_0761c	Isolated from a porcine small intestine.
B.FirB	<i>Lactobacillus johnsonii</i> N6.2	ljn	T285_04020	Isolated from the stools of BioBreeding diabetes-resistant rats.
B.FirB	<i>Lactobacillus acidophilus</i> NCFM	lac	LBA1234	Contribute to the organisms' gastric survival and promote interactions with the intestinal mucosa and microbiota. First isolated by Moro in 1900 from infant feces.
B.FirB	<i>Lactobacillus acidophilus</i> La-14	lad	LA14_1238	Probiotic functionalities, including tolerance to gastrointestinal conditions, oxalate-degradation capability, bacteriocin production, and beneficial modulation of the immune response.
B.FirB	<i>Lactobacillus acidophilus</i> FS14	laf	SD55_1229	Isolated from yogurt.
B.FirB	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i> ATCC 11842	ldb	Ldb1301	Originally isolated from bulgarian yogurt in 1919.
B.FirB	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i> ATCC BAA-365	lbu	LBUL_1216	
B.FirB	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i> ND02	lde	LDBND_1248	Isolated from naturally fermented yak milk in Qinghai, China.
B.FirB	<i>Lactobacillus delbrueckii</i> subsp. <i>bulgaricus</i> 2038	ldl	LBU_1113	Originally isolated from Bulgaria.
B.FirB	<i>Lactobacillus gasseri</i> ATCC 33323	lga	LGAS_0834	
B.FirB	<i>Lactobacillus helveticus</i> DPC 4571	lhe	lhv_1323	Swiss cheese isolate.
B.FirB	<i>Lactobacillus helveticus</i> H10	lhl	LBHH_0836	Isolated from traditional fermented milk in Tibet, China.
B.FirB	<i>Lactobacillus helveticus</i> R0052	lhr	R0052_04905	Isolated in March 1990 from a sweet acidophilus milk.
B.FirB	<i>Lactobacillus helveticus</i> CNRZ32	lhv	lhe_1254	Used worldwide as a starter culture in the manufacture of cheeses and for the production of bioactive peptides from milk proteins during fermentation.
B.FirB	<i>Lactobacillus helveticus</i> H9	lhh	LBH_1086	Isolated from kurutin Tibet of China.
B.FirB	<i>Lactobacillus helveticus</i> KLD51.8701	lhd	HUO_05490	Isolated from traditional sour milk in Sinkiang of China.
B.FirB	<i>Lactobacillus crispatus</i> ST1	lcr	LCRIS_01253	Originally isolated from the crop of a chicken.
B.FirB	<i>Lactobacillus amylovorus</i> GRL 1112	lam	LA2_06955	Originally isolated from porcine feces and found to be an abundant colonizer of the gastrointestinal tract in pigs.
B.FirB	<i>Lactobacillus amylovorus</i> 30SC ( <i>Lactobacillus acidophilus</i> 30SC)	lai	LAC30SC_06915	Isolated from Swine Intestines.
B.FirB	<i>Lactobacillus amylovorus</i> GRL1118	lay	LAB52_06335	Isolated from porcine ileum.
B.FirB	<i>Lactobacillus kefirifaciens</i> subsp. <i>kefirifaciens</i> ZW3 ( <i>Lactobacillus kefirifaciens</i> ZW3)	lke	WANG_0460	Isolated from kefir grain collected in Tibet, China.
B.FirB	<i>Lactobacillus</i> sp. <i>wkB8</i>	law	LACWKB8_1061	Isolated from the guts of the honey bee <i>Apis mellifera</i> .

B.FirB	<i>Lactobacillus acetotolerans</i> NBRC 13120	lae	LBAT_0720 LBAT_0763	Isolated from putrefied (hiochi) Japanese sake.
B.FirB	<i>Lactobacillus gallinarum</i> HFD4	lgl	AO203_09880	
B.FirB	<i>Lactobacillus jensenii</i> SNUV360	lje	BUE77_03985	Isolated from a vaginal sample from a healthy Korean woman.
B.FirB	<i>Lactobacillus amylolyticus</i> L6	lamy	B1745_03070	Isolated from naturally fermented tofu whey (NFTW) collected in Guangdong province.
B.FirB	<i>Lactobacillus paragasseri</i> JCM 5343	lpw	LpgJCM5343_0788	Originally isolated by Weiss and Rettger from human faeces in 1934.
B.FirB	<i>Lactobacillus kullabergensis</i> ESL0186	lkl	DKL58_05420	Isolated from the gut of honey bees.
B.FirB	<i>Lactobacillus apis</i> ESL0185	lapi	DKL56_04415	Isolated from the gut of honey bees.
B.FirB	<i>Lactobacillus helsingborgensis</i> ESL0183	lhs	DLD54_05020	Isolated from the gut of honey bees.
B.FirB	<i>Lactobacillus taiwanensis</i> CLG01	lta	H1A07_03840	Isolated from Peyer's patches collected from small intestine of healthy C57BL/6 mice.
B.FirB	<i>Lactobacillus ultunensis</i> Kx293C1	luu	H4B44_04750	
B.FirB	<i>Lactobacillus panisapium</i> ESL0416	lpai	GYM71_05630	Isolated from Apis cerana in Kanagawa, Japan.
B.FirB	<i>Lactobacillus iners</i> KY	lid	GYK47_01675	
B.FirB	<i>Lactobacillus intestinalis</i> DSM 6629	liq	KBW87_03655	
B.FirB	<i>Lactobacillus mulieris</i> VSI18	lmul	PUW59_05515	
B.FirB	<i>Lactobacillus xylocopicola</i> Kim32-2	lxo	KIM322_08640	Isolated from a carpenter bee, <i>Xylocopa appendiculata circumvolans</i> (Japanese common name: kimunekumabachi), collected at Tokyo University of Agriculture on July 7, 2017.
B.FirB	<i>Lactocaseibacillus paracasei</i> ATCC 334 ( <i>Lactobacillus paracasei</i> ATCC 334)	lca	LSEI_0125	<b>Acidophile</b> <a href="https://www.mdpi.com/2304-8158/12/15/2965">https://www.mdpi.com/2304-8158/12/15/2965</a>
B.FirB	<i>Lactocaseibacillus paracasei</i> Zhang ( <i>Lactobacillus casei</i> Zhang)	lcz	LCAZH_0133 LCAZH_2411	Exhibits resistance to <b>acid</b> and bile stresses. Isolated from koumiss (traditional drink) samples collected in Inner Mongolia, China.
B.FirB	<i>Lactocaseibacillus paracasei</i> BD-II ( <i>Lactobacillus casei</i> BD-II)	lcs	LCBD_0116	Isolated from homemade koumiss in China which exhibits the ability to reduce the blood lipid level and regulate the cardiovascular system.
B.FirB	<i>Lactocaseibacillus paracasei</i> LC2W ( <i>Lactobacillus casei</i> LC2W)	lce	LC2W_0106	Isolated from traditional dairy products in Inner Mongolia.
B.FirB	<i>Lactocaseibacillus paracasei</i> W56 ( <i>Lactobacillus casei</i> W56)	lcw	BN194_01190	Shows immunomodulatory properties.
B.FirB	<i>Lactocaseibacillus paracasei</i> LOCK919 ( <i>Lactobacillus casei</i> LOCK919)	lcl	LOCK919_0128 LOCK919_2669	Originally isolated from a fecal sample collected from healthy 5-year-old boy.
B.FirB	<i>Lactocaseibacillus paracasei</i> N1115 ( <i>Lactobacillus paracasei</i> N1115)	lpq	AF91_14835	Isolated from traditional homemade dairy products in Inner Mongolia, China.

B.FirB	<i>Lacticaseibacillus paracasei</i> subsp. <i>paracasei</i> 8700:2	lpi	LBPG_01670 LBPG_02357	
B.FirB	<i>Lacticaseibacillus paracasei</i> subsp. <i>paracasei</i> JCM 8130	lpap	LBPC_0108	Isolated from milk product.
B.FirB	<i>Lacticaseibacillus paracasei</i> BL23 ( <i>Lactobacillus casei</i> BL23)	lcb	LCABL_01160	Obtained in trying to cure <i>L. casei</i> ATCC 393 (reclassified as <i>Lactobacillus zeae</i> ) of a plasmid.
B.FirB	<i>Lacticaseibacillus casei</i> 12A ( <i>Lactobacillus casei</i> 12A)	lcx	LCA12A_1058 LCA12A_1941	Corn silage isolate.
B.FirB	<i>Lacticaseibacillus paracasei</i> subsp. <i>paracasei</i> JCM 8130	lpab	PQ472_09465	Isolated from milk product.
B.FirB	<i>Lactiplantibacillus plantarum</i> WCFS1 ( <i>Lactobacillus plantarum</i> WCFS1)	lpl	lp_1919	Originally isolated from human saliva. <b>Acidophile</b> <a href="https://www.mdpi.com/2304-8158/12/15/2965">https://www.mdpi.com/2304-8158/12/15/2965</a>
B.FirB	<i>Lactiplantibacillus plantarum</i> JDM1 ( <i>Lactobacillus plantarum</i> JDM1)	lpj	JDM1_1613	Chinese commercial lactic acid bacterium.
B.FirB	<i>Lactiplantibacillus plantarum</i> ZJ316 ( <i>Lactobacillus plantarum</i> ZJ316)	lpt	zj316_1892	Originally isolated from healthy newborn infant fecal samples. Probiotic strain with several functions.
B.FirB	<i>Lactiplantibacillus plantarum</i> ST-III ( <i>Lactobacillus plantarum</i> subsp. <i>plantarum</i> ST-III)	lps	LPST_C1542	Probiotic strain. Isolated from kimchi.
B.FirB	<i>Lactiplantibacillus plantarum</i> subsp. <i>plantarum</i> P-8 ( <i>Lactobacillus plantarum</i> subsp. <i>plantarum</i> P-8)	lpr	LBP_cg1496	Originally isolated from dairy products.
B.FirB	<i>Lactiplantibacillus plantarum</i> 16 ( <i>Lactobacillus plantarum</i> 16)	lpz	Lp16_1487	Originally isolated from malt production steep water.
B.FirB	<i>Lactiplantibacillus plantarum</i> B21 ( <i>Lactobacillus plantarum</i> B21)	lpb	SH83_07950	Isolated from the Vietnamese fermented sausage nem chua.
B.FirB	<i>Lactiplantibacillus paraplantarum</i> L-ZS9 ( <i>Lactobacillus paraplantarum</i> L-ZS9)	lpx	ASU28_05805	Isolated from fermented sausage.
B.FirB	<i>Limosilactobacillus gastricus</i> LG045	lgas	LG045_04330	
B.FirB	<i>Levilactobacillus suantsaii</i> CBA3634	lsua	H3M12_07160	Isolated from fermented potherb mustard and its brine which were obtained from the factory in Hangzhou, Zhejiang Province in 2018.
B.FirB	<i>Loigolactobacillus backii</i> TMW 1.1988 ( <i>Lactobacillus backii</i> TMW 1.1988)	lbt	AYR52_09650	Isolated from light wheat beer in German brewery.
B.FirB	<i>Loigolactobacillus coryniformis</i> subsp. <i>torquens</i> DSM 20004 = KCTC 3535 ( <i>Lactobacillus coryniformis</i> subsp.	lcy	LC20004_12745	

	<i>torquens</i> DSM 20004 = KCTC 3535)			
B.FirB	<i>Paucilactobacillus hokkaidonensis</i> JCM 18461 ( <i>Lactobacillus hokkaidonensis</i> LOOC260)	lho	LOOC260_111150	Isolated from Timothy grass silage in Hokkaido.
B.FirB	<i>Pediococcus claussenii</i> ATCC BAA-344	pce	PECL_1790	Brewery contaminant.
B.FirB	<i>Pediococcus damnosus</i> TMW 2.1535	pdm	ADU72_0180	
B.FirB	<i>Pediococcus inopinatus</i> DSM 20285	pio	PI20285_04695	
B.FirB	<i>Furfurilactobacillus rossiae</i> L1	iros	LROSL1_0230	
B.FirB	<i>Schleiferilactobacillus harbinensis</i> M1	lhb	D1010_14505	Isolated from naturally fermented tofu whey (NFTW).
B.FirB	<i>Xylocopilactobacillus apis</i> KimC2	xak	KIMC2_00850	Isolated from a carpenter bee, <i>Xylocopa appendiculata</i> circumvolans (Japanese common name: kimunekumabachi), collected at Tokyo Kamiyoga Park located near the Tokyo University of Agriculture on July 7, 2017.
B.FirB	<i>Xylocopilactobacillus apicola</i> XA3	xap	XA3_17830	Isolated from a carpenter bee, <i>Xylocopa tranquebarorum</i> (Japanese common name: taiwantakekumabachi), collected at Tokyo Kinuta Park located near the Tokyo University of Agriculture on August 24, 2021.
B.FirC	<i>Caproicibacterium argilliputei</i> ZCY20-5	carl	PXC00_11165	Anaerobic, caproic acid producing bacterium. Isolated from pit clay in a Chinese strong-aroma type Baijiu factory located in Sichuan Province, PR China (28 deg 53 min 25.8 sec N 105 deg 27 min 38.1 sec E).
B.FirC	<i>Acetobacterium woodii</i> DSM 1030	awo	Awo_c04620 Awo_c27420	Anaerobic, <b>acetogenic</b> bacterium. Employs the Wood-Ljungdahl pathway without cytochromes and is one of the very few organisms known to completely rely on a sodium ion potential for energetic reactions.
B.FirC	<i>Sulfobacillus thermotolerans</i> Kr1	sthr	BXT84_09295	
B.FirC	<i>Candidatus Hydrogenisulfobacillus filiaventi</i>	hfv	R50_1484 R50_2536	
B.FirC	<i>Aceticella autotrophica</i> 3443-3Ac	aaout	ACETAC_07915	Obligately autotrophic <b>acetogenic</b> bacterium. Isolated from a sample of sediments collected from the terrestrial hot spring Kaskadny at East Thermal Field, Uzon Caldera, Kamchatka, Russia (N54 deg 30.026 min E160 deg 00.374 min, elevation 658 m) in August 2015.
B.Act	<i>Mycobacterium mantenii</i> JCM 18113	mman	MMAN_13180	Isolated from clinical specimens of patients who visited or admitted to the University of the Ryukyus Hospital.
B.Act	<i>Mycobacterium marinum</i> M	mmi	MMAR_2578	Human pathogen, Animal pathogen, Fish pathogen <a href="#">H01458</a> Nontuberculous mycobacterial infection Ubiquitous pathogen of fish and amphibia. Shown to also be a human pathogen. Facultative anaerobe. Unable to reduce nitrate and produces characteristic bright yellow carotenoid pigments when exposed to light. Isolated from a patient with fish tank granuloma in San Francisco in 1992.
B.Act	<i>Mycobacterium marinum</i> E11	mmae	MMARE11_24970	Originally isolated from <i>Dicentrarchus labrax</i> (sea bass). Displays a chronic course of infection with a typical tuberculosis-like signature in zebrafish.
B.Act	<i>Mycobacterium liflandii</i> 128FXT	mli	MULP_02305	Amphibian pathogen Originally isolated from infected <i>Xenopus tropicalis</i> at the University of California, Berkeley.
B.Act	<i>Mycobacterium pseudoshottsii</i> JCM 15466	mpse	MPSD_26320	Fish pathogen Capable of producing mycolactone. Originally isolated from wild striped bass.

B.Act	<i>Mycobacterium shottsii</i> JCM 12657	msho	MSHO_38610	Isolated from clinical specimens of patients who visited or admitted to the University of the Ryukyus Hospital.
B.Act	<i>Mycobacterium kansasii</i> ATCC 12478	mkn	MKAN_03595	Human pathogen. <b>Acid</b> -fast bacterium that can cause a pulmonary disease in immunocompromised individuals and those with underlying pulmonary conditions such as chronic obstructive pulmonary disease and silicosis. First identified in 1953 as the "yellow bacillus".
B.Act	<i>Mycobacterium basiliense</i> DSM 104308	mbai	MB901379_02380	Slow growing, nontuberculous mycobacterium (NTM). Isolated from human bronchoalveolar lavage.
B.Act	<i>Mycobacterium malmoense</i> ATCC 29571	mma m	K3U93_06350	Nontuberculous mycobacteria (NTM) strain. Isolated from lung tissue.
B.Act	<i>Mycobacterium spongiae</i> FSD4b-SM	mosp	F6B93_20030	Isolated from a <i>Fascaplysinopsis reticulata</i> sponge taken from the waters of the Great Barrier Reef in Queensland, Australia, at a depth of 25m
B.Act	<i>Candidatus</i> <i>Mycobacterium methanotrophicum</i>	mmeh	M5I08_01865	<b>Methanotroph</b> Isolated from the biofilm samples collected from the wall of Sulfur Cave in Romania (46.1 deg N, 26.0 deg E).
B.Act	<i>Mycobacterium kiyosense</i> IWGMT90018-18076	mky	IWGMT90018_1189	Scotochromogenic slow-growing mycobacterium. Isolated in Mie, Japan in 2018.
B.Act	<i>Mycolicibacterium chubuense</i> NBB4	mcb	Mycch_1653 Mycch_3473	
B.Act	<i>Mycolicibacterium vaccae</i> 95051	mvq	MYVA_3168	
B.Act	<i>Mycolicibacterium helvum</i> JCM 30396	mhev	MHEL_40770	Isolated from clinical specimens of patients who visited or admitted to the University of the Ryukyus Hospital
B.Act	<i>Mycolicibacterium farcinogenes</i> BKK/CU-MFGFA-001	mfg	K6L26_03595	Isolated from clinical specimens in Thailand.
B.Act	<i>Rhodococcus</i> sp. WMMA185	rhw	BFN03_09880	Isolated in 2011 from a marine sponge <i>Chondrilla nucula</i> collected off the coast of the Florida Keys.
B.Act	<i>Rhodococcus antarcticus</i> 75	rant	RHODO2019_06000	Aerobic strain. Isolated from Collins glacier front till, Antarctica (62 deg 10.938 min S, 058 deg 51.999 min W).
B.Act	<i>Rhodococcus</i> sp. WB1	rhow	A4U64_27440	PCB degrader. Isolated from contaminated soil in Zhejiang, China.
B.Act	<i>Streptomyces nodosus</i> ATCC 14899	snq	CP978_25595	
B.Act	<i>Streptomyces spongiicola</i> HNM0071	sspo	DDQ41_28125	Isolated from an unidentified marine sponge collected from the coast of Sanya City, PR China.
B.Act	<i>Microbacterium orticulturae</i> KACC 23027	mhot	PU630_08010	Strictly aerobic bacterium. Isolated from flowerpot soil in which a gun tree was planted in an office at the National Institute of Agricultural Sciences, Wanju-gun, Jeonju-si, Republic of Korea (35 deg 83 min 10.5 sec N 127 deg 05 min 62.8 sec E) on 29 November 2022.
B.Act	<i>Arthrobacter polaris</i> C1-1	apoa	J0916_06115	Aerobic strain. Isolated from fellfield soil samples collected from frost-sorted polygons on Jane Col, Signy Island, Maritime Antarctic (60 deg 43 min S, 45 deg 36 min W).
B.Act	<i>Sinomonas atrocyanea</i> KCTC 3377	satk	SA2016_2921	
B.Act	<i>Sinomonas cyclohexanicum</i> ATCC 51369 ( <i>Corynebacterium cyclohexanicum</i> ATCC 51369)	ccyc	SCMU_22270	Grows on cyclohexanecarboxylate (CHCA).
B.Act	<i>Nakamurella antarctica</i> s14-144	nak	EH165_02565	Isolated from a tundra soil sample collected from the South Shetland Islands of Antarctica (62 deg 22 min 34 sec S, 59 deg 42 min 34 sec W).

B.Act	<i>Acidimicrobium ferrooxidans</i> DSM 10331	afo	Afer_0291	Iron oxidation. Rapidly oxidizes iron pyrite during autotrophic growth in the absence of an enhanced CO <sub>2</sub> concentration. Isolated from hot springs in the Krysuvik geothermal area, Iceland. Ferrous-iron-oxidizing, moderately thermophilic, <b>acidophilic</b> bacteria <a href="https://doi.org/10.1099/00221287-142-4-785">https://doi.org/10.1099/00221287-142-4-785</a>
B.Cya	<i>Synechococcus</i> sp. SynAce01	syny	BM449_01575	Photosynthesis. Isolated from Ace Lake, Antarctic, by Lynne Rankin (Powell) in 1992.
B.Cya	<i>Synechococcus</i> sp. LA31	synl	KJJ24_06640	Photosynthesis. Isolated from the Narragansett Bay Time Series in Rhode Island, USA (latitude, 41.47; longitude, -71.40).
B.Cya	<i>Cyanobium</i> sp. NIES-981	cyi	CBM981_0788	Photosynthesis. Marine cyanobacterium. Isolated from tidal flat sands in Okinawa, Japan.
B.Cya	<i>Cyanobacterium aponinum</i> PCC 10605	can	Cyan10605_0858	Photosynthesis.
B.Cya	<i>Microcystis panniformis</i> FACHB-1757	mpk	VL20_2650	Photosynthesis. Water bloom-forming cyanobacterium. Isolated from Meiliang Bay of Lake Taihu in August 2011.
B.Cya	<i>Crocospaera subtropica</i> ATCC 51142 (Cyanotheca sp. ATCC 51142)	cyt	cce_0846	Photosynthesis.
B.Cya	<i>Planktothrix rubescens</i> PCC 7821	prun	PCC7821_02356	Photosynthesis. Isolated from L. Gjersjoen in Norway, 1971.
B.Gnb	<i>Dehalogenimonas formicexedens</i> NSZ-14	dfo	Dform_00106	A strictly anaerobic, Gram-stain-negative, non-spore-forming bacterium. Isolated from contaminated groundwater in Louisiana (USA).
B.Gnb	<i>Anaerolinea thermophila</i> UNI-1	atm	ANT_07360	
B.Gnb	<i>Tepidiforma flava</i> YIM 72310	tfla	O0235_06730	Thermophilic bacterium. Isolated from the sample collected from Hamazui (Frog Mouth) Hot Spring (HMZ; pH 7.2, temperature 68 deg C), located in the Rehai Geothermal Field in Tengchong County, Yunnan Province, China, at 24 deg 57 min 12.6 sec N, 98 deg 26 min 17.5 sec E.
B.Dei	<i>Oceanithermus profundus</i> DSM 14977	opr	Ocepr_1872	Isolated from samples of hydrothermal fluids and chimneys collected at the 13oN hydrothermal vent field on the East Pacific Rise at a depth of 2600 m.
B.Hyp	<i>Athalassotoga saccharophila</i> NAS-01	asac	ATHSA_0046	Anaerobic <b>thermoacidophilic</b> bacterium. Isolated from a terrestrial hot spring in Japan.
B.Fus	<i>Cetobacterium somerae</i> CS2105-BJ	csom	MKD34_03915	Isolated from the gut contents of healthy zebrafish.
A.Eur	<i>Methanocaldococcus jannaschii</i> DSM 2661	mja	MJ_1226	Autotrophic <b>methanogen</b> . Autotrophic and strict anaerobe. Produces methane. Grows at pressures of up to more than 200 atm and at an optimum temperature of near 85 deg C. Originally isolated from a sediment sample collected from the sea floor surface at the base of a 2600-m-deep "white smoker" chimney on the East Pacific Rise.
A.Eur	<i>Methanocaldococcus fervens</i> AG86	mfe	Mefer_0580	Autotrophic <b>methanogen</b>
A.Eur	<i>Methanocaldococcus vulcanius</i> M7	mvu	Metvu_0873	Autotrophic <b>methanogen</b>
A.Eur	<i>Methanocaldococcus</i> sp. FS406-22	mfs	MFS40622_0852	Autotrophic <b>methanogen</b>
A.Eur	<i>Methanocaldococcus bathoardescens</i> JH146	mjh	JH146_0615	Isolated from 26 deg C hydrothermal fluid that was flowing from a crack in basaltic rock at Marker 113 vent at Axial Seamount on the Juan de Fuca Ridge in the northeastern Pacific Ocean.
A.Eur	<i>Methanocaldococcus lauensis</i> SG7	mesg	MLAUSG7_1204	<b>Methanogen</b> . Hyperthermophilic methanogen. Obligately anaerobic, chemolithotrophic strain.

				Isolated from an active chimney sample from the ABE vent field (20 deg 46 min S, 176 deg 11 min W) at 2130 m.
A.Eur	<i>Methanocaldococcus lauensis</i> SG1	mesa	MLASG1_0573	<b>Methanogen.</b> Hyperthermophilic methanogen. Obligately anaerobic, chemolithotrophic strain. Isolated from an active chimney sample from the Tu'i Malila vent field at 1872 m depth (21 deg 59 min S, 176 deg 34 min W).
A.Eur	<i>Methanococcus aeolicus</i> Nankai-3	mae	Maeo_0802	Autotrophic <b>methanogen</b>
A.Eur	<i>Methanothermococcus okinawensis</i> IH1	mok	Metok_0504	Autotrophic <b>methanogen</b>
A.Eur	<i>Methanothermobacter thermautotrophicus</i> Delta H	mtH	MTH_481 MTH_482	Autotrophic <b>methanogen</b> <b>Lithoautotrophic</b> , thermophilic archaeon. Conserves energy by using H <sub>2</sub> to reduce CO <sub>2</sub> to CH <sub>4</sub> and synthesizes all of its cellular components from these same gaseous substrates plus N <sub>2</sub> or NH <sub>4</sub> <sup>+</sup> and inorganic salts. Isolated in 1971 from sewage sludge in Urbana, Illinois.
A.Eur	<i>Methanothermobacter tenebrarum</i> RMAS	mtee	MTTB_13520	<b>Methanogen</b> Thermophilic and hydrogenotrophic methanogen. Isolated from gas-associated formation water of a gas-producing well in a natural gas field in Japan.[PMID: <a href="#">22561588</a> ]
A.Eur	<i>Methanothermobacter</i> sp. EMTCatA1	mete	tca_00447	Reconstructed from a metagenome of a thermophilic electromethanogenic biocathode.
A.Eur	<i>Methanothermobacter</i> sp. MT-2	metz	METMT2_1403	
A.Eur	<i>Methanobacterium lacus</i> AL-21 ( <i>Methanobacterium</i> sp. AL-21)	mel	Metbo_1031	Autotrophic <b>methanogen</b> Isolated from an acidic boreal poor fen site in Alaska, USA. [PMID: <a href="#">24449792</a> ]
A.Eur	<i>Methanobacterium paludis</i> SWAN1 ( <i>Methanobacterium</i> sp. SWAN-1)	mew	MSWAN_1117 MSWAN_1175	Autotrophic <b>methanogen</b> Isolated from a near circumneutral temperate minerotrophic fen in New York State, USA. [PMID: <a href="#">24449792</a> ]
A.Eur	<i>Methanobacterium</i> sp. MB1	meth	MBMB1_2009	Isolated from a rural biogas plant producing methane-rich biogas from maize silage and cattle manure in Germany.
A.Eur	<i>Methanobacterium</i> sp. 5-4	mfeg	GCM10025860_051 GCM10025860_168	
A.Eur	<i>Thermococcus</i> sp. 5-4	thh	CDI07_04690	
A.Eur	<i>Methanosarcina barkeri</i> Fusaro	mbar	Mbar_A2777 Mbar_A2778	Autotrophic <b>methanogen</b> Utilizes four methanogenic pathways. Isolated from sediment from Lago del Fusaro, a freshwater coastal lagoon west of Naples, Italy.
A.Eur	<i>Methanosarcina barkeri</i> MS	mby	MSBRM_1448	
A.Eur	<i>Methanosarcina barkeri</i> Wiesmoor	mbw	MSBRW_1949 MSBRW_1950	
A.Eur	<i>Methanosarcina barkeri</i> 227	mbar	MSBR2_0955	
A.Eur	<i>Methanosarcina acetivorans</i> C2A	mac	MA_1678 MA_2833	Autotrophic <b>methanogen</b> Acetate-utilizing methanogen. Isolated from a marine canyon with large deposits of kelp and sea grass.
A.Eur	<i>Methanosarcina vacuolata</i> Z-761	mvc	MSVAZ_1825	
A.Eur	<i>Methanosarcina</i> sp. Kolksee	mek	MSKOL_1803	
A.Eur	<i>Methanosarcina</i> sp. WH1	mef	MSWH1_1282	
A.Eur	<i>Methanosarcina</i> sp. WWM596	meq	MSWHS_1365	
A.Eur	<i>Methanosarcina siciliae</i> C2J	msj	MSSAC_1523 MSSAC_2595	

A.Eur	<i>Methanosarcina siciliae</i> HI350	msz	MSSIH_1442 MSSIH_2176	
A.Eur	<i>Methanosarcina siciliae</i> T4/M	msw	MSSIT_1494 MSSIT_2250	
A.Eur	<i>Methanosarcina horonobensis</i> HB-1	mhor	MSHOH_1770	
A.Eur	<i>Methanococcoides burtonii</i> DSM 6242	mbu	Mbur_0068	Autotrophic <b>methanogen</b> . <b>Psychrophilic</b> methanogenic archaeon. Isolated from cold methane-saturated, anaerobic bottom waters of Ace Lake, Antarctica.
A.Eur	<i>Methanolobus mangrovi</i> FTZ2	mmav	RE476_03845	<b>Methanogen</b> <b>Methylotrophic</b> methanogen. Isolated from mangrove sediments collected from Futian Mangrove Nature Reserve, Shenzhen, PR China (22.31 deg N 114.00 deg E) in May 2021.
A.Eur	<i>Methanolobus sedimins</i> FTZ6	mseb	RE474_05855	<b>Methanogen</b> <b>Methylotrophic</b> methanogen. Isolated from mangrove sediments collected from Futian Mangrove Nature Reserve, Shenzhen, PR China (22.31 deg N 114.00 deg E) in May 2021.
A.Eur	<i>Methanoculleus bourgensis</i> MS2	mbg	BN140_2171	Autotrophic <b>methanogen</b> Capable of synthesizing methane via the hydrogenotrophic pathway utilizing hydrogen and carbon dioxide or formate as the substrates. First isolated from a digester fermenting tannery by-products inoculated with digested sewage sludge from Bourg, France.
A.Eur	<i>Methanoculleus bourgensis</i> MAB1	mema	MMAB1_2877	Isolated from a mesophilic <b>methanogenic</b> reactor operating with swine manure.
A.Eur	<i>Methanoculleus chikugoensis</i> MG62	mchk	MchiMG62_11840	Strictly anaerobic, methanogenic archaeon. Isolated from paddy field soil in Chikugo, Fukuoka, Japan. [PMID: <a href="#">11594593</a> ]
A.Eur	<i>Methanolacinia petrolearia</i> DSM 11571 ( <i>Methanoplanus petrolearius</i> DSM 11571)	mpi	Mpet_2552	Autotrophic <b>methanogen</b> Anaerobic methanogen. Isolated from an offshore oil field from the Gulf of Guinea, Africa.
A.Eur	<i>Methanoregula boonei</i> 6A8	mbn	Mboo_0927 Mboo_1257 Mboo_1501	<b>Acidophilic methanogen</b> isolated from an ombrotrophic peat bog (McLean Bog) in New York State, USA.
A.Eur	<i>Methanocella paludicola</i> SANAE	mpd	MCP_1264 MCP_1274 MCP_2468	Mesophilic, <b>hydrogenotrophic methanogen</b> . Isolated from a rice paddy soil at Nagaoka, Niigata, Japan.
A	<i>Thermoplasma acidophilum</i> DSM 1728	tac	Ta1045	<b>Thermoacidophilic</b> archaeon. Species of the genus <i>Thermoplasma</i> do not possess a rigid cell wall, but are only delimited by a plasma membrane. It thrives at 59 deg C and pH 2, which was isolated from self-heating coal refuse piles and solfataric fields.
A	<i>Picrophilus oshimae</i> DSM 9789 ( <i>Picrophilus torridus</i> DSM 9790)	pto	PTO1482	<b>Thermoacidophilic</b> organism. The smallest genome among nonparasitic aerobic microorganisms. First isolated from a dry solfataric field in northern Japan.
A	<i>Ferroplasma cidarmanus</i> Fer1	fac	FACI_IFERC01G15	<b>Acidophilic</b> archaeon. Isolated from enrichment cultures inoculated with mine water and sediment samples collected in July 1997 from the five-way site within the Richmond Mine.
A	<i>Ferroplasma acidiphilum</i> Y	fai	FAD_0498	Iron oxidation Iron-oxidising extreme <b>acidophiles</b> .
A	<i>Cuniculiplasma divulgatum</i> PM4 (=JCM 30641;=VKM B-2940)	cdiv	CPM_0095	
A	<i>Aciduliprofundum boonei</i> T469	abi	Aboo_1158	
A	<i>Aciduliprofundum</i> sp. MAR08-339	acf	AciM339_0846	

A.Cre	<i>Desulfurococcus amyolyticus</i> 1221n ( <i>Desulfurococcus kamchatkensis</i> 1221n)	dka	DKAM_1201	Anaerobic <b>organotrophic hyperthermophilic</b> crenarchaeon. Isolated from a hot spring of Uzon Caldera in Kamchatka Peninsula, Russia.
A.Cre	<i>Desulfurococcus mucosus</i> DSM 2162	dmu	Desmu_0157	Isolated from an <b>acidic</b> hot spring in Askja, Iceland.
A.Cre	<i>Thermogladius calderae</i> 1633 ( <i>Thermogladius cellulolyticus</i> 1633)	thg	TCELL_1192	Obligate anaerobe. Grows optimally at a temperature of 84 deg C and pH 7.1, isolated from the hot spring in the Uzon Caldera in Kamchatka (Russia). Capable of growing by fermentation not only on proteinaceous substrates but also on cellulose. Elemental sulfur is not obligately required but stimulates growth and is reduced to H <sub>2</sub> S.
A.Cre	<i>Sulfurisphaera ohwakuensis</i> TA-1	soh	D1869_04765	Isolated from hot spring in Ohwaku Valley, Hakone, Japan.
A.Cre	<i>Saccharolobus caldissimus</i> JCM32116	scas	SACC_25290	Hyperthermophilic archaeon. Isolated from an <b>acidic</b> terrestrial hot spring (68 deg C, pH 1.4) in Ohwaku-dani, Hakone, Japan (35 deg 14 min 22 sec N, 139 deg 01 min 07 sec E). [PMID: <a href="#">34914906</a> ]
A.Cre	<i>Saccharolobus islandicus</i> L.S.2.15 ( <i>Sulfolobus islandicus</i> L.S.2.15)	sis	LS215_0955	Carbon fixation. <b>Thermoacidophilic</b> archaeon. Isolated from Lassen National Park in California.
A.Cre	<i>Saccharolobus islandicus</i> M.14.25 ( <i>Sulfolobus islandicus</i> M.14.25)	sia	M1425_0780	Carbon fixation. <b>Thermoacidophilic</b> archaeon. Isolated from the Mutnovsky Volcano in Kamchatka, Russia.
A.Cre	<i>Saccharolobus islandicus</i> M.16.27 ( <i>Sulfolobus islandicus</i> M.16.27)	sim	M1627_0786	Carbon fixation. <b>Thermoacidophilic</b> archaeon. Isolated from the Mutnovsky Volcano in Kamchatka, Russia.
A.Cre	<i>Saccharolobus aldissimus</i> JCM32116	sid	M164_0826	Hyperthermophilic archaeon. Isolated from an <b>acidic</b> terrestrial hot spring (68 deg C, pH 1.4) in Ohwaku-dani, Hakone, Japan (35 deg 14 min 22 sec N, 139 deg 01 min 07 sec E). [PMID: <a href="#">34914906</a> ]
A.Cre	<i>Saccharolobus islandicus</i> Y.G.57.14 ( <i>Sulfolobus islandicus</i> Y.G.57.14)	siy	YG5714_0872	Carbon fixation. Thermoacidophilic archaeon. Isolated from Yellowstone National Park.
A.Cre	<i>Saccharolobus islandicus</i> Y.N.15.51 ( <i>Sulfolobus islandicus</i> Y.N.15.51)	sin	YN1551_1995	<b>Thermoacidophilic</b> archaeon. Isolated from Yellowstone National Park.
A.Cre	<i>Saccharolobus islandicus</i> L.D.8.5 ( <i>Sulfolobus islandicus</i> L.D.8.5)	sii	LD85_0717	Carbon fixation. Thermoacidophilic archaeon. Isolated from Lassen National Park in California.
A.Cre	<i>Sulfolobus</i> sp. S-194	sull	EWF20_05705	
A.Cre	<i>Metallosphaera sedula</i> DSM 5348	mse	Msed_0505	Carbon fixation, Sulfur compound oxidation. Extremely <b>thermoacidophilic</b> and metal sulfide-oxidizing archaeon.
A.Cre	<i>Metallosphaera sedula</i> MJ1HA	memj	MJ1HA_0609	Aerobic archaeal host of Nanoarchaeota archaeon MJ1. Isolated from a hot spring water sample (55 deg C, pH 2.3, salinity <0.1%) collected at Oku-Shiobara (36 deg 57 min 170 sec N 139 deg 46 min 47 sec E), Tochigi, Japan, in October 2018.
A.Cre	<i>Metallosphaera cuprina</i> Ar-4	mcn	Mcup_1591	Metal sulfide-oxidizing, <b>thermoacidophilic</b> strain. Originally isolated from a sulfuric hot spring.
A.Cre	<i>Metallosphaera hakonensis</i> JCM 8857 = DSM 7519 HO1-1	mhk	DFR87_05190	Extremely <b>thermoacidophilic</b> archaea. Isolated from geothermal field, Hakone NP, Japan.
A.Cre	<i>Metallosphaera prunae</i> Ron 12/II	mpru	DFR88_04080	
A.Cre	<i>Metallosphaera tengchongensis</i> Ric-A	mten	GWK48_10030	Isolated from the muddy water samples of sulfuric hot springs (24.57 N and 98.26 E) in Tengchong county of Yunnan Province, China.

A.Cre	<i>Metallosphaera javensis</i>	mjn	MjAS7_1246	Isolated from hot spring water (62 deg C, pH 3.3) which was collected at Kawah Domas hot springs in Tangkuban Perahu, Indonesia (6 deg 45 min 41 sec S 107 deg 37 min 32 sec E).
A.Cre	<i>Acidianus hospitalis</i> W1	aho	Ahos_2125	Sulfur compound oxidation. <b>Chemolithoautotrophic</b> and facultatively anaerobic <b>acidothermophile</b> .
A.Cre	<i>Acidianus manzaensis</i> YN-25	aman	B6F84_03420	<b>Thermoacidophilic</b> archaeon. Capable of oxidizing elemental sulfur and reduced inorganic sulfur compounds (RISCs). Shows excellent capacity for metal recovery and high efficiency of chalcopyrite bioleaching. Isolated from an <b>acid</b> thermal spring in Tengchong, China.
A.Cre	<i>Acidianus brierleyi</i> DSM 1651	abri	DFR85_05945	Extremely <b>thermoacidophilic</b> archaea. Isolated from <b>acidic</b> hot spring, Yellowstone NP, USA.
A.Cre	<i>Acidianus sulfidivorans</i> JP7	asul	DFR86_03425	Extremely <b>thermoacidophilic</b> archaea. Isolated from solfatara, Lihir Island, Papua New Guinea.
A.Cre	<i>Acidianus ambivalens</i> LEI 10	aamb	D1866_05645	Isolated from Leirhnjukur, Myvatn, Iceland.
A.Cre	<i>Acidianus</i> sp. HS-5	acih	HS5_09440	Facultatively aerobic archaea growing on elemental sulfur as an energy source. Isolated from a sulfur hot spring located in Unzen, Japan.
A.Cre	<i>Sulfodiicoccus acidiphilus</i> HS-1	sacd	HS1genome_0631	<b>Thermoacidophilic</b> archaeon. Isolated from a hot water sample (68 deg C, pH 1.4) collected at a solfataric field, Ohwaku-dani, Hakone, Japan (35 deg 14 min 22 sec N 139 deg 01 min 07 sec E). [PMID: <a href="#">28629504</a> ]
A.Cre	<i>Stygiolobus caldivivus</i> KN-1	csty	KN1_22450	Anaerobic <b>thermoacidophilic</b> crenarchaeon. Isolated from a hot spring water sample collected at the Unzen hot spring in Japan (65 deg C to 68.5 deg C, pH 2.3).
A.Cre	<i>Sulfuracidifex tepidarius</i> IC-006	step	IC006_0237	Strictly aerobic, sulfur-dependent, <b>thermoacidophilic</b> strain. Isolated from heated <b>acidic</b> soil samples obtained at a solfataric field of Hakone, Owaku-dani (Ohwaku-dani), Kanagawa, Japan (2 September 1993; 35 deg 14 min 24 sec N 139 deg 01 min 17 sec E).
A.Cre	<i>Sulfuracidifex metallicus</i> DSM 6482 = JCM 9184	smet	RQ359_001297	Obligately <b>chemolithoautotrophic</b> aerobe and sulfur oxidizer. Isolated from a solfataric field in Iceland in 1991.
A.Cre	<i>Sulfolobales</i> archaeon HS-7	sahs	HS7_04600	Isolated from muddy water collected in a 100-ml glass bottle at the Unzen hot spring in Japan (32 deg 44 min 23 sec N, 130 deg 15 min 54 sec E) (65 deg C to 68.5 deg C, pH 2.3).
A.Cre	<i>Pyrobaculum neutrophilum</i> V24Sta	tne	Tneu_1175	Carbon fixation
A.Cre	<i>Vulcanisaeta moutnovskia</i> 768-28	vmo	VMUT_0483	Dissimilatory sulfate reduction. <b>Thermoacidophilic</b> anaerobic crenarchaeon. Isolated from a hot spring in Kamchatka, Russia.
A.Cre	<i>Thermofilum pendens</i> Hrk 5	tpe	Tpen_1427	Hyperthermophilic, sulfur-dependent and anaerobic heterotroph. Isolated from a solfatara in Iceland.
A.Cre	<i>Thermofilum adornatum</i> 1910b ( <i>Thermofilum</i> sp. 1910b)	thb	N186_00545	Isolated from a mud sample from a black mud pit (86 deg C, pH 5.5) located near Pauzhetka (Kamchatka Peninsula, Russia).
A.Cre	<i>Thermofilum adornatum</i> 1505	tcb	TCARB_1189	Isolated from a terrestrial hot spring in Kamchatka (Russia) in the presence of 30% CO in the gas phase.
A.Cre	<i>Infirmitulum uzonense</i> 1807-2 ( <i>Thermofilum uzonense</i> 1807-2)	thf	MA03_02610	Isolated from a mud sample of Uzon Caldera, Kamchatka, Russia.
A.Cre	<i>Infirmitulum lucidum</i> 3507LT	thel	IG193_07990	Hyperthermophilic crenarchaeon. Isolated from a terrestrial hot spring near Tinguiririca volcano, Chile (S34 deg 57.518 min, W70 deg 26.331 min).
A.Cre	<i>Fervidicoccus fontis</i> Kam940	ffo	FFONT_0721	Thermophilic, <b>slightly acidophilic</b> and anaerobic heterotroph. Isolated from terrestrial hot springs of the Uzon caldera on the Kamchatka peninsula.
A.Cre	<i>Candidatus Korarchaeum cryptofilum</i> OPF8	kcr	Kcr_0389	Isolated terrestrial and marine thermal environments.

A.Th	<i>Conexivisphaera calida</i> NAS-02	ccai	NAS2_0141	Sulfur- and iron-reducing <b>thermoacidophilic</b> archaeon. Isolated from fluid samples collected at a thermoacidic spring at OkuShiobara, Tochigi, Japan (36 deg 57 min 17 sec N, 139 deg 46 min 47 sec E).
A	<i>Candidatus Nanopusillus acidilobi</i> 7A	naa	Nps_01260	Ectosymbiotic Nanoarchaeota. Host (Acidilobus, a crenarchaeote).
A	<i>Nanobdella aerobiophila</i> MJ1	naer	MJ1_0248 MJ1_0262	<b>Thermoacidophilic</b> , obligate symbiotic archaeon. Isolated from a hot spring water sample (55 deg C, pH 2.3, salinity <0.1%) collected at Oku-Shiobara (36 deg 57 min 170 sec N 139 deg 46 min 47 sec E), Tochigi, Japan, in October 2018.
A	<i>Candidatus Mancarchaeum acidiphilum</i> Mia14	marh	Mia14_0584	Co-cultured with <i>Cuniculiplasma divulgatum</i> PM4 during the isolation of this strain from acidic streamer in Parys Mountain (Isle of Anglesey, UK).
A	<i>Candidatus Micrarchaeum</i> sp. A_DKE	miy	Micr_00385	
A	<i>Candidatus Micrarchaeota archaeon</i> ARM-1	marv	ARM1_0407	Isolated from hot spring water (62 deg C, pH 3.3) which was collected at Kawah Domas hot springs in Tangkuban Perahu, Indonesia (6 deg 45 min 41 sec S 107 deg 37 min 32 sec E).