

S1 Table. Random sample of 50 CBB-positive genomes with literature references supporting or opposing Calvin cycle utilization and autotrophy.

Accession	Species	Comment	CBB	Ref.
GB_GCA_003137095.1	Bog-1198 sp003137095	No information	NA	NA
RS_GCF_000698555.1	<i>Caballeronia grimmiae</i>	Isolated from moss	0	[1,2]
GB_GCA_003244105.1	<i>Eremiobacter</i> sp003244105	Calvin cycle observed but not confirmed operational	1	[3]
RS_GCF_003057965.1	<i>Thermodesulfobium acidiphilum</i>	Chemolithoautotrophic	1	[4]
GB_GCA_002726415.1	GCA-2726415 sp002726415 (Acidiferrobacteraceae)	Chemolithoautotrophic	1	[5]
RS_GCF_000012425.1	<i>Dechloromonas aromatica</i>	Calvin cycle observed but not confirmed operational	1	[6]
RS_GCF_000612825.1	<i>Mycolicibacterium mageritense</i>	Human pathogen; predominantly environmental	0	[7,8]
RS_GCF_000502875.1	<i>Mesorhizobium</i> sp000502875	No information	NA	NA
GB_GCA_002366795.1	UBA3069 sp002366795 (Rhodobacteraceae)	Phototrophic; CBB-positive or -negative	1	[9,10]
GB_GCA_003165655.1	Palsa-465 sp003165655	No information	NA	NA
GB_GCA_900105125.1	<i>Bradyrhizobium canariense_A</i>	Nodulates genistoid legumes of Canary Islands	0	[11]
RS_GCF_000227215.1	<i>Acidithiobacillus thiooxidans</i>	Sulfur oxidizer that uses Calvin cycle	1	[12]
RS_GCF_001612825.1	<i>Nocardia caishijiensis</i>	Endophyte	0	[13]
RS_GCF_002903155.1	<i>Sulfobacillus</i> sp002903155	Sulfur oxidizer that uses Calvin cycle	1	[14]
RS_GCF_000297055.2	<i>Sulfuricella denitrificans</i>	Sulfur oxidizer that uses Calvin cycle	1	[15]
RS_GCF_001558155.1	<i>Pseudoruegeria_C sabulilitoris</i>	Isolated from seashore sand; Phototrophic; CBB-positive or -negative	1	[9,10,16]
RS_GCF_000196675.1	<i>Pseudonocardia dioxanivorans</i>	Chemolithoautotrophic; Uses Calvin cycle	1	[17,18]
RS_GCF_000701585.1	<i>Acidiphilium angustum</i>	Quasiphotosynthetic/Photoheterotrophic	0	[19,20]
RS_GCF_000227665.2	<i>Thiomicrospira aerophila</i>	Sulfur-oxidizing chemolithoautotroph with Rubisco	1	[21]
GB_GCA_002083395.1	<i>Nitrosomonas</i> sp002083395	Ammonia-oxidizing bacterium that uses Calvin cycle	1	[22]
RS_GCF_001613365.1	<i>Nocardia xishanensis</i>	Isolated from soil	0	[23]
GB_GCA_003221005.1	AG25 sp003221005	No information	NA	NA
GB_GCA_003138975.1	<i>Sulfotelmato bacter</i> sp003138975	Potentially sulfur- and hydrogen-oxidizing	1	[24]
RS_GCF_900104745.1	<i>Actinopolymorpha singaporensis</i>	Isolated from tropical rainforest	0	[25]
RS_GCF_001458355.1	<i>Thalassobius gelatinovor</i>	Chemo-organotroph; Phototrophic; CBB-positive or -negative	1	[9,10,26]
UBA9297	<i>Methanothrix_A</i> sp9297u	Rubisco-mediated CO ₂ reduction	1	[27]
RS_GCF_900155475.1	<i>Methylomagnum ishizawai</i>	RuMP and RuBP (Calvin cycle) pathways active	1	[28]
RS_GCF_000013085.1	<i>Rhodospirillum rubrum</i>	Photoautotroph that uses the Calvin cycle	1	[9]
RS_GCF_900104845.1	<i>Paraburkholderia_B caballeronis</i>	Tomato-associated	0	[29]

RS_GCF_001583505.1	<i>Marichromatium gracile</i>	Sulfur-oxidation and denitrification	1	[30]
RS_GCF_003053725.1	<i>Rhodovulum kholense</i>	Photolithoautotrophic; Phototrophic; CBB- positive or -negative	1	[9,10,31]
GB_GCA_002695745.2	GCA-002705045 sp002695745 (Rhodobacteraceae)	Phototrophic; CBB-positive or -negative	1	[9,10]
GB_GCA_001512375.1	<i>Methanoculleus thermohydrogenotrophicum</i>	Hydrogenotrophic methanogen	0	[32]
GB_GCA_003104975.1	<i>Methylomirabilis sp003104975</i>	Uses Calvin cycle	1	[33]
GB_GCA_001447805.1	<i>Tenderia electrophaga</i>	Electroautotroph that uses the Calvin cycle	1	[34,35]
RS_GCF_900129505.1	<i>Bradyrhizobium erythrophlei_D</i>	Isolated from ironwood nodules	0	[36]
RS_GCF_000787695.1	<i>Paracoccus</i> sp000787695 (Rhodobacteraceae)	Phototrophic; CBB-positive or -negative	1	[9,10,37]
RS_GCF_001295865.1	<i>Rubrivivax</i> sp001295865	Chemolithoautotrophic; Uses Calvin cycle	1	[38]
RS_GCF_000304355.2	<i>Methanoculleus bourgensis</i>	Hydrogenotrophic methanogen	0	[39]
GB_GCA_003233235.1	SZUA-26 sp003233235 (Mariprofundaceae)	Iron-oxidizing chemolithoautotroph; Has Calvin cycle genes	1	[40]
GB_GCA_003446655.1	<i>Thauera</i> sp003446655	Chemolithoautotrophic	1	[41]
GB_GCA_002839575.1	<i>Methanoculleus sp002839575</i>	Hydrogenotrophic methanogen	0	[32,39]
GB_GCA_003160215.1	Bog-257 sp003160215	No information	NA	NA
GB_GCA_001899775.1	<i>Thiobacillus</i> sp001899775	Chemolithoautotrophic; Uses Calvin cycle	1	[42,43]
GB_GCA_003138855.1	Bog-756 sp003138855	No information	NA	NA
GB_GCA_002256995.1	<i>Thiobacillus</i> sp002256995	Chemolithoautotrophic; Uses Calvin cycle	1	[42,43]
GB_GCA_003157035.1	Fen-999 sp003157035 (Rhodocyclaceae)	Some family members are photoautotrophic	1	[21]
GB_GCA_003228405.1	SZUA-229 sp003228405	No information	NA	NA
RS_GCF_000243255.1	<i>Methanoplanus limicola</i>	Methanogen	0	[44]
GB_GCA_002256785.1	<i>Thiobacillus</i> sp002256785	Chemolithoautotrophic; Uses Calvin cycle	1	[42,43]

The columns contain GTDB accession ID ('Accession'), species name from GTDB ('Species'; family name is given within parentheses if used for conclusion), a comment regarding Calvin cycle utilization and autotrophy or other acquired information ('Comment'), statement about Calvin cycle confirmation ('CBB'; 1 if likely confirmed, 0 if not likely confirmed, NA if there was no information), and references for the comment ('Ref.'). There was no information available for seven genomes. For the remaining 43 genomes, 30 (70%) appeared to be likely Calvin-cycle positive genomes, but only one (2%) genome appeared unlikely to be Calvin-cycle positive given its status as a human pathogen (*Mycolicibacterium mageritense*).

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