WP2, D2.4, D13 A CATALOGUE OF THE ACTIVE MICROBIAL DIVERSITY IN SUBGLACIAL HABITATS

Project Number:	10107276
Project name:	Center for Glacial Biome Doctoral Network
Project Acronym:	ICEBIO
Call:	HORIZON-MSCA-2021-DN-01
Topic:	HORIZON-MSCA-2021-DN-01-01
Type of Action:	HORIZON-TMA-MSCA-DN
Service:	REA/A/01
Project Start Date:	1 October 2022
Project Duration:	48 months
Deliverable Title:	A Catalogue of the Active Microbial Diversity in Subglacial Habitats
Deliverable Number:	D2.4
Type:	Document, report
Due date (month):	35
Lead Beneficiary:	AU
Dissemination Level:	PU – Public
Work Package No:	WP1
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Funded by the European Union

ICEBIO

1. Introduction

The cryosphere, the frozen parts of our planet, hides some of Earth's greatest wetland systems: subglacial networks of lakes, rivers, and water-saturated sediments teeming with microbial life (Vincent & Laybourn-Parry, 2008). Beneath ice sheets and glaciers, wet habitats persists where pressure, geothermal heat, and friction maintain liquid water at the pressure-melting point (Pattyn et al., 2016). The vastness of these hidden worlds is still unknown. Modelling studies predict that subglacial lakes alone may cover about 5% (≈590,000 km^2) of the bed of grounded Antarctic ice (Goeller et al., 2016). This estimate excludes subglacial rivers and water-saturated sediments. The true extent of the subglacial Antarctic "wetland" system may be far larger, rivalling the West Siberian Lowland peatlands (~900,000 km^2), often cited as Earth's largest wetland complex (Kremenetski et al., 2003). Given their vast extent and connectivity, subglacial systems may exert a greater influence on global biogeochemical cycles than is currently recognized.

Life in these hidden ecosystems is sustained by energy and nutrients derived from water–rock interactions and relict sources (e.g., glacier-overridden organic matter and ancient lacustrine or marine sediments). Mechanical comminution and mineral weathering of basal rocks release electron donors (e.g., H_2, Fe^{2+}, reduced sulphur), electron acceptors (e.g., SO_4^{2-}, NO_3^-, Fe^{3+}), and short-chain hydrocarbons, while relict organic matter and supraglacial inputs add additional substrates (Gill-Olivas et al., 2021). Spatial variability in bedrock composition, hydrology, geothermal flux, and basal-ice structure (driven by glacier motion) creates a mosaic of microbial habitats beneath the ice that support chemolithoautotrophic primary production and a range of heterotrophic and anaerobic processes, including fermentation, denitrification, sulphate and iron reduction, and methanogenesis, alongside the oxidation of methane, ferrous iron, and reduced sulphur (Achberger et al., 2016; Doyle & Christner, 2022; A. J. Dubnick et al., 2023; Kayani et al., 2018; Michaud et al., 2017; Nixon et al., 2017). Yet the extent and distribution of microbial functional diversity and activity remain poorly understood because clean-access sampling of these isolated systems is logistically challenging.

To date, only a small number of subglacial sites have been explored. Most studies have focused on two habitats: debris-rich basal ice and subglacial lakes. This report assembles records from these habitats spanning Greenland, Antarctica, Iceland, the Canadian Arctic, Alaska, and the Qinghai–Tibet Plateau. The main output of this report is a catalogue of the microbial diversity of these two subglacial habitats. First, a brief overview of key microbial processes for each habitat is provided, inferred from the compiled catalogues, after which the taxonomic catalogues, with updated nomenclature (according to the SILVA 138.2 database), are presented at the end of the report. The catalogues primarily report bacterial taxa, with only a few archaeal findings. Eukaryotes are not included due to limited data available, only two studies have explored eukaryotic diversity in these habitats, both analysing the same sample (D'Elia et al., 2009; Shtarkman et al., 2013).

2. Brief overview of microbial processes in basal ice and subglacial lakes

2.1. Basal ice

Basal ice at glacier beds, especially debris-rich ice that is created when moving ice entrains and mixes with the underlying sediment, harbours abundant and taxonomically diverse microbial communities. Studies show that debris-laden basal ice supports metabolically active bacteria spanning various phylogenetic groups, including aerobes and anaerobes, whereas clean (sediment-poor) basal ice holds lower biomass communities resembling those of meteoric and englacial ice (Doyle & Christner, 2022; A. Dubnick et al., 2020). Signs of in situ microbial activity in basal ice have been detected: distinctive isotopic gas patterns,

elevated 16S rRNA-to-rDNA ratios, and higher ATP levels suggest that some microbes may be metabolically active inside basal ice (Doyle & Christner, 2022; Kayani et al., 2018). Far from being entirely solid, basal ice may host a network of intercrystalline brine veins and liquid pockets formed by solute exclusion during freezing. These aqueous microhabitats can entrap microorganisms and support activity at subzero temperatures (Bakermans & Skidmore, 2011a, 2011b).

Studies of debris-rich basal ice from Antarctica, Greenland, North America, and Asia (Table 1) consistently find communities dominated by Bacillota, Actinomycetota, and Pseudomonadota, with Gammaproteobacteria typically more prevalent. Other groups, such as Acidobacteriota, Chloroflexota (Chloroflexi), and Bacteroidota (Bacteroidetes), occur less frequently. Phyla like Nitrospirota, Campylobacterota, and Gemmatimonadota have been reported only in a few locations (in Antarctic and Canadian basal ice). Within these communities are lineages associated with iron and sulphur metabolisms. Enrichment cultures of basal sediment from Arctic and Greenland glaciers yielded typical Fe(III)-reducing taxa, including *Desulfosporosinus* (Bacillota) and *Geobacter* (Thermodesulfobacteriota), *Chlostridium* (Bacillota), *Desulfitobacterium* (Bacillota), and *Rhodoferax* (Pseudomonadota). *Thiobacillus* and *Rhodoferax* (associated with sulphur and iron oxidation) have also been directly detected in Antarctic basal ice. Based on RNA-derived 16S profiles from the basal ice of the Matanuska Glacier (Alaska) and Taylor Glacier (Antarctica), Bacillota, Thermodesulfobacteriota, and Chloroflexota are among the most active phyla. Together, these studies suggest active iron- and sulphur cycling beneath glaciers. In addition, predictive functional profiling indicates enrichment of genes related to anaerobic carbon fixation and fermentation relative to surface ice, suggesting that heterotrophic and chemolithoautotrophic metabolisms prevail beneath the ice. Lastly, broadly distributed cryospheric generalists (e.g., *Polaromonas*, *Variovorax*, *Massilia*, *Glaciimonas*, *Bacillus*, *Kocuria*) also appear to constitute a substantial portion of the basal ice community.

In summary, the limited but growing evidence indicates that debris-rich basal ice supports an active microbial community carrying out heterotrophic and fermentative processes and driving iron, sulphur, and nitrogen cycling.

2.2. Subglacial lakes

Subglacial lakes are bodies of liquid water trapped beneath ice sheets or caps, maintained in liquid form by the pressure of overlying ice and geothermal/frictional heating. About 800 subglacial lakes have currently been mapped beneath the Antarctic and Greenland ice sheets and under Icelandic ice caps, with a few known from Arctic ice caps and valley glaciers (for a global inventory, see Livingstone et al., 2022). Two types of subglacial lakes are recognised: active lakes, which are hydrologically connected and undergo repeated fill-and-drain cycles, and inactive lakes, which are hydraulically isolated and relatively stable. This hydrological contrast may strongly influence microbial habitats: active lakes can receive seasonal pulses of oxygenated meltwater and solutes (and microbial) from upstream sources, including the supraglacial system, whereas inactive lakes rely on in situ water-rock reactions and recycling of internal nutrients. To date, only a handful of subglacial lakes have been directly accessed through clean drilling operations and include Subglacial Lake Whillans (SLW) and Lake Mercer in West Antarctica, the Icelandic lakes beneath Grímsvötn and the East/West Skaftárkatlar, and the deep, isolated Lake Vostok in East Antarctica.

Bacterial communities in subglacial lakes are typically dominated by Pseudomonadota, Actinomycetota, Bacillota, and Bacteroidota (Table 2). Similar to basal ice, almost all sequences are bacterial. Only a few archaeal sequences were recovered from SLW, represented by *Candidatus Nitrosoarchaeum* (a Thaumarchaeota ammonia-oxidizer). The SLW water column and sediments are rich in chemoautotrophic bacteria: 16S rDNA and rRNA analyses detected abundant sulphur-oxidizing *Thiobacillus* and iron-

oxidizing *Sideroxydans*, along with the methane-oxidizer *Methylobacter*. The presence of *Ca*. *Nitrosoarchaeum* and nitrite-oxidizers (e.g. *Nitrotoga*) also indicates active nitrification in SLW. Large rRNA:rDNA ratios observed for many taxa (e.g. *Albidiferax*, *Methylobacter*, *Nitrotoga*, *Sideroxydans*) suggest that these microbes are active in situ. Other work on SLW revealed *pmoA* genes (methane monooxygenase) and isotope evidence confirming aerobic methanotrophy beneath the West Antarctic Ice Sheet.

Genus-level detections across lakes highlight various functional guilds. For example, Hydrogenophilus *thermoluteolus* (a thermophilic hydrogen-oxidizer) was detected in Vostok accretion ice, implying hydrogen-driven chemolithotrophy in that system. In SLW, *Methylobacter* (an aerobic methanotroph) was prevalent. Iron-cycling bacteria such as *Rhodoferax* also occur in subglacial waters. The Icelandic subglacial lakes, influenced by volcanic geothermal inputs, are dominated by chemolithotrophs such as *Sulfuricurvum* and *Sulfurospirillum* (Campylobacterota) and by fermentative Bacillota, reflecting the sulphur-rich geochemistry.

From the studies compiled, it is clear that subglacial lakes harbour active microbial communities whose functions reflect lake geochemistry. Chemolithoautotrophy using H_2, reduced sulphur compounds (e.g. S^{2-}), ferrous iron, and small organics appears prevalent, along with both aerobic and anaerobic heterotrophy. Other documented processes include methane oxidation (driven by *Methylobacter*), denitrification, sulphate reduction, iron oxidation/reduction, and ammonia oxidation, as well as anaerobic ammonium oxidation (anammox) by putative representatives of *Candidatus Jettenia* and *Brocadia*.

3. Taxonomic Catalogues of Subglacial Microbial Diversity

Table 1. Taxonomic catalogue of bacteria from debris-rich basal ice

Names are updated to the SILVA r138.2 database. Sequences were not re-analysed; therefore, lineage assignments follow those reported in the original studies and may differ from placements obtained with newer phylogenetic workflows and updated databases. This table is a catalogue of the prokaryotic diversity reported to date. No reclassification of sequences was performed. For any thorough analysis or reuse of these records, readers should consult the cited papers and the underlying data reported therein.

Sources and methods used for this catalogue:

This catalogue draws on seven basal-ice studies. Most used 16S rRNA gene amplicon sequencing (V4 or V3-V4): Sverdrup Glacier, **Canada** (A. J. Dubnick et al., 2023); Taylor Glacier, **Antarctica** (Doyle & Christner, 2022), which also included rRNA-derived cDNA libraries; Devon Ice Cap, **Canada** (A. Dubnick et al., 2020); and Dongkemadi Glacier on the Qinghai–Tibet Plateau, **China** (Ren et al., 2022). A multi-omic study at Matanuska Glacier, **Alaska (USA)** combined 16S rDNA, 16S rRNA (cDNA) amplicons, and shotgun metagenomics (Kayani et al., 2018). Work on the Greenland Ice Sheet, **Greenland**, characterised cultured isolates by Sanger 16S rRNA gene sequencing (Miteva et al., 2004). Finally, iron-reducing enrichments were profiled with 16S sequencing at Engabreen (**Norway**), Finsterwalderbreen (**Svalbard, Norway**), Leverett and Russell (**Greenland**), and Lower Wright (**Antarctica**) (Nixon et al., 2017). Data from these studies underpin Table 1.

Phylum	Class	Order	Family	Genus	Glacier	Location	Authors
Acidobacteriota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Acidobacteriota					Matanuska Glacier	Alaska	Kayani et al., 2018
Acidobacteriota	Holophagae	Holophagales	Holophagaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Actinomycetota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Actinomycetota					Taylor Glacier	Antarctica	Doyle & Christner, 2022
Actinomycetota	Actinobacteria				Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Actinomycetota	Actinobacteria				Matanuska Glacier	Alaska	Kayani et al., 2018
Actinomycetota	Actinobacteria	Frankiales			Taylor Glacier	Antarctica	Doyle & Christner, 2022
Actinomycetota	Actinobacteria	Frankiales	Nakamurellaceae	*Nakamurella*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales			Taylor Glacier	Antarctica	Doyle & Christner, 2022
Actinomycetota	Actinobacteria	Micrococcales	Demequinaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Actinomycetota	Actinobacteria	Micrococcales	Intrasporangiaceae	*Janibacter*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Curtobacterium*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Frigoribacterium*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Microbacterium*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Plantibacter*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Arthrobacter*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Kocuria*	Taylor Glacier	Antarctica	Doyle & Christner, 2022
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Kocuria*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Micrococcus*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Mycobacteriales	Nocardiaceae	*Rhodococcus*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Actinobacteria	Mycobacteriales	Nocardiaceae	*Williamsia*	Greenland ice sheet	Greenland	Miteva et al., 2004
Actinomycetota	Thermoleophilia				Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Bacillota					Taylor Glacier	Antarctica	Doyle & Christner, 2022
Bacillota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Bacillota	Bacilli	Alicyclobacillales	Alicyclobacillaceae	*Tumebacillus*	Taylor Glacier	Antarctica	Doyle & Christner, 2022

Bacillota	Bacilli	Bacillales	Bacillaceae		Taylor Glacier	Antarctica	Doyle & Christner, 2022
Bacillota	Bacilli	Bacillales	Bacillaceae	*Bacillus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Bacillales	Planococcaceae	*paenisporosarcina*	Taylor Glacier	Antarctica	Doyle & Christner, 2022
Bacillota	Bacilli	Bacillales	Planococcaceae	*Sporosarcina*	Greenland ice sheet	Greenland	Miteva et al., 2004
Bacillota	Bacilli	Exiguobacterales	Exiguobacteraceae	*Exiguobacterium*	Greenland ice sheet	Greenland	Miteva et al., 2004
Bacillota	Bacilli	Lactobacillales	Aerococcaceae	*Aerococcus*	Greenland ice sheet	Greenland	Miteva et al., 2004
Bacillota	Bacilli	Lactobacillales	Enterococcaceae	*Enterococcus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Lactobacillales	Lactobacillaceae	*Lactobacillus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Lactobacillales	Lactobacillaceae	*Pediococcus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Lactobacillales	Leuconostocaceae	*Weissella*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Lactobacillales	Streptococcaceae	*Lactococcus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Lactobacillales	Streptococcaceae	*Streptococcus*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Bacillota	Bacilli	Paenibacillales	Paenibacillaceae	*Paenibacillus*	Greenland ice sheet	Greenland	Miteva et al., 2004
Bacillota	Clostridia	Clostridiales	Clostridiaceae	*Clostridium*	Engabreen	Norway	Nixon et al., 2017
Bacillota	Clostridia	Clostridiales	Clostridiaceae	*Clostridium*	Leverett	Greenland	Nixon et al., 2017
Bacillota	Clostridia	Clostridiales	Clostridiaceae	*Clostridium*	Fresh Leverett	Greenland	Nixon et al., 2017
Bacillota	Clostridia	Clostridiales	Clostridiaceae	*Clostridium*	Russell	Greenland	Nixon et al., 2017
Bacillota	Clostridia	Peptostreptococcales-Tissierellales	Fusibacteraceae	*Fusibacter*	Taylor Glacier	Antarctica	Doyle & Christner, 2022
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfitobacterium*	Leverett	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfitobacterium*	Fresh Leverett	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfitobacterium*	Russell	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfitobacterium*	Lower Wright	Antarctica	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Engabreen	Norway	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Finsterwalderbreen	Norway (Svalbard)	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Leverett	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Fresh Leverett	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Russell	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Lower Wright	Antarctica	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Syntrophobotulaceae	*Dehalobacter*	Fresh Leverett	Greenland	Nixon et al., 2017
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Syntrophobotulaceae	*Dehalobacter*	Lower Wright	Antarctica	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae		Finsterwalderbreen	Norway (Svalbard)	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae		Leverett	Greenland	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae		Fresh Leverett	Greenland	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae		Russell	Greenland	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae		Lower Wright	Antarctica	Nixon et al., 2017
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae	*Anaerosinus*	Leverett	Greenland	Nixon et al., 2017
Bacteroidota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Bacteroidota	Bacteroidia				Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Bacteroidota	Bacteroidia				Taylor Glacier	Antarctica	Doyle & Christner, 2022
Bacteroidota	Bacteroidia	Cytophagales	Hymenobacteraceae	*Hymenobacter*	Greenland ice sheet	Greenland	Miteva et al., 2004
Campylobacterota	Campylobacteria				Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Campylobacterota	Campylobacteria				Taylor Glacier	Antarctica	Doyle & Christner, 2022
Campylobacterota	Campylobacteria				Devon Ice Cap	Canada	A. Dubnick et al., 2020
Campylobacterota	Campylobacteria				Matanuska Glacier	Alaska	Kayani et al., 2018
Chloroflexota	Anaerolineae	Anaerolineales	Anaerolineaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Cyanobacteriota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Gemmatimonadota					Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Gemmatimonadota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Nitrospirota					Taylor Glacier	Antarctica	Doyle & Christner, 2022
Nitrospirota					Matanuska Glacier	Alaska	Kayani et al., 2018
Nitrospirota	Nitrospinia	Nitrospinales	Nitrospinaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Nitrospirota	Nitrospirales	Nitrospiraceae	Nitrospiraceae		Matanuska Glacier	Alaska	Kayani et al., 2018

Nitrospirota	Thermodesulfovibrionia				Taylor Glacier	Antarctica	Doyle & Christner, 2022
Pseudomonadota					Taylor Glacier	Antarctica	Doyle & Christner, 2022
Pseudomonadota					Devon Ice Cap	Canada	A. Dubnick et al., 2020
Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Brevundimonas*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Beijerinckiaceae	*Methylorubrum*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Gammaproteobacteria				Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales			Taylor Glacier	Antarctica	Doyle & Christner, 2022
Pseudomonadota	Gammaproteobacteria	Burkholderiales			Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Polaromonas*	Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Rhodoferax*	Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Rhodoferax*	Leverett	Greenland	Nixon et al., 2017
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Rhodoferax*	Lower Wright	Antarctica	Nixon et al., 2017
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Variovorax*	Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Methylophilaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Oxalobacteraceae		Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Oxalobacteraceae	*Massilia*	Sverdrup Glacier	Canada	A. J. Dubnick et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Rhodocyclaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Enterobacteriaceae		Qinghai–Tibet Plateau	China	Ren et al., 2022
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Enterobacteriaceae	*Klebsiella*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Erwiniaceae	*Pantoea*	Qinghai–Tibet Plateau	China	Ren et al., 2022
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Yersiniaceae	*Serratia*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Gammaproteobacteria	Lysobacterales	Lysobacteraceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Pseudomonadota	Gammaproteobacteria	Lysobacterales	Lysobacteraceae	*Stenotrophomonas*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Enhydrobacter*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Pseudomonas*	Greenland ice sheet	Greenland	Miteva et al., 2004
Pseudomonadota	Hydrogenophilia	Hydrogenophilales	Hydrogenophilaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Thermodesulfobacteriota					Taylor Glacier	Antarctica	Doyle & Christner, 2022
Thermodesulfobacteriota	Desulfobulbia	Desulfobulbales	Desulfobulbaceae		Matanuska Glacier	Alaska	Kayani et al., 2018
Thermodesulfobacteriota	Desulfobulbia	Desulfobulbales	Desulfocapsaceae	*Desulfocapsa*	Taylor Glacier	Antarctica	Doyle & Christner, 2022
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Leverett	Greenland	Nixon et al., 2017
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Fresh Leverett	Greenland	Nixon et al., 2017
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Russell	Greenland	Nixon et al., 2017
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Lower Wright	Antarctica	Nixon et al., 2017
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Matanuska Glacier	Alaska	Kayani et al., 2018

Table 2. Taxonomic catalogue of bacteria from subglacial lakes

Names are updated to the SILVA r138.2 database. Sequences were not re-analysed; therefore, lineage assignments follow those reported in the original studies and may differ from placements obtained with newer phylogenetic workflows and updated databases. This table is a catalogue of the prokaryotic diversity reported to date. No reclassification of sequences was performed. For any thorough analysis or reuse of these records, readers should consult the cited papers and the underlying data reported therein. Archaeal records are indicated by **bold taxonomic ranks** and an asterisk (*****).

Sources and methods used for this catalogue:

This catalogue compiles microbiological taxonomic data from subglacial lakes in Antarctica and Iceland. Work on **Lake Vostok, Antarctica** is dominated by 16S rRNA gene clone libraries from environmental DNA and from isolates (Bulat et al., 2004, 2018; Christner et al., 2001; Priscu et al., 1999), along with functional-gene PCR/cloning targeting 16S rRNA plus RuBisCO and NiFe-hydrogenase markers (Lavire et al., 2006). Vostok studies also include Sanger 16S sequencing of isolates (D'Elia et al., 2008) and shotgun metagenomics of accretion ice (Shtarkman et al., 2013). Clean-access drilling at **Lake Whillans, Antarctica** produced 16S rRNA amplicon community profiles (Achberger et al., 2016) and pmoA gene cloning indicating aerobic methanotrophy (Michaud et al., 2017). At Lake Mercer, Antarctica, datasets comprise 16S V4 amplicons (Davis et al., 2023) and single-cell amplified genomes (SAGs) from water and surface sediments (Kim et al., 2025). In **Iceland**, **Grímsvötn** and **Skaftárkatlar** were investigated with 16S clone libraries (Gaidos et al., 2004; Marteinsson et al., 2013) and, more recently, metagenomics (Vannier et al., 2023).

Phylum	Class	Order	Family	Genus	Lake	Location	Authors
Acidobacteriota	Terriglobia				Mercer	Antarctica	Kim et al., 2025
Acidobacteriota	Vicinamibacteria	Vicinamibacterales			Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Actinobacteria				Vostok	Antarctica	D'Elia et al., 2008
Actinomycetota	Actinobacteria				Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria				Whillans	Antarctica	Achberger et al., 2016
Actinomycetota	Actinobacteria				Mercer	Antarctica	Davis et al., 2023
Actinomycetota	Actinobacteria				Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Acidimicrobiia				Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Acidimicrobiia	Acidimicrobiales			Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Acidimicrobiia	Acidimicrobiales	Ilumatobacteraceae		Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Acidimicrobiia	Microtrichales	Ilumatobacteraceae	*Ilumatobacter*	Whillans	Antarctica	Achberger et al., 2016
Actinomycetota	Acidimicrobiia	Microtrichales	Ilumatobacteraceae	*Ilumatobacter*	Mercer	Antarctica	Davis et al., 2023
Actinomycetota	Acidimicrobiia	Microtrichales	Microtrichaceae	*Candidatus Planktophila*	Whillans	Antarctica	Achberger et al., 2016
Actinomycetota	Actinobacteria	Actinomycetales	Actinomycetaceae	*Actinomyces*	Vostok	Antarctica	Priscu et al., 1999
Actinomycetota	Actinobacteria	Actinomycetales	Actinomycetaceae	*Actinomyces*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Actinomycetales	Microbacteriaceae	*Phycicola*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Bifidobacteriales	Bifidobacteriaceae	*Bifidobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Bifidobacteriales	Bifidobacteriaceae	*Parascardovia*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Kitasatosporales	Streptomycetaceae	*Streptomyces*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Cellulomonadaceae	*Cellulomonas*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Actinomycetota	Actinobacteria	Micrococcales	Dermabacteraceae	*Brachybacterium*	Vostok	Antarctica	Christner et al., 2001
Actinomycetota	Actinobacteria	Micrococcales	Dermabacteraceae	*Dermabacter*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Dermatophilaceae	*Dermatophilus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Dermatophilaceae	*Mobilicoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Intrasporangiaceae	*Arsenicicoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Intrasporangiaceae	*Janibacter*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Intrasporangiaceae	*Terracoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae		Vostok	Antarctica	Shtarkman et al., 2013

Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Agrococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Frigoribacterium*	Vostok	Antarctica	D'Elia et al., 2008
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Frigoribacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Leifsonia*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Microbacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Microbacterium*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Microbacterium*	Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Actinobacteria	Micrococcales	Microbacteriaceae	*Subtercola*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae		Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Arthrobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Arthrobacter*	Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Kocuria*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Micrococcus*	Vostok	Antarctica	D'Elia et al., 2008
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Micrococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Nesterenkonia*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Rothia*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Micrococcales	Micrococcaceae	*Yaniella*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Mycobacteriales	Corynebacteriaceae	*Corynebacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Mycobacteriales	Dietziaceae	*Dietzia*	Whillans	Antarctica	Achberger et al., 2016
Actinomycetota	Actinobacteria	Mycobacteriales	Mycobacteriaceae	*Mycobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Nanopelagicales	Nanopelagicaceae		Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Actinobacteria	Nanopelagicales	Nanopelagicaceae	*Planktophila*	Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Actinobacteria	Propionibacteriales	Nocardioidaceae	*Marmoricola*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Propionibacteriales	Nocardioidaceae	*Nocardioides*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Propionibacteriales	Propionibacteriaceae	*Propionibacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Streptosporangiales	Thermomonosporaceae	*Actinoallomurus*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Actinobacteria	Streptosporangiales	Thermomonosporaceae	*Thermomonospora*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Coriobacteriia	Coriobacteriales	Atopobiaceae	*Atopobium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Coriobacteriia	Coriobacteriales	Eggerthellaceae	*Denitrobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Actinomycetota	Rubrobacteria	Rubrobacterales	Rubrobacteriaceae	*Rubrobacter*	Vostok	Antarctica	Christner et al., 2001
Actinomycetota	Thermoleophilia	Gaiellales			Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Thermoleophilia	Gaiellales	Gaiellaceae		Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Thermoleophilia	Gaiellales	Gaiellaceae	*Gaiella*	Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Thermoleophilia	Gaiellales	Gaiellaceae	*Gaiellasilicea*	Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Thermoleophilia	Miltoncostaeales	Miltoncostaeaceae		Mercer	Antarctica	Kim et al., 2025
Actinomycetota	Thermoleophilia	Solirubrobacterales	Solirubrobacteraceae		Mercer	Antarctica	Kim et al., 2025
Armatimonadota					Whillans	Antarctica	Achberger et al., 2016
Bacillota	Bacilli	Acholeplasmatales	Acholeplasmataceae	*Acholeplasma*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Alicyclobacillales	Alicyclobacillaceae	*Alicyclobacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Alicyclobacillales	Alicyclobacillaceae	*Tumebacillus*	Vostok	Antarctica	Bulat et al., 2018
Bacillota	Bacilli	Bacillales	Bacillaceae	*Alkalilactibacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Bacillaceae	*Anoxybacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Bacillaceae	*Bacillus*	Vostok	Antarctica	D'Elia et al., 2008
Bacillota	Bacilli	Bacillales	Bacillaceae	*Bacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Marinococcaceae	*Marinococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Marinococcaceae	*Sinobaca*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Planococcaceae	*Planococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Bacillales	Planococcaceae	*Sporosarcina*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Erysipelotrichales	Erysipelotrichaceae	*Erysipelothrix*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Erysipelotrichales	Erysipelotrichaceae	*Erysipelothrix*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacillota	Bacilli	Lactobacillales	Carnobacteriaceae	*Alkalibacterium*	Vostok	Antarctica	Christner et al., 2001
Bacillota	Bacilli	Lactobacillales	Carnobacteriaceae	*Carnobacterium*	Vostok	Antarctica	D'Elia et al., 2008
Bacillota	Bacilli	Lactobacillales	Carnobacteriaceae	*Carnobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Carnobacteriaceae	*Trichococcus*	Vostok	Antarctica	Shtarkman et al., 2013

Bacillota	Bacilli	Lactobacillales	Enterococcaceae	*Enterococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Enterococcaceae	*Melissococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Enterococcaceae	*Tetragenococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Lactobacillaceae	*Lactiplantibacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Lactobacillaceae	*Pediococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Listeriaceae	*Listeria*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Streptococcaceae	*Lactococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Streptococcaceae	*Streptococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Lactobacillales	Vagococcaceae	*Vagococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Mycoplasmatales	Mycoplasmataceae	*Mycoplasma*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Mycoplasmatales	Mycoplasmataceae	*Spiroplasma*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Paenibacillales	Paenibacillaceae	*Paenibacillus*	Vostok	Antarctica	Christner et al., 2001
Bacillota	Bacilli	Paenibacillales	Paenibacillaceae	*Paenibacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Paenibacillales	Paenibacillaceae	*Saccharibacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Staphylococcales	Staphylococcaceae	*Jeotgalicoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Staphylococcales	Staphylococcaceae	*Macrococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Staphylococcales	Staphylococcaceae	*Salinicoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Bacilli	Staphylococcales	Staphylococcaceae	*Staphylococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Clostridiales	Clostridiaceae		Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Clostridiales	Clostridiaceae	*Clostridium*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Eubacteriales	Eubacteriaceae	*Acetobacterium*	Skaftárkatlar (east)	Iceland	Marteinsson et al., 2013
Bacillota	Clostridia	Eubacteriales	Eubacteriaceae	*Acetobacterium*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacillota	Clostridia	Eubacteriales	Eubacteriaceae	*Eubacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Lachnospirales	Lachnospiraceae		Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Lachnospirales	Lachnospiraceae	*Robinsoniella*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Oscillospirales	Butyricicoccaceae	*Butyricicoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Oscillospirales	Oscillospiraceae	*Flavonifractor*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Oscillospirales	Ruminococcaceae	*Ruminococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Clostridia	Peptococcales	Peptococcaceae	*Desulfosporosinus*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacillota	Clostridia	Peptostreptococcales-Tissierellales	Peptostreptococcaceae	*Peptostreptococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Desulfitobacteriia	Desulfitobacteriales	Desulfitobacteriaceae	*Desulfosporosinus*	Skaftárkatlar (east)	Iceland	Marteinsson et al., 2013
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Selenomonadaceae	*Pectinatus*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Selenomonadaceae	*Selenomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Sporomusaceae	*Pelosinus*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacillota	Negativicutes	Veillonellales-Selenomonadales	Veillonellaceae	*Veillonella*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota					Whillans	Antarctica	Achberger et al., 2016
Bacteroidota	Bacteroidia				Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Bacteroidales	Bacteroidaceae	*Bacteroides*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Bacteroidales	Paludibacteraceae	*Microbacter*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacteroidota	Bacteroidia	Bacteroidales	Paludibacteraceae	*Paludibacter*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacteroidota	Bacteroidia	Bacteroidales	Prevotellaceae	*Paraprevotella*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Bacteroidales	Prevotellaceae	*Prevotella*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Bacteroidales	Prolixibacteraceae		Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacteroidota	Bacteroidia	Bacteroidales	Tannerellaceae	*Parabacteroides*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Chitinophagales	Chitinophagaceae	*Ferruginibacter*	Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Chitinophagales	Chitinophagaceae		Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Chitinophagales	Chitinophagaceae	*Niveitalea*	Mercer	Antarctica	Davis et al., 2023
Bacteroidota	Bacteroidia	Chitinophagales	Saprospiraceae		Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Chitinophagales	Saprospiraceae	*Opimibacter*	Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Cytophagales	Microscillaceae	*Flexibacter*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Cytophagales	Microscillaceae	*Ohtaekwangia*	Whillans	Antarctica	Achberger et al., 2016
Bacteroidota	Bacteroidia	Flavobacteriales	Flavobacteriaceae	*Capnocytophaga*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Flavobacteriales	Flavobacteriaceae	*Flavobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Flavobacteriales	Flavobacteriaceae	*Flavobacterium*	Grímsvötn	Iceland	Gaidos et al., 2004

Bacteroidota	Bacteroidia	Flavobacteriales	Flavobacteriaceae		Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Flavobacteriales	Flavobacteriaceae	*Lutibacter*	Mercer	Antarctica	Davis et al., 2023
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Daejeonella*	Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Pedobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Pedobacter*	Mercer	Antarctica	Kim et al., 2025
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Pedobacter*	Grímsvötn	Iceland	Gaidos et al., 2004
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Pedobacter*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Solitalea*	Whillans	Antarctica	Achberger et al., 2016
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Sphingobacterium*	Vostok	Antarctica	Christner et al., 2001
Bacteroidota	Bacteroidia	Sphingobacteriales	Sphingobacteriaceae	*Sphingobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Bdellovibrionota	Bacteriovoracia	Bacteriovoracales	Bacteriovoracaceae		Mercer	Antarctica	Kim et al., 2025
Bdellovibrionota	Bacteriovoracia	Bacteriovoracales	Bacteriovoracaceae	*Bacteriovorax*	Vostok	Antarctica	Shtarkman et al., 2013
Bdellovibrionota	Bacteriovoracia	Bacteriovoracales	Bacteriovoracaceae	*Bacteriovorax*	Mercer	Antarctica	Kim et al., 2025
Bdellovibrionota	Bdellovibrionia	Bdellovibrionales	Bdellovibrionaceae	*Pseudobdellovibrio*	Mercer	Antarctica	Kim et al., 2025
Bdellovibrionota	Oligoflexia	Oligoflexales			Mercer	Antarctica	Kim et al., 2025
Caldisericota	Caldisericia	Caldisericales	Caldisericaceae	*Caldisericum*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Campylobacterota	Campylobacteria	Campylobacterales	Campylobacteraceae	*Campylobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Campylobacterota	Campylobacteria	Campylobacterales	Helicobacteraceae	*Helicobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Campylobacterota	Campylobacteria	Campylobacterales	Sulfurimonadaceae	*Sulfuricurvum*	Skaftárkatlar (east)	Iceland	Marteinsson et al., 2013
Campylobacterota	Campylobacteria	Campylobacterales	Sulfurimonadaceae	*Sulfuricurvum*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Campylobacterota	Campylobacteria	Campylobacterales	Sulfurospirillaceae	*Sulfurospirillum*	Skaftárkatlar (east)	Iceland	Marteinsson et al., 2013
Campylobacterota	Campylobacteria	Campylobacterales	Sulfurospirillaceae	*Sulfurospirillum*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Candidatus Zixiibacteriota					Mercer	Antarctica	Davis et al., 2023
Chlamydiota	Chlamydiia	Chlamydiales			Mercer	Antarctica	Kim et al., 2025
Chlorobiota					Whillans	Antarctica	Achberger et al., 2016
Chloroflexota					Whillans	Antarctica	Achberger et al., 2016
Chloroflexota					Mercer	Antarctica	Kim et al., 2025
Chloroflexota	Anaerolineae	Anaerolineales	Anaerolineaceae	*Pelolinea*	Mercer	Antarctica	Davis et al., 2023
Chloroflexota	Anaerolineae	Anaerolineales	Anaerolineaceae	*Thermomarinilinea*	Whillans	Antarctica	Achberger et al., 2016
Chloroflexota	Anaerolineae	Epilineales	Epilineaceae		Mercer	Antarctica	Kim et al., 2025
Chloroflexota	Dehalococcoidia				Mercer	Antarctica	Davis et al., 2023
Chloroflexota	Dehalococcoidia				Mercer	Antarctica	Kim et al., 2025
Chloroflexota	Limnocylindria	Limnocylindrales			Mercer	Antarctica	Kim et al., 2025
Chloroflexota	Limnocylindria	Limnocylindrales	Limnocylindraceae	*Limnocylindrus*	Mercer	Antarctica	Kim et al., 2025
Cyanobacteriota	Cyanobacteriia				Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Chroococcales	Halothecaceae	*Euhalothece*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Coleofasciculaceae	*Microcoleus*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Coleofasciculaceae	*Wilmottia*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Nostocaceae	*Nodularia*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Nostocaceae	*Nostoc*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Oscillatoriaceae		Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Oscillatoriaceae	*Oscillatoria PCC-6304*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Phormidiaceae		Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Phormidiaceae	*Lyngbya*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Cyanobacteriales	Xenococcaceae	*Gloeocapsopsis*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Gloeobacterales	Gloeobacteraceae	*Gloeobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Leptolyngbyales	Leptolyngbyaceae	*Leptolyngbya*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Nostocales	Aphanizomenonaceae	*Dolichospermum*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Synechococcales	Leptolyngbyaceae	*Plectonema*	Vostok	Antarctica	Shtarkman et al., 2013
Cyanobacteriota	Cyanobacteriia	Synechococcales	Synechococcaceae	*Synechococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Deferribacterota	Deferribacteres	Deferribacterales	Deferribacteraceae	*Mucispirillum*	Vostok	Antarctica	Shtarkman et al., 2013
Deinococcota	Deinococci	Deinococcales	Deinococcaceae	*Deinococcus*	Vostok	Antarctica	Shtarkman et al., 2013
Dependentiae	Babeliae	Babeliales			Mercer	Antarctica	Kim et al., 2025
Desulfobacterota	Desulfobulbia	Desulfobulbales	Desulfobulbaceae	*Candidatus Electrothrix*	Mercer	Antarctica	Davis et al., 2023

Elusimicrobiota	Elusimicrobia				Mercer	Antarctica	Kim et al., 2025
Fusobacteriota	Fusobacteriia	Fusobacteriales	Fusobacteriaceae	*Fusobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Fusobacteriota	Fusobacteriia	Fusobacteriales	Fusobacteriaceae	*Ilyobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Fusobacteriota	Fusobacteriia	Fusobacteriales	Fusobacteriaceae	*Propionigenium*	Vostok	Antarctica	Shtarkman et al., 2013
Gemmatimonadota	Gemmatimonadetes	Gemmatimonadales	Gemmatimonadaceae		Mercer	Antarctica	Kim et al., 2025
Hydrogenedentota	Hydrogenedentia	Hydrogenedentiales			Mercer	Antarctica	Kim et al., 2025
Ignavibacteriota	Ignavibacteria	Ignavibacteriales	Ignavibacteriaceae	*Ignavibacterium*	Whillans	Antarctica	Achberger et al., 2016
Ignavibacteriota	Ignavibacteria	Ignavibacteriales	Ignavibacteriaceae	*Ignavibacterium*	Mercer	Antarctica	Davis et al., 2023
Lentisphaerota	Lentisphaeria	Lentisphaerales	Lentisphaeraceae	*Lentisphaera*	Whillans	Antarctica	Achberger et al., 2016
Margulisbacteria	Marinamargulisbacteria				Mercer	Antarctica	Kim et al., 2025
Myxococcota					Mercer	Antarctica	Kim et al., 2025
Myxococcota	Myxococcia	Myxococcales	Anaeromyxobacteraceae	*Anaeromyxobacter*	Mercer	Antarctica	Davis et al., 2023
Myxococcota	Myxococcia	Myxococcales	Myxococcaceae	*Aggregicoccus*	Whillans	Antarctica	Achberger et al., 2016
Myxococcota	Polyangia	Polyangiales			Mercer	Antarctica	Kim et al., 2025
Myxococcota	Polyangiia	Polyangiales	Polyangiaceae	*Byssovorax*	Whillans	Antarctica	Achberger et al., 2016
Myxococcota	Polyangiia	Polyangiales	Polyangiaceae	*Labilithrix*	Whillans	Antarctica	Achberger et al., 2016
***Nanoarchaeota**	**Nanoarchaeia**	**Pacearchaeales**			Mercer	Antarctica	Kim et al., 2025
Nitrospirota					Whillans	Antarctica	Achberger et al., 2016
Nitrospirota	Nitrospiria				Mercer	Antarctica	Kim et al., 2025
Nitrospirota	Nitrospiria	Nitrospirales	Nitrospiraceae		Mercer	Antarctica	Kim et al., 2025
Nitrospirota	Nitrospiria	Nitrospirales	Nitrospiraceae	*Nitrospira*	Whillans	Antarctica	Achberger et al., 2016
Nitrospirota	Thermodesulfovibrionia				Mercer	Antarctica	Davis et al., 2023
Nitrospirota	Thermodesulfovibrionia				Mercer	Antarctica	Kim et al., 2025
Patescibacteria					Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Andersenbacteria				Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Gracilibacteria				Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Gracilibacteria	Peribacterales	Peribacteraceae		Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Microgenomatia	Curtissbacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Microgenomatia	Daviesbacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Microgenomatia	Levybacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Microgenomatia				Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Paceibacteria				Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Paceibacteria		Colwellbacteraceae		Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Paceibacteria		Zambryskibacteraceae		Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Paceibacteria	Paceibacterales	Staskawiczbacteraceae		Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Paceibacteria	Paceibacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia				Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia	Absconditabacterales	Absconditicoccaceae		Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia	Buchananbacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia	Magasanikbacterales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia	Saccharimonadales			Mercer	Antarctica	Kim et al., 2025
Patescibacteria	Saccharimonadia	Saccharimonadales	Saccharimonadaceae		Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Patescibacteria	Saccharimonadia	Veblenbacterales			Mercer	Antarctica	Kim et al., 2025
Planctomycetota	Phycisphaerae	Phycisphaerales			Mercer	Antarctica	Kim et al., 2025
Planctomycetota	Phycisphaerae				Mercer	Antarctica	Davis et al., 2023
Planctomycetota	Planctomycetes	Pirellulales	Pirellulaceae	*Pirellula*	Vostok	Antarctica	Shtarkman et al., 2013
Planctomycetota	Planctomycetia	Brocadiales	Brocadiaceae	*Candidatus Brocadia*	Whillans	Antarctica	Achberger et al., 2016
Planctomycetota	Planctomycetia	Brocadiales	Brocadiaceae	*Candidatus Jettenia*	Whillans	Antarctica	Achberger et al., 2016
Planctomycetota	Planctomycetia	Gemmatales	Gemmataceae		Mercer	Antarctica	Kim et al., 2025
Planctomycetota	Planctomycetia	Planctomycetales	Planctomycetaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota					Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Alphaproteobacteria				Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Acetobacterales	Acetobacteraceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Caedibacterales	Caedibacteraceae	*Caedibacter*	Vostok	Antarctica	Shtarkman et al., 2013

Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Brevundimonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Brevundimonas*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Brevundimonas*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Caulobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Caulobacterales	Caulobacteraceae	*Phenylobacterium*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales			Vostok	Antarctica	D'Elia et al., 2008
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Beijerinckiaceae	*Bosea*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Beijerinckiaceae	*Methylobacterium*	Vostok	Antarctica	Christner et al., 2001
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Beijerinckiaceae	*Methylobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Hyphomicrobiaceae	*Hyphomicrobium*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Rhizobiaceae	*Aminobacter*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Rhizobiaceae	*Ensifer*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Rhizobiaceae	*Mesorhizobium*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Rhizobiaceae	*Rhizobium*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Xanthobacteraceae	*Afipia*	Vostok	Antarctica	Priscu et al., 1999
Pseudomonadota	Alphaproteobacteria	Hyphomicrobiales	Xanthobacteraceae	*Afipia*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	incertae_sedis	incertae_sedis	*Subaequorebacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Rhizobiales	Kaistiaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Rhodobacterales	Paracoccaceae	*Paracoccus*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Rhodobacterales	Paracoccaceae	*Rhodobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Rhodobacterales	Paracoccaceae	*Rhodovulum*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Alphaproteobacteria	Rhodobacterales	Paracoccaceae	*Tabrizicola*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Alphaproteobacteria	Rhodobacterales	Rhodobacteraceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Rickettsiales			Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae		Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Erythrobacter*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Novosphingobium*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Novosphingobium*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*	Vostok	Antarctica	Christner et al., 2001
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingomonas*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingopyxis*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Alphaproteobacteria	Sphingomonadales	Sphingomonadaceae	*Sphingopyxis*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Betaproteobacteria	Burkholderiales	Comamonadaceae	*Albidiferax*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Betaproteobacteria	Nitrosomonadales	Gallionellaceae	*Candidatus Nitrotoga*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria				Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria				Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Acidiferrobacterales	Acidiferrobacteraceae	*Acidiferrobacter*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Acidiferrobacterales	Acidiferrobacteraceae	*Acidiferrobacter*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Acidiferrobacterales	Acidiferrobacteraceae	*Sulfuricaulis*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Acidiferrobacterales	Sulfurifustaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Acidithiobacillales	Acidithiobacillaceae	*Acidithiobacillus*	Vostok	Antarctica	Christner et al., 2006
Pseudomonadota	Gammaproteobacteria	Alteromonadales	Alteromonadaceae	*Aestuariibacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Beggiatoales	Leucotrichaceae	*Incertae Sedis*	Vostok	Antarctica	Christner et al., 2006
Pseudomonadota	Gammaproteobacteria	Burkholderiales			Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Aquaspirillaceae	*Aquaspirillum*	Grímsvötn	Iceland	Gaidos et al., 2004
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Burkholderiaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Burkholderiaceae	*Burkholderia*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Burkholderiaceae	*Lautropia*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Burkholderiaceae	*Polaromonas*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Burkholderiaceae	*Rhodoferax*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae		Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Acidovorax*	Vostok	Antarctica	Priscu et al., 1999

Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Acidovorax*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Aquabacterium*	Vostok	Antarctica	Christner et al., 2001
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Caldimonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Comamonas*	Vostok	Antarctica	Priscu et al., 1999
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Comamonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Delftia*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Diaphorobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Hydrogenophaga*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Polaromonas*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Polaromonas*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Comamonadaceae	*Rhodoferax*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae		Vostok	Antarctica	Bulat et al., 2018
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae	*Ferriphaselus*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae	*Nitrotoga*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae	*Sideroxydans*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Gallionellaceae	*Sideroxydans*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Hydrogenophilaceae	*Hydrogenophilus*	Vostok	Antarctica	Bulat et al., 2004
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Hydrogenophilaceae	*Hydrogenophilus*	Vostok	Antarctica	Lavire et al., 2006
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Hydrogenophilaceae	*Thiobacillus*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Hydrogenophilaceae	*Thiobacillus*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Methylophilaceae	*Methylobacillus*	Vostok	Antarctica	Christner et al., 2006
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Methylophilaceae	*Methylobacillus*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Methylophilaceae	*Methylotenera*	Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Methylophilaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Neisseriaceae	*Neisseria*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Nitrosomonadaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Nitrosomonadaceae	*Nitrosospira*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Oxalobacteraceae	*Herbaspirillum*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Oxalobacteraceae	*Herbaspirillum*	Grímsvötn	Iceland	Gaidos et al., 2004
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Oxalobacteraceae	*Janthinobacterium*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Rhodocyclaceae	*Methyloversatilis*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Rhodocyclaceae	*Methyloversatilis*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Sulfuricellaceae	*Sulfuricella*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Sutterellaceae	*Sutterella*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Burkholderiales	Usitatibacteraceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Cardiobacteriales	Cardiobacteriaceae	*Cardiobacterium*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Chromatiales	Wenzhouxiangellaceae	*Wenzhouxiangella*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Ectothiorhodospirales	Ectothiorhodospiraceae	*Ectothiorhodospira*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Alteromonadaceae	*Rheinheimera*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Enterobacteriaceae	*Escherichia*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Enterobacteriaceae	*Escherichia-Shigella*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Enterobacteriaceae	*Klebsiella*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Pasteurellaceae	*Actinobacillus*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Pasteurellaceae	*Haemophilus*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Pseudoalteromonadaceae	*Pseudoalteromonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Succinivibrionaceae	*Anaerobiospirillum*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Enterobacterales	Vibrionaceae	*Vibrio*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Legionellales	Legionellaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Lysobacterales	Lysobacteraceae	*Stenotrophomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Lysobacterales	Lysobacteraceae	*Xanthomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Methylococcales	Methylomonadaceae	*Methylobacter*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Methylococcales	Methylomonadaceae	*Methylobacter*	Whillans	Antarctica	Michaud et al., 2017
Pseudomonadota	Gammaproteobacteria	Methylococcales	Methylomonadaceae	*Methylobacter A*	Mercer	Antarctica	Kim et al., 2025

Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Halomonadaceae	*Halomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Halomonadaceae	*Salinicola*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Microbulbiferaceae	*Microbulbifer*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Acinetobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Acinetobacter*	Whillans	Antarctica	Achberger et al., 2016
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Acinetobacter*	Grímsvötn	Iceland	Gaidos et al., 2004
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Enhydrobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Moraxella*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Moraxellaceae	*Psychrobacter*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudohongiellaceae		Mercer	Antarctica	Kim et al., 2025
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae		Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Pseudomonas*	Vostok	Antarctica	Christner et al., 2001
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Pseudomonas*	Vostok	Antarctica	Shtarkman et al., 2013
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Pseudomonas*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Pseudomonadaceae	*Pseudomonas*	Grímsvötn	Iceland	Gaidos et al., 2004
Pseudomonadota	Gammaproteobacteria	Pseudomonadales	Saccharospirillaceae	*Salinispirillum*	Mercer	Antarctica	Davis et al., 2023
Pseudomonadota	Gammaproteobacteria	Steroidobacterales	Steroidobacteraceae		Mercer	Antarctica	Kim et al., 2025
Spirochaetota	Brachyspirae	Brachyspirales	Brachyspiraceae	*Brachyspira*	Vostok	Antarctica	Shtarkman et al., 2013
Spirochaetota	Spirochaetia	Spirochaetales	Spirochaetaceae		Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Thermodesulfobacteriota	Desulfobacteria	Desulfatiglandales	Desulfatiglandaceae	*Desulfatiglans*	Whillans	Antarctica	Achberger et al., 2016
Thermodesulfobacteriota	Desulfobacteria	Desulfobacterales	Desulfatibacillaceae	*Desulfatibacillum*	Whillans	Antarctica	Achberger et al., 2016
Thermodesulfobacteriota	Desulfuromonadia	Desulfuromonadales			Vostok	Antarctica	Christner et al., 2006
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Skaftárkatlar (east)	Iceland	Marteinsson et al., 2013
Thermodesulfobacteriota	Desulfuromonadia	Geobacterales	Geobacteraceae	*Geobacter*	Skaftárkatlar (east)	Iceland	Vannier et al., 2023
Thermodesulfobacteriota	Syntrophia	Syntrophales	Smithellaceae	*Smithella*	Whillans	Antarctica	Achberger et al., 2016
Thermodesulfobacteriota	Syntrophia	Syntrophales	Syntrophaceae	*Syntrophus*	Whillans	Antarctica	Achberger et al., 2016
***Thermoproteota**	**Nitrososphaeria**	**Nitrosopumilales**	**Nitrosopumilaceae**	***Nitrosoarchaeum***	Whillans	Antarctica	Achberger et al., 2016
***Thermoproteota**	**Nitrososphaeria**	**Nitrosopumilales**	**Nitrosopumilaceae**	***Nitrosoarchaeum***	Mercer	Antarctica	Kim et al., 2025
Verrucomicrobiota	Verrucomicrobiae	Limisphaerales			Mercer	Antarctica	Kim et al., 2025
Verrucomicrobiota	Verrucomicrobiae	Opitutales	Opitutaceae		Mercer	Antarctica	Kim et al., 2025
Verrucomicrobiota	Verrucomicrobiia	Pedosphaerales	Pedosphaeraceae	*Pedosphaera*	Vostok	Antarctica	Shtarkman et al., 2013

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