**LAST UPDATED: 10/3/17, 05/10/18, 05/14/18, 5/25/28**

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Genera-potential function inventory

For each genus identified by post-sequencing processing (using Greengenes\_13\_8 via mothur or QIIME, or SILVA\_132\_99 via QIIME2), a potential function was identified through a literature review. When formally describing a new genus, a battery of physiological tests are conducted on the cultured type species. These studies provided the potential function of each genus. Some notable exceptions are when a genus or type species could not be cultured in isolation and were cultured in consortia or observed in its natural habitat.

\*\*\*NOTE: The presence of genes that often indicate physiological traits will be added as another literature review is conducted.

“Potential function (initial)” describes how each genus was described in the initial paper; “potential function” denotes the broad functional group used for downstream analyses.

\*\*\*NOTE: Genera without a reference in “Citation” are currently being investigated.

Running total: 335 genera, 202 EndNote citations

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Genus* | Potential function (initial) | Potential function | Citation | Notes |
| *A17* |  | non-N |  | family: Pirellulaceae |
| *Acetivibrio* |  | Cellulolytic |  |  |
| *Acetobacteroides* |  | Hydrogen-producing | (Su et al., 2014) | carbohydrate-fermenting, anaerobic, produce CO2, H2, acetate |
| *Acidibacter* |  | Fe3 reduction | (Falagán and Johnson, 2014) | acidophilic, obligate heterotroph, tolerant of arsenic (V), feeric iron reduction under microaerobic or anaerobic conditions |
| *Acidobacterium* |  | non-N | (Kishimoto et al., 1991) | acidophilic, found in mineral environments |
| *Acidovorax* |  | non-N |  | causes bacterial fruit blotch on cucurbits |
| *Acinetobacter* |  | non-N | (Cicconi et al) | isolated from Loyalsock Creek as part of undergraduate course, only identification is from poster |
| *Actinobacteria\_*  *phylum\_hgcI clade* |  | varied |  | phylum level clade, cannot assign potential function |
| *Actinotalea* |  | Cellulolytic+ | (Bagnara et al., 1985). (Yi et al., 2007) |  |
| *Aeromonas* |  | non-N | (Janda and Abbott, 1998) | human pathogen |
| *Aetherobacter* |  | non-N | (Garcia et al., 2016) | myxobacteria |
| *Agrobacterium* |  | non-N |  | disease forming, uses nitroglycerine as sole N source (microbewiki) |
| *Akkermansia* |  | non-N | (Derrien et al., 2004) | found in human gut microbiota, use mucin as sole nitrogen source |
| *Algorimarina* |  | non-N | (Kendall et al., 2006) | syntrophic with methanogens |
| *Alicyclobacillus* | use nitrate | Denitrification | (Wisotzkey et al., 1992) | can grow in acidic environments |
| *Alkanibacter* |  | non-N | (Friedrich and Lipski, 2008) |  |
| *Alkanindiges* |  | non-N | (Bogan et al., 2003) | alkane-degrading |
| *Allorhizobium-*  *Neorhizobium-*  *Pararhizobium-*  *Rhizobium* |  | N fixation | (Mousavi et al., 2014) | can enter N fixing symbioses with legumes |
| *Altererythrobacter* |  | non-N | (Kwon et al., 2007a) | aerobes |
| *Anaerococcus* |  | non-N | (Ezaki et al., 2001) | can be found in vaginal discharges |
| *Anaerolinaceae WCHB1-05* |  | Cellulolytic | (Xia et al., 2016) | Anaerolineae lineage (Chloroflexi phylum), found in anaerobic digesters, fermentative lifestyle, may be able to use ethanol as carbon source |
| *Anaerolinea* |  | Cellulolytic |  |  |
| *Anaeromyxobacter* | nitrate as electron acceptor, nitrous oxide to dinitrogen | Denitrification | (He and Sanford, 2003) |  |
| *Anaerospora* |  | non-N | (Woo et al., 2005) |  |
| *Aquabacterium* | nitrate as electron acceptor | Denitrification | (Kalmbach et al., 1999) | isolated from biofilms |
| *Aquicella* |  | non-N | (Santos et al., 2003) | related to Rickettsiella and Legionella |
| *Arcobacter* | nitrate as electron acceptor | Denitrification | (Pati et al., 2010) | genome of A. nitrofigilis sequenced by |
| *Arenimonas* |  | non-N | (Kwon et al., 2007b) | described by |
| *Arthrobacter* | nitrification | Nitrite oxidation |  |  |
| *Aurantimicrobium* |  | non-N | (Nakai et al., 2015) | aerobic |
| *Azoarcus* | nitrogen fixation | N fixation | (Reinhold-Hurek et al., 1993) | can be found in endophytic chambers of some plants |
| *Azospirillum* | fix N | N fixation | (Steenhoudt and Vanderleyden, 2000) | rhizobacterium |
| *Bacillus* | some denitrify | Denitrification |  |  |
| *Bacteriovorax* |  | non-N | (Davidov and Jurkevitch, 2004) | Predators |
| *Bacteroides* |  | non-N |  | can be motile or nonmotile, usually mutualistic, especially in guts |
| *Bauldia* |  | non-N | (Yee et al., 2010) | obligate aerobe |
| *Bdellovibrio* |  | non-N |  | wikipedia |
| *Bifidobacterium* |  | non-N |  | wikipedia |
| *Blastocatellaceae\_family\_JGI 0001001-H03* |  | varied |  | family level, cannot assign potential function |
| *Blautia* |  | Denitrification | (Liu et al., 2008) (Müller and Frerichs, 2013) | isolated from human and animal feces some acetogenic |
| *Blvii28* |  | non-N |  | family: Rikenellaceae, found in gastrointestinal tract (wikipedia) |
| *Bosea* |  | Thiosulfate oxidation | (Das et al., 1996) |  |
| *Bradyrhizobium* | some fix N, some use NH4 or NO3 as N source | N fixation | (Jordan, 1982) | found in root nodules |
| *Bryobacter* |  | non-N | (Kulichevskaya et al., 2010) |  |
| *Burkholderia* |  | non-N | (Yabuuchi et al., 1992) |  |
| *Butyrivibrio* |  | Cellulolytic |  |  |
| *C39* |  | non-N |  | family: Rhodocyclaceae, wikipedia |
| *Caldanaerobacter* |  | Cellulolytic |  |  |
| *Caldicellulosiruptor* |  | Cellulolytic |  |  |
| *Candidatus*  *Diapherotrites\_*  *phylum* |  | varied\_archaea |  | phylum level, cannot assign potential function |
| *Candidatus*  *Pacearchaeota\_*  *phylum* |  | varied\_archaea |  | phylum level, cannot assign potential function |
| *Candidatus Accumulibacter* |  | Polyphosphate-accumulating | (Mao et al., 2015) | accumulate P, reduce nitrate |
| *Candidatus babela* |  | non-N | (Pagnier et al., 2015) | genome sequenced by |
| *Candidatus brocadia* | anammox | Anammox |  |  |
| *Candidatus jettenia* | anammox | Anammox |  |  |
| *Candidatus koribacter* |  | Denitrification+ |  |  |
| *Candidatus kuenenia* | anammox | Anammox |  |  |
| *Candidatus metachlamydia* |  | non-N |  | chlamydia-like intracellular parasite |
| *Candidatus nitrosoarchaeum* | ammonia oxidizer | Ammonia oxidation | (Lehtovirta-Morley et al., 2011) | acidophilic ammonia oxidizer, could provide missing link between acidic soils and high ammonia oxidation rates |
| *Candidatus nitrosocaldus* | ammonia oxidation | Ammonia oxidation | (De la Torre et al., 2008) |  |
| *Candidatus nitrososphaera* | ammonia oxidation | Ammonia oxidation |  |  |
| *Candidatus nitrosotalea* | ammonia oxidizer | Ammonia oxidation | (Lehtovirta-Morley et al., 2011) | acidophilic ammonia oxidizer, could provide missing link between acidic soils and high ammonia oxidation rates |
| *Candidatus Nitrosotenuis* |  | Ammonia oxidation | (Li et al., 2016) |  |
| *Candidatus nitrotoga* | nitrite oxidizer | Nitrite oxidation | (Alawi et al., 2007) | described by psychrophilic |
| *Candidatus Omnitrophus* |  | Magnetatactic+ | (Kolinko et al., 2016) | contains Nif‐specific ferredoxin III, maybe N fixation, may reduce S, contains genes for magnetatism |
| *Candidatus phytoplasma* |  | non-N |  |  |
| *Candidatus planktophila* |  | non-N | (Jezbera et al., 2009) | found in freshwater, no axenic culture |
| *Candidatus protistobacter* |  | non-N | (Vannini et al., 2013) | obliate symbiont of ciliate from Euplotes genus |
| *Candidatus protochlamydia* |  | non-N | (Collingro et al., 2005) |  |
| *Candidatus rhabdochlamydia* |  | non-N | (Kostanjsek et al., 2004) | share lots of genetic similarity to chlamydia |
| *Candidatus saccharimonas* | nitrate reduction | Denitrification | (Kindaichi et al., 2016) | genomes sequenced from WWTPs |
| *Candidatus solibacter* |  | Denitrification+ | (Kindaichi et al., 2016) | genomes sequenced from WWTPs |
| *Candidatus vidania* |  | non-N | (Gonella et al., 2011) |  |
| *Candidatus\_brocadia* |  | Anammox | (Gonella et al., 2011) |  |
| *Candidatus\_methanoregula* |  | Methanogen | (Bräuer et al., 2011) | hydrogenotrophic methanogen |
| *Candidatus\_nitrososphaera* |  | Ammonia oxidation |  |  |
| *Candidatus\_protochlamydia* |  | non-N | (Bräuer et al., 2011) |  |
| *Candidatus\_rhabdochlamydia* |  | non-N | (Bräuer et al., 2011) |  |
| *Candidatus\_xiphinematobacter* |  | non-N | (Vandekerckhove et al., 2002) | endosymbiont of nematodes |
| *Caulobacter* |  | non-N | (MacRae and Smit, 1991) | isolated from various WWTPs |
| *Cellulomonas* |  | Cellulolytic+ | (Bagnara et al., 1985) |  |
| *Cenarchaeum* | ammonia oxidation through different pathways | Ammonia oxidation | (Hallam et al., 2006) | only contain one species that is symbiont of sponges, have amoA genes |
| *Chitinophaga* |  | non-N | (SANGKHOBOL and Skerman, 1981) | hydrolyze chitin but not cellulose |
| *Chlamydia* |  | non-N | (Collingro et al., 2005) | interacellular pathogen, cannot synthesize its own ATP or grow on artificial medium,  temperature sensitive, two cell forms: non-infectious reticulate body and vegetative form. Found in wastewater by |
| *Chthoniobacter* |  | non-N | (Sangwan et al., 2004) |  |
| *Cloacibacterium* |  | non-N | (Allen et al., 2006) | isolated from wastewater |
| *Clostridium* |  | Cellulolytic |  |  |
| *Compostimonas* | nitrate reduction | Denitrification | (Kim et al., 2012) |  |
| *Conexibacter* |  | Denitrification | (Monciardini et al., 2003) |  |
| *Coprococcus* |  | non-N | (HOLDEMAN and Moore, 1974) | peptones used as nitrogen source |
| *Corynebacterium* |  | non-N |  | found in gut microbiome (wikipedia) |
| *Coxiella* |  | non-N |  | 5 genomes of C. burnetii exist <https://www.patricbrc.org/portal/portal/patric/GenomeList>?  cType=taxon&cId=777&displayMode=Complete&dataSource=RAST&pk=1178009952#  key=1178009952&pS=20&aP=1&aT=&cwG=false&cF=&gId=&gName=&gdir=ASC&  gsort=genome\_name&sdir=ASC&ssort=genome\_name |
| *Crenothrix* |  | Ammonia oxidation | (Stoecker et al., 2006) | capable of Methanotroph |
| *Crocinitomix* |  | non-N | (Bowman et al., 2003) | described by |
| *Cupriavidus* |  | non-N | (Vandamme and Coenye, 2004) | genus described by |
| *Curtobacterium* |  | non-N | (Funke et al., 2005) | acid produced from glucose breakdown |
| *Cytophaga* |  | non-N |  |  |
| *Dechloromonas* | nitrate as electron acceptor | Denitrification | (Coates et al., 2001) | can couple benzene oxidation to nitrate reduction in pure culture |
| *Delftia* |  | non-N | (Wen et al., 1999) |  |
| *Demequina* |  | non-N | (Yi et al., 2007) |  |
| *Denitratisoma* |  | non-N |  |  |
| *Denitrobacterium* | nitrate reduction | Denitrification |  |  |
| *Desulfobulbus* |  | non-N |  | inhabitants of human gastrointestinal tract (wikipedia) |
| *Desulfosporosinus* |  | Sulfur reduction | (Stackebrandt et al., 1997) | reduces thiosulfate and sulfate |
| *Desulfovibrio* |  | Denitrification |  | can reduce sulfate, sulfur, nitrate, nitrite, uranium, chromium, and iron (microbewiki) |
| *Devosia* |  | Denitrification | (Nakagawa et al., 1996) | some species can fix N |
| *Dialister* |  | non-N | (Moore and Moore, 1994) | found in human mouths, can cause gingivitis |
| *Dinghuibacter* |  | non-N | (Lv et al., 2016) |  |
| *Dokdonella* |  | Denitrification | (Yoon et al., 2006) |  |
| *Dongia* |  | Denitrification | (Liu et al., 2010) |  |
| *Duganella* |  | non-N | (Hiraishi et al., 1997) | aerobic, chemoorganotrophic |
| *Dyella* |  | Denitrification | (Xie and Yokota, 2005) |  |
| *Ethanoligenens* |  | non-N | (Xing et al., 2006) |  |
| *Eubacterium* |  | Cellulolytic |  |  |
| *Faecalibacterium* |  | non-N | (Duncan et al., 2002) | found in human gut microbiota, produce butyrate |
| *family\_*  *Microscillaceae\_*  *OLB12* |  | varied | (Hahnke et al., 2016) |  |
| *Ferribacterium* | nitrate reduction | Denitrification | (Cummings et al., 1999) | dissimilatory Fe(III) reducing, couples oxidation of acetate and other org compounds to iron reduction or nitrate reduction |
| *Ferritrophicum* |  | Fe2 oxidation | (Weiss et al., 2007) | microaerophilic, lithotrophic |
| *Ferruginibacter* |  | non-N | (Lim et al., 2009) |  |
| *Fimbriimonas* |  | non-N | (Im et al., 2012) |  |
| *Flavisolibacter* |  | non-N | (Yoon and Im, 2007) |  |
| *Flavobacterium* |  | non-N |  | (microbewiki) |
| *Gaiella* |  | Denitrification | (Albuquerque et al., 2011) |  |
| *Gallionella* | nitric oxide reduction | Nitric oxide reduction | (Anderson and Pedersen, 2003; Emerson et al., 2013) | found in deep sea hydrothermal vents, only have in situ growth conditions, reduces iron, only one  species in genus found nitric oxide reductases in the genome of gallionella |
| *Gemmata* |  | varied |  | wide variety of metabolisms within genus http://www.cell.com/current-biology/fulltext/S0960-9822(13)00836-1 |
| *Gemmatimonas* |  | non-N |  | (microbewiki) |
| *Geobacter* |  | non-N |  | can oxidize metals, including iron and radioactive metals |
| *Georgfuchsia* | nitrate reduction, only with toulene | Denitrification | (Weelink et al., 2009) | isolated from polluted aquifer |
| *Geothrix* | nitrate as electron acceptor | Denitrification |  | 94% similarity to Holophaga, use fe (III) ase electron acceptor (microbewiki) |
| *Giesbergeria* |  | non-N | (Grabovich et al., 2006) | isolated from activated sludge |
| *Glomus* |  | non-N |  |  |
| *Gouta19* |  | Sulfur reduction |  | may be Thermodesulfovibrio |
| *Haliangium* |  | non-N | (Fudou et al., 2002) | obligate aerobe |
| *Halocella* |  | Cellulolytic |  |  |
| *Halomonas* |  | Denitrification | (Vreeland et al., 1980) | high salt tolerance |
| *Herbaspirillum* | some denitrify | Denitrification | (Baldani et al., 1986) |  |
| *Herminiimonas* |  | non-N | (Fernandes et al., 2005) |  |
| *Heteroc45\_4W* |  | non-N |  | family: Chthoniobacteraceae, copy from Chthoniobacter |
| *Holophaga* |  | non-N | (Liesack et al., 1994) | genus described by |
| *Hydrogenophaga* |  | Denitrification | (Willems et al., 1989) |  |
| *Hymenobacter* |  | non-N | (Reddy, 2013) | diverse genus |
| *Hyphomicrobium* | nitrate reduction | Denitrification | (Moore, 1981) | genus described by |
| *Hyphomonadaceae\_family\_SWB02* |  | varied |  | family leve, cannot assign potential function |
| *Ideonella* |  | non-N | (Malmqvist et al., 1994) | chlorate as electron acceptor |
| *Ignavibacterium* |  | Sulfur reduction | (Iino et al., 2010) | KEY: use of ferredoxins |
| *Incisomonas* |  | non-N | (Cavalier-Smith and Scoble, 2013) | marine heterokont flagellate |
| *Janthinobacterium* |  | non-N | (Ciesielski et al., 2014) (Shoemaker et al., 2015) (Hornung et al., 2013) | ability to produce short and potentially medium length chain PHAs  Chemoorganoheterotroph found in soils. Aerobic, can form antifungal compounds |
| *Kaistia* |  | Denitrification | (Im et al., 2004) |  |
| *Kaistobacter* |  | non-N |  | in Sphingomonadaceae, use metabolism of Sphingomonad |
| *Knoellia* |  | Denitrification | (Groth et al., 2002) |  |
| *Kuenenia* |  | Anammox | (Groth et al., 2002) |  |
| *Lacunisphaera* |  | non-N | (Rast et al., 2017) | aerobic |
| *Legionella* |  | non-N |  | use amino acids to grow and can be parasitic, most species are motile (microbewiki) |
| *Leptolinea* |  | non-N | (Yamada et al. 2006)? | isolated from activated sludge |
| *Leptolyngbya* | nitrogen fixation | N fixation | (Shimura et al., 2015) | terrestrial and FW cyanobacterium |
| *Leptonema* |  | non-N |  | wikipedia |
| *Leptospira* |  | non-N |  | disease causing or saprobic (wikipedia) |
| *Leptotrichia* |  | non-N | (Couturier et al., 2012) | anaerobic, part of normal human flora, can be pathogenic in immunosuppressed patients |
| *Levilinea* |  | non-N | (Yamada et al., 2006) | anaerobic |
| *Limnobacter* |  | Sulfur oxidation | (Spring et al., 2001) | thiosulfate oxidation |
| *Luteimonas* |  | Denitrification | (Finkmann et al., 2000) | only reduce to N2O |
| *Luteolibacter* |  | non-N | (Glaeser et al., 2012) | (Verrucomicorbium) |
| *Lysobacter* |  | Degrade chitin | (CHRISTENSEN and Cook, 1978) |  |
| *Macellibacteroides* |  | non-N | (Jabari et al., 2012) |  |
| *Magnetospirillum* |  | non-N | (Thrash et al., 2010) | can use perchlorate as terminal electron acceptor, exhibit aerotaxis and magnetotaxis |
| *Malikia* | some nitrate reduction | Denitrification | (Spring et al., 2005) |  |
| *Massilia* | some strains may reduce nitrate | Denitrification | (Lindquist et al., 2003) | isolated from human blood and tissue samples |
| *Megasphaera* |  | non-N | (Rogosa, 1971) |  |
| *Mesorhizobium* |  | N fixation | https://en.wikipedia.org/wiki/Mesorhizobium | one species can N fixation, M. loti (root nodules) |
| *Methanobacterium* |  | non-N | (Zeikus and Wolee, 1972) | methanogenic |
| *Methanobrevibacter* |  | Methanogen |  | archaea, wikipedia |
| *Methanomassiliicoccus* |  | Methanogen | (Dridi et al., 2012) | archaea |
| *Methanosaeta* |  | non-N | (Smith and Ingram-Smith, 2007) | acetoclastic methanogen |
| *Methanosarcina* |  | Methanogen |  | microbewiki |
| *Methanospirillum* |  | Methanogen | (Ferry et al., 1974) | hydrogenotrophic methanogen |
| *Methylobacter* |  | Methanotroph | (wikipedia) | family Methylococcaceae are all methanotrophs |
| *Methylobacterium* |  | non-N |  |  |
| *Methylococcaceae* |  | *Methanotroph* | (Bowman, 2006) |  |
| *Methylocystis* |  | Methanogen | (Belova et al., 2013) | facultative methanotroph |
| *Methylomonas* |  | Methanotroph |  | wikipedia |
| *Methylophaga* |  | non-N |  | strict methylotrophs |
| *Methylosarcina* |  | non-N |  | methanotrophic |
| *Methylosinus* |  | Denitrification | (Sullivan et al., 1998) |  |
| *Methylotenera* |  | non-N | (Kalyuzhnaya et al., 2006) | use methylamine as sole N source |
| *Methylothermus* | can use nitrate or ammonia as N source | Denitrification | (Tsubota et al., 2005) | methanotroph |
| *Methyloversatilis* |  | non-N | (Kalyuzhnaya et al., 2006) | methylotroph, closest relationship to denitrifier |
| *Methylovulum* |  | Methanotroph | (Iguchi et al., 2011) |  |
| *Micromonospora* |  | non-N |  | wikipedia |
| *Mucilaginibacter* |  | non-N | (Pankratov et al., 2007) |  |
| *Mycobacterium* |  | non-N | (Butler et al., 1993) | potentially disease causing |
| *Mycoplasma* |  | non-N | (Wodke et al., 2013) |  |
| *Neochlamydia* |  | obligate parasite | (Horn et al., 2000) | obligate intracytoplasmatic parasite of H. vermiformis |
| *Nevskia* |  | non-N | (Kim et al., 2011) |  |
| *Niabella* |  | non-N | (Kim et al., 2007) |  |
| *Nitratifractor* | denitrification | Denitrification | (Nakagawa et al., 2005) |  |
| *Nitratireductor* | nitrate reduction to nitrite only | Denitrification | (Labbé et al., 2004) |  |
| *Nitratiruptor* | nitrate as electron acceptor | Denitrification | (Nakagawa et al., 2005) |  |
| *Nitrobacter* | nitrite oxidation | Nitrite oxidation |  |  |
| *Nitrosococcus* | Nitrite oxidization | Nitrite oxidation |  |  |
| *Nitrosocosmicus* |  | Ammonia oxidation | (Sauder et al., 2017) |  |
| *Nitrosomona-daceae\_*  *family\_GOUTA6* |  | Ammonia oxidation |  | type genus is Nitrosomonas |
| *Nitrosomona-daceae\_*  *family\_MND1* |  | Ammonia oxidation |  | type genus is Nitrosomonas |
| *Nitrosomonas* | ammonia oxidation | Ammonia oxidation |  |  |
| *Nitrosopumilus* | ammonia oxidation | Ammonia oxidation |  |  |
| *Nitrososphaera* | ammonia oxidation | Ammonia oxidation |  |  |
| *Nitrosospira* | ammonia oxidizing | Ammonia oxidation | (Meincke et al., 1989) |  |
| *Nitrosovibrio* | Ammonia oxidizing | Ammonia oxidation |  |  |
| *Nitrospina* | nitrite oxidizing | Nitrite oxidation |  |  |
| *Nitrospira* | nitrite oxidizing | Nitrite oxidation |  |  |
| *Nitrospirillum* | N fixation | N fixation | (Chung et al., 2015) |  |
| *Novosphingobium* |  | non-N |  | http://genome.jgi.doe.gov/novar/novar.home.html |
| *Opitutus* | nitrate reduction to nitrite | Denitrification | (Chin et al., 2001) | isolated from anoxic rice paddies, grow better in syntrophic assembalges with methanogens |
| *Or-59* |  | non-N | (Sangwan et al., 2004) | same family as Chthoniobacter |
| *Paenibacillus* |  | fix N |  | wikipedia |
| *Pajaroellobacter* |  | obligate parasite | (Brooks et al., 2016) | cause of bovine abortion |
| *Paludibacter* |  | non-N | (Ueki et al., 2006) |  |
| *Paludibaculum* |  | Fe3 reduction | (Kulichevskaya et al., 2014) | facultative anaerobe, can reduce nitrate, produce CO2, acetate |
| *Parcubacteria\_family\_Candidatus Magasanikbacteria bacterium* |  | OD-1 | http://www.uniprot.org/taxonomy/1752731 |  |
| *Parvibaculum* |  | Oxidize surfactants | (Schleheck et al., 2004) |  |
| *Pedobacter* |  | non-N | (Steyn et al., 1998) |  |
| *Pedomicrobium* | nitrate reduction | Denitrification | (Gebers and Beese, 1988) | found on biofilms, can oxidize manganese |
| *Pedosphaera* |  | non-N | (Kant et al., 2011) | genome sequenced |
| *Pelagicoccus* |  | OD-1? |  |  |
| *Pelobacter* |  | non-N |  | iron and sulfure reducing (microbewiki} |
| *Pelosinus* |  | non-N | (Shelobolina et al., 2007) |  |
| *Pelotomaculum* |  | non-N | (Imachi et al., 2007) (Imachi et al., 2002) | all publications about this genus are anerobic, syntrophic, most with methanogens  (http://www.bacterio.net/pelotomaculum.html). Novel genus Pelotomaculum. Cannot degrade sulfur, sulfite, a  nd thiosulfate |
| *Peredibacter* |  | non-N | (Davidov and Jurkevitch, 2004) |  |
| *Perlucidibaca* |  | Denitrification | (Song et al., 2008). |  |
| *Phascolarctobacterium* |  | non-N | (Del Dot et al., 1993) |  |
| *Phenylobacterium* |  | non-N | (Lingens et al., 1985) |  |
| *Phycisphaeraceae\_family\_SM1A02* |  | Denitrification | (Fukunaga et al., 2009) | nitrate reduction observed in type species of type genus (only description of family is type genuse) |
| *Pilimelia* |  | non-N |  | same family as Micromonospora, wikipedia |
| *Planctomyces* |  | Anammox |  | microbewiki, seem to be same as Planctomycetes? |
| *Polaromonas* |  | non-N | (Weon et al., 2008) |  |
| *Polynucleobacter* |  | non-N | (Heckmann and Schmidt, 1987) | obligate ciliate endosymbiont |
| *Prochlorococcus* |  | OD-1? |  |  |
| *Prolixibacter* |  | non-N | (Holmes et al., 2007) |  |
| *Prolixibacteraceae\_family* |  | N fixation | (Huang et al., 2014) | proposed family |
| *Prolixibacteraceae\_family\_BSV13* |  | N fixation | (Huang et al., 2014) | proposed family |
| *Propionivibrio* | some use nitrate as electron acceptor | Denitrification | (Brune et al., 2002) | extended description of genus |
| *Prosthecobacter* |  | non-N |  | https://microbewiki.kenyon.edu/index.php/Prosthecobacter |
| *Pseudarthrobacter* |  | Denitrification | (Busse, 2016) |  |
| *Pseudo-rhodobacter* |  | non-N | (Uchino et al., 2002) |  |
| *Pseudolabrys* |  | non-N | (Kämpfer et al., 2006) |  |
| *Pseudomonas* | nitrate reduction | Denitrification | (Nishimori et al., 2000) | intracellular parasite of fish |
| *Ralstonia* | nitrate reduction | Denitrification | (Yabuuchi et al., 1995) |  |
| *Reyranella* |  | Denitrification | (Pagnier et al., 2011) | isolated from freshwater, co-cultured with amoeba |
| *Rhizobium* |  | fix N |  | same as Brachyrhizobium |
| *Rhodanobacter* | (some)nitrate reduction | Denitrification | (Kostka et al., 2012) | 6 species had full genome sequencing, all had most genes involved in full nitrate reduction to dinitrogen gas |
| *Rhodobacter* |  | N fixation |  | varied metabolisms within the genus, some fix N (microbewiki) |
| *Rhodococcus* |  | non-N |  | (microbewiki) |
| *Rhodocyclaceae dok59* |  | Denitrification | (Van der Zaan et al., 2012) | Rhodocyclaceae may degrade benzenes |
| *Rhodocyclus* |  | non-N |  | all references say purple nonsulfur bacteria http://www.bacterio.net/rhodocyclus.html |
| *Rhodoferax* | nitrate as electron acceptor | Denitrification | (Finneran et al., 2003) | species can undergo fermentative respiration, photoautotrophy under anaerobic conditions, or aerobic respiration  (http://www.bacterio.net/rhodoferax.html). R. ferrireductans can reduce Fe (III) |
| *Rhodomicrobium* |  | non-N |  |  |
| *Rhodoplanes* | capability to denitrify | Denitrification | (Hiraishi and Ueda, 1994) | Hiraishi and Ueda |
| *Rhodopseudomonas* |  | N fixation+ | https://microbewiki.kenyon.edu/index.php/Rhodopseudomonas | purple nonsulfur pohotrophic organisms, one species can degrade several constituent of lignin, one fixes N, |
| *Rickettsia* |  | non-N |  | obligate intracellular pathogens of eukaryotes https://microbewiki.kenyon.edu/index.php/Rickettsia |
| *Rikenellaceae\_*  *family\_Bact-08* |  | non-N |  | gut microbiome member (wikipedia) |
| *Romboutsia* |  | Acetogenic | (Gerritsen et al., 2014) |  |
| *Roseburia* |  | non-N |  | found in human colon (wikipedia) |
| *Roseimarinus* |  | non-N | (Wu et al., 2015) | facultative anaerobic |
| *Roseomonas* | some reduce nitrate | Denitrification | (Rihs et al., 1993) |  |
| *Rubrobacter* | nitrate reduction to nitrite | Denitrification |  | (microbewiki) |
| *Ruminiclostridium* |  | Cellulolytic | refs in (Ravachol et al., 2015 Sheng, T., et al. (2016)) | mesophilic, also metabolizes some hemicellulosic polysaccharides, produces ehtanol, acetate, and lactate |
| *Ruminococcus* |  | Cellulolytic |  |  |
| *Rummeliibacillus* |  | non-N | (Vaishampayan et al., 2009) |  |
| *Saccharibacter* |  | non-N | (Jojima et al., 2004) | only one species, isolated from pollen |
| *Saccharophagus* |  | non-N |  | degrades polysaccharides (microwiki https://microbewiki.kenyon.edu/index.php/Saccharophagus\_degradans) |
| *Saccharospirillum* | nitrate reduction | Denitrification |  | isolated from hypersaline environments |
| *Salinibacterium* |  | non-N | (Han et al., 2003) |  |
| *Sediminibacterium* |  | non-N | (Qu and Yuan, 2008) |  |
| *Shd-14* |  | Cellulolytic |  | family: Anaerolinaceae, copy from Anaerolinaea |
| *Sideroxydans* | fix N | N fixation | (Beckwith et al., 2015) (Emerson et al., 2013) | oxidize ferrous iron and reduces oxygen |
| *Siluania* |  | non-N | (Karpov et al., 1998) | one of the smallest 18S flagellate |
| *Simkania* |  | non-N |  | obligate intracellular bacteria, can cause disease (microbewiki) |
| *Simplicispira* |  | Denitrification | (Grabovich et al., 2006) | isolated from activated sludge |
| *Smb53* |  | Cellulolytic |  | family: Clostridiaceae, copy from Clostridia |
| *Smithella* |  | Propionate oxidation-syntrophy | (Liu et al., 1999) | anaerobic, syntrophic, propionate-oxidizing, co culture with methanogens, form acetate, co2, methane |
| *Solibacillus* |  | non-N | (Krishnamurthi et al., 2009) | Krishnamurthi, S., et al. |
| *Solitalea* | some reduce nitrate | Denitrification | (Weon et al., 2009) | one strain reduces nitrate, one does not |
| *Sphaerobacter* |  | non-N | (Demharter et al., 1989) | thermophilic |
| *Sphingobacterium* |  | non-N | (YABUUCHI et al., 1983) | genus first described by |
| *Sphingobium* |  | non-N | (Takeuchi et al., 2001) |  |
| *Sphingomonas* |  | non-N |  | (microbewiki) |
| *Sphingorhabdus* |  | non-N | (Jogler et al., 2013) | aerobic |
| *Spirobacillus* |  | non-N | (Rodrigues et al., 2008) | parasites of Daphnia, contain carotenoids |
| *Spirochaeta* |  | Cellulolytic |  |  |
| *Sporobacter* |  | Methanotroph | (Grech-Mora et al., 1996) |  |
| *Staphylococcus* |  | non-N |  | wikipedia |
| *Stenotrophomonas* |  | non-N |  | wikipedia |
| *Steroidobacter* |  | Denitrification+ | (Fahrbach et al., 2006) |  |
| *Sterolibacterium* | nitrate reduction | Denitrification | (Tarlera and Denner, 2003) | isolated from USB, oxidizes cholesterol to co2 |
| *Streptococcus* |  | non-N |  | human pathogen (wikipedia) |
| *Streptomyces* |  | non-N |  | create antibiotics (wikipedia) |
| *Sulfuricurvum* |  | Denitrification | (Kodama and Watanabe, 2004) | isolated from crude oil, utilized sulfide, elemental sulfur, thiosulfate, hydrogen, nitrate, oxygen as electron acceptors |
| *Sulfurimonas* | nitrate, nitrite as electron acceptors | Denitrification |  | can use zero valent surlfur, molecular hydrogen, or reduced sulfur as electron donors; nitrate, nitrite, oxygen as electron acceptors (Wikipedia) |
| *Sulfurisoma* | nitrate as electron acceptor | Denitrification | (Kojima and Fukui, 2014) | oxidizes thiosulfate, elemental sulfur, and hydrogen |
| *Sulfuritalea* | nitrate reduction | Denitrification |  |  |
| *Sulfurospirillum* |  | Sulfur reduction | refs in (Buttet et al., 2013) | microaerophilic or facultative anaerobes, versatile metabolism |
| *Sunxiuqinia* |  | non-N | (Qu et al., 2011) |  |
| *Sutterella* |  | Denitrification | (Wexler et al., 1996) |  |
| *Syntrophobacter* |  | Methanotroph | (Boone and Bryant, 1980) | syntrophic, degrades proprionate while cocultured with methanogens |
| *Syntrophorhabdus* |  | Denitrification+ | (Qiu et al., 2008) | obligate anaerobe, flexible metabolism, in syntrophy with hydrogenotrophic methanogens |
| *Syntrophus* |  | Methanotroph | (Mountfort et al., 1984) | syntrophic, needs hydrogenic methanogen |
| *Telmatospirillum* |  | N fixation-methanogen | (Sizova et al., 2007) | chemoorganotrophs/autotrophs, microaerophilic, contain NifH, found in methanogenic consortia |
| *Terrimonas* |  | non-N | (Xie and Yokota, 2006) | obligate aerobe |
| *Thermoanaerobaculaceae\_family\_Subgroup 10* |  | varied |  | unknown Acidobacteria |
| *Thermomonas* |  | non-N | (Busse et al., 2002) |  |
| *Thiobacillus* |  | Sulfur oxidation |  | wikipedia |
| *Thiobacter* |  | non-N | (Hirayama et al., 2005) | obligate thermophilic, sulfur-oxidizing, high growth on thiosulfate or elemental sulfate as an energy source and oxygen as electron acceptor |
| *Thiohalophilus* | potential denitrification | Denitrification | (Sorokin et al., 2007)? |  |
| *Thiothrix* | nitrate reduction | Denitrification | (Williams and Unz, 1985) |  |
| *Tolumonas* |  | non-N | (Fischer-Romero et al., 1996) | facultative anaerobic, toluene producing, can produce acetate, ethanol, and formate |
| *Treponema* |  | non-N |  | human pathogens, many obligate (microbewiki) |
| *Trichococcus* |  | Denitrification | (Liu et al., 2002) |  |
| **uncultured archaeon** |  | uncultured\_archaea | na |  |
| *uncultured Bacteroidetes bacterium* |  | non-N |  |  |
| *uncultured Candidatus*  *Omnitrophus* |  | Magnetatactic+ | (Kolinko et al., 2016) | contains Nif‐specific ferredoxin III, maybe N fixation, may reduce S, contains genes for magnetatism |
| *uncultured Chlorobi bacterium* |  | Sulfur oxidation | https://en.wikipedia.org/wiki/Green\_sulfur\_bacteria | phylum: "green sulfur", all are obligate anaerobic photoautotrophs, and non-autotrophs, use sulfide ions to produce CO2 |
| **uncultured euryarchaeote** |  | uncultured\_eukaryote | na |  |
| *uncultured organism* |  | uncultured | na |  |
| **uncultured Parcubacteria**  **group bacterium** |  | CPR-OD1 | (Nelson and Stegen, 2015) | one candidate species may be capable of nitrogen reactions [Castelle, C. J., et al. (2017)} |
| *Undibacterium* |  | non-N | (Kämpfer et al., 2007) | isolated from drinking water |
| *Variovorax* |  | non-N | (Willems et al., 1991) | aerobic, some strains capable of hydrogen-fueled autotrophic growth (not type species) |
| *Veillonella* |  | non-N |  | gut and oral microbiome member (wikipedia) |
| *Verrucomicrobium* |  | non-N |  | (microbewiki) |
| *Wchb1-05*  (f.Anaerolineacaea) | varied | varied |  | family: Anaerolinaceae |
| *Zoogloea* |  | non-N |  | important in reducing BOD in wastewater sludge https://microbewiki.kenyon.edu/index.php/Zoogloea |

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