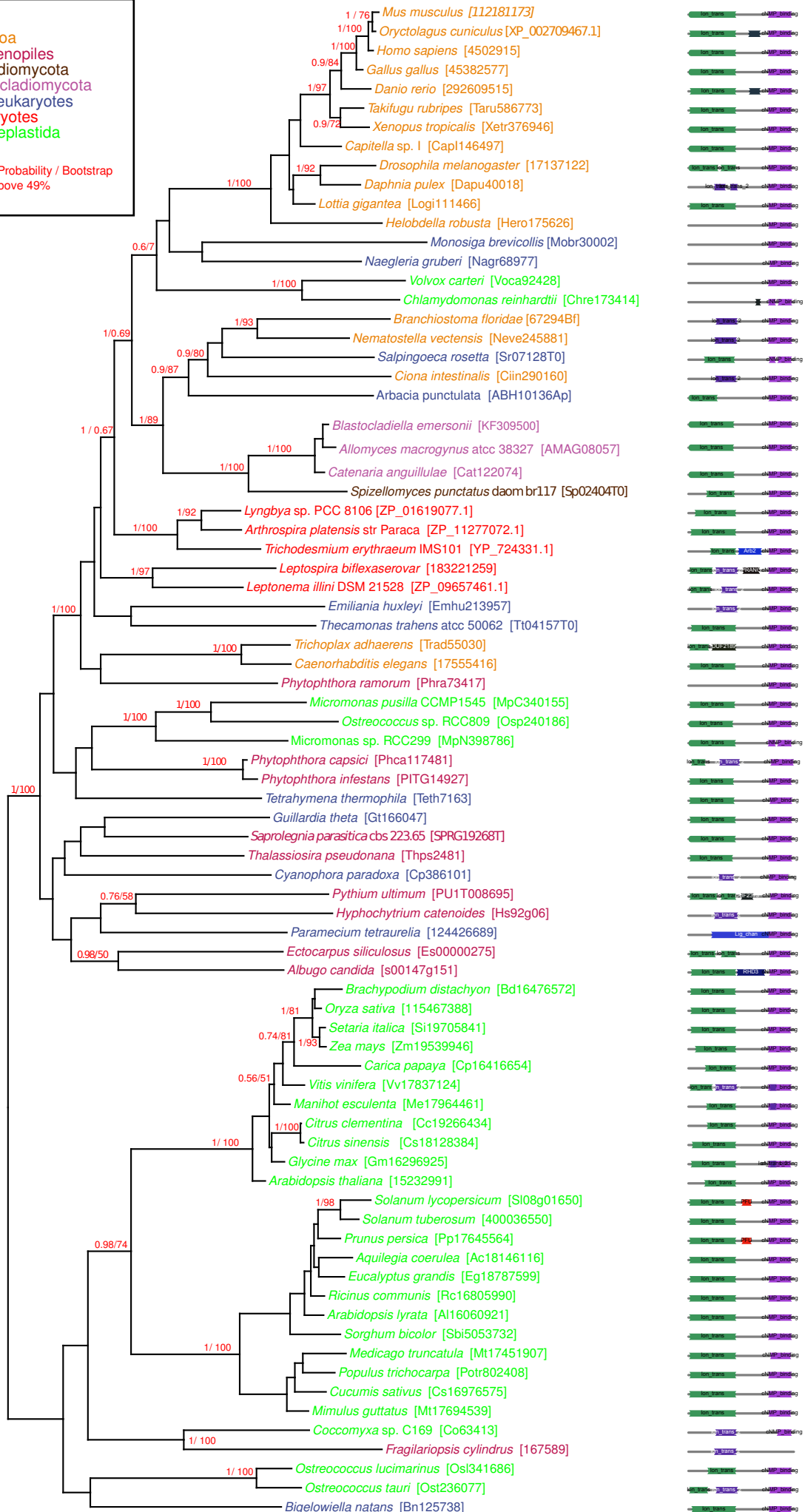


**Key**

- Metazoa
- stramenopiles
- Chytridiomycota
- Blastocladiomycota
- other eukaryotes
- prokaryotes
- Archaeplastida

— 0.1

\*\*/\*\* = Posterior Probability / Bootstrap when bootstrap above 49%



**Figure S1 - A phylogeny of a putative cyclic nucleotide gated channel.** MrBayes phylogeny (100,000,000 generations, WAG +  $\Gamma$ , relative burn-in of 7,027 samples [sampled every 1,000 generations]). Where applicable Bootstrap support values are added (from analysis in RAxML (LG +  $\Gamma$ ) with 1,000 bootstraps). Support values in red: Bayesian posterior probability/ML bootstrap. Each branch is annotated with the PFAM domain architecture of the source sequence. All sequences are labelled with GenBank Accession numbers or genome sequencing centre Gene IDs. Sequences used in the alignment are available at

<https://github.com/guyleonard/blastocладиella/tree/master/publication/supplementary>

**Table S1. List of genomes used for comparative analysis and phylogenetic analysis.**

*Acaryochloris marina* MBIC11017  
*Achlya hypogyna*  
*Acholeplasma laidlawii* PG-8A  
*Acidiphilium cryptum* JF-5  
*Acidobacteria bacterium* Ellin345  
*Acidothermus cellulolyticus* 11B  
*Acidovorax avenae* subsp. *citrulli* AAC00-1  
*Acidovorax* sp. JS42  
*Acinetobacter baumannii*  
*Acinetobacter baumannii* ATCC 17978  
*Acinetobacter* sp. ADP1  
*Acremonium alcalophilum*  
*Actinobacillus pleuropneumoniae* L20  
*Actinobacillus pleuropneumoniae* serovar 3 str. JL03  
*Actinobacillus succinogenes* 130Z  
*Aeromonas hydrophila* subsp. *hydrophila* ATCC 7966  
*Aeromonas salmonicida* subsp. *salmonicida* A449  
*Aeropyrum pernix* K1  
*Agaricus bisporus*  
*Agrobacterium tumefaciens* str. C58  
*Albugo candida*  
*Alcanivorax borkumensis* SK2  
*Alkalilimnicola ehrlichei* MLHE-1  
*Alkaliphilus metalliredigens* QYMF  
*Alkaliphilus oremlandii* OhILAs  
*Allomyces macrogynus* atcc 38327  
*Alternaria brassicicola*  
*Anabaena variabilis* ATCC 29413  
*Anaeromyxobacter dehalogenans* 2CP-C  
*Anaeromyxobacter* sp. Fw109-5  
*Anaplasma marginale* str. St. Maries  
*Anaplasma phagocytophilum* HZ  
*Aquifex aeolicus* VF5  
*Aquilegia coerulea*  
*Arabidopsis lyrata*  
*Arabidopsis thaliana*  
*Archaeoglobus fulgidus* DSM 4304  
*Arcobacter butzleri* RM4018  
*Arthrobacter aurescens* TC1  
*Arthrobacter* sp. FB24  
*Ashbya gossypii*  
*Aspergillus aculeatus*  
*Aspergillus carbonarius*  
*Aspergillus clavatus*  
*Aspergillus flavus*  
*Aspergillus fumigatus*  
*Aspergillus nidulans*

*Aspergillus niger*  
*Aspergillus oryzae*  
*Aspergillus terreus*  
Aster yellows witches-broom phytoplasma AYWB  
*Aureococcus anophagefferens*  
*Auricularia delicata*  
*Azoarcus* sp. BH72  
*Azoarcus* sp. EbN1  
*Azorhizobium caulinodans* ORS 571  
*Bacillus amyloliquefaciens* FZB42  
*Bacillus anthracis* str. Ames  
*Bacillus anthracis* str. Ames Ancestor  
*Bacillus anthracis* str. Sterne  
*Bacillus cereus* ATCC 10987  
*Bacillus cereus* ATCC 14579  
*Bacillus cereus* E33L  
*Bacillus cereus* subsp. cytotoxis NVH 391-98  
*Bacillus clausii* KSM-K16  
*Bacillus halodurans* C-125  
*Bacillus licheniformis* ATCC 14580  
*Bacillus pumilus* SAFR-032  
*Bacillus subtilis* subsp. subtilis str. 168  
*Bacillus thuringiensis* serovar konkukian str. 97-27  
*Bacillus thuringiensis* str. Al Hakam  
*Bacillus weihenstephanensis* KBAB4  
*Bacteroides fragilis* NCTC 9343  
*Bacteroides fragilis* YCH46  
*Bacteroides thetaiotaomicron* VPI-5482  
*Bacteroides vulgatus* ATCC 8482  
*Bartonella bacilliformis* KC583  
*Bartonella henselae* str. Houston-1  
*Bartonella quintana* str. Toulouse  
*Bartonella tribocorum* CIP 105476  
*Batrachochytrium dendrobatidis*  
*Baudoinia compniacensis*  
*Baumannia cicadellinicola* str. Hc  
*Bdellovibrio bacteriovorus* HD100  
*Beijerinckia indica* subsp. indica ATCC 9039  
*Bifidobacterium adolescentis* ATCC 15703  
*Bifidobacterium longum* NCC2705  
*Bigelowiella natans*  
*Bjerkandera adusta*  
*Blastocladiella emersonii*  
*Blastocladiella emersonii* v2  
*Blastomyces dermatitidis*  
*Bordetella avium* 197N  
*Bordetella bronchiseptica* RB50  
*Bordetella parapertussis* 12822  
*Bordetella pertussis* Tohama I  
*Bordetella petrii* DSM 12804

Borrelia afzelii PKo  
Borrelia burgdorferi B31  
Borrelia garinii PBi  
Botrytis cinerea  
Brachypodium distachyon  
Bradyrhizobium japonicum USDA 110  
Bradyrhizobium sp. BTAi1  
Bradyrhizobium sp. ORS278  
Branchiostoma floridae  
Brucella abortus biovar 1 str. 9-941  
Brucella abortus S19  
Brucella canis ATCC 23365  
Brucella melitensis 16M  
Brucella melitensis biovar Abortus 2308  
Brucella ovis ATCC 25840  
Brucella suis 1330  
Brucella suis ATCC 23445  
Buchnera aphidicola str. APS  
Buchnera aphidicola str. Bp  
Buchnera aphidicola str. Cc  
Buchnera aphidicola str. Sg  
Burkholderia ambifaria AMMD  
Burkholderia ambifaria MC40-6  
Burkholderia cenocepacia AU 1054  
Burkholderia cenocepacia HI2424  
Burkholderia cenocepacia MC0-3  
Burkholderia mallei ATCC 23344  
Burkholderia mallei NCTC 10229  
Burkholderia mallei NCTC 10247  
Burkholderia mallei SAVP1  
Burkholderia multivorans ATCC 17616  
Burkholderia pseudomallei 1106a  
Burkholderia pseudomallei 1710b  
Burkholderia pseudomallei 668  
Burkholderia pseudomallei K96243  
Burkholderia sp. 383  
Burkholderia thailandensis E264  
Burkholderia vietnamiensis G4  
Burkholderia xenovorans LB400  
Caenorhabditis elegans  
Caldicellulosiruptor saccharolyticus DSM 8903  
Caldivirga maquilingensis IC-167  
Campylobacter concisus 13826  
Campylobacter curvus 525.92  
Campylobacter fetus subsp. fetus 82-40  
Campylobacter hominis ATCC BAA-381  
Campylobacter jejuni RM1221  
Campylobacter jejuni subsp. doylei 269.97  
Campylobacter jejuni subsp. jejuni 81-176  
Campylobacter jejuni subsp. jejuni 81116

Campylobacter jejuni subsp. jejuni NCTC 11168  
Candida albicans SC5314  
Candida caseinolytica  
Candida glabrata  
Candida tenuis  
Candidatus Blochmannia floridanus  
Candidatus Blochmannia pennsylvanicus str. BPEN  
Candidatus Carsonella ruddii PV  
Candidatus Desulforudis audaxviator MP104C  
Candidatus Korarchaeum cryptofilum OPF8  
Candidatus Methanoregula boonei 6A8  
Candidatus Pelagibacter ubique HTCC1062  
Candidatus Protochlamydia amoebophila UWE25  
Candidatus Ruthia magnifica str. Cm  
Candidatus Sulcia muelleri GWSS  
Candidatus Vesicomysocius okutanii HA  
Capitella sp. I  
Capsaspora owczarzaki  
Carboxydotherrmus hydrogenoformans Z-2901  
Carica papaya  
Catenaria anguillulae  
Caulobacter crescentus CB15  
Caulobacter sp. K31  
Ceriporiopsis subvermisporea  
Chaetomium globosum  
Chlamydia muridarum Nigg  
Chlamydia trachomatis 434 Bu  
Chlamydia trachomatis A HAR-13  
Chlamydia trachomatis D UW-3 CX  
Chlamydia trachomatis L2b UCH-1 proctitis  
Chlamydomonas reinhardtii  
Chlamydophila abortus S26 3  
Chlamydophila caviae GPIC  
Chlamydophila felis Fe C-56  
Chlamydophila pneumoniae AR39  
Chlamydophila pneumoniae CWL029  
Chlamydophila pneumoniae J138  
Chlamydophila pneumoniae TW-183  
Chlorella NC64A  
Chlorobium chlorochromatii CaD3  
Chlorobium phaeobacteroides DSM 266  
Chlorobium tepidum TLS  
Chloroflexus aurantiacus J-10-fl  
Chromobacterium violaceum ATCC 12472  
Chromohalobacter salexigens DSM 3043  
Ciona intestinalis  
Citrobacter koseri ATCC BAA-895  
Citrus clementina  
Citrus sinensis  
Clavibacter michiganensis subsp. michiganensis NCPPB 382

*Clavibacter michiganensis* subsp. *sepedonicus*  
*Clostridium acetobutylicum* ATCC 824  
*Clostridium beijerinckii* NCIMB 8052  
*Clostridium botulinum* A str. ATCC 19397  
*Clostridium botulinum* A str. ATCC 3502  
*Clostridium botulinum* A str. Hall  
*Clostridium botulinum* A3 str. Loch Maree  
*Clostridium botulinum* B str. Eklund 17B  
*Clostridium botulinum* B1 str. Okra  
*Clostridium botulinum* F str. Langeland  
*Clostridium difficile* 630  
*Clostridium kluyveri* DSM 555  
*Clostridium novyi* NT  
*Clostridium perfringens* ATCC 13124  
*Clostridium perfringens* phage phiSM101  
*Clostridium perfringens* SM101  
*Clostridium perfringens* str. 13  
*Clostridium phytofermentans* ISDg  
*Clostridium tetani* E88  
*Clostridium thermocellum* ATCC 27405  
*Coccidioides immitis*  
*Coccidioides posadasii*  
*Coccomyxa* C169  
*Cochliobolus heterostrophus*  
*Cochliobolus sativus*  
*Coemansia reversa*  
*Colwellia psychrerythraea* 34H  
*Conidiobolus coronatus*  
*Coniophora puteana*  
*Coprinus cinereus*  
*Corynebacterium diphtheriae* NCTC 13129  
*Corynebacterium efficiens* YS-314  
*Corynebacterium glutamicum* ATCC 13032  
*Corynebacterium glutamicum* R  
*Corynebacterium jeikeium* K411  
*Corynebacterium urealyticum* DSM 7109  
*Coxiella burnetii* Dugway 5J108-111  
*Coxiella burnetii* RSA 331  
*Coxiella burnetii* RSA 493  
*Cryphonectria parasitica*  
*Cryptococcus neoformans*  
*Cryptosporidium parvum*  
*Cucumis sativus*  
*Cupriavidus taiwanensis*  
*Cyanidioschyzon merolae*  
*Cyanophora paradoxa*  
*Cyanothece* sp. ATCC 51142  
*Cytophaga hutchinsonii* ATCC 33406  
*Dacryopinax* sp  
*Danio rerio*

*Daphnia pulex*  
*Debaryomyces hansenii*  
*Dechloromonas aromatica* RCB  
*Dehalococcoides ethenogenes* 195  
*Dehalococcoides* sp. BAV1  
*Dehalococcoides* sp. CBDB1  
*Deinococcus geothermalis* DSM 11300  
*Deinococcus radiodurans* R1  
*Delftia acidovorans* SPH-1  
*Desulfitobacterium hafniense* Y51  
*Desulfococcus oleovorans* Hxd3  
*Desulfotalea psychrophila* LSv54  
*Desulfotomaculum reducens* MI-1  
*Desulfovibrio desulfuricans* G20  
*Desulfovibrio vulgaris* subsp. *vulgaris* DP4  
*Desulfovibrio vulgaris* subsp. *vulgaris* str. Hildenborough  
*Dichelobacter nodosus* VCS1703A  
*Dichomitus squalens*  
*Dictyostelium discoideum*  
*Dictyostelium purpureum*  
*Dinoroseobacter shibae* DFL 12  
*Dothistroma septosporum*  
*Drosophila melanogaster*  
*Ectocarpus siliculosus*  
*Ehrlichia canis* str. Jake  
*Ehrlichia chaffeensis* str. Arkansas  
*Ehrlichia ruminantium* str. Gardel  
*Ehrlichia ruminantium* str. Welgevonden  
*Emiliana huxleyi*  
*Encephalitozoon cuniculi*  
*Entamoeba histolytica*  
*Enterobacter sakazakii* ATCC BAA-894  
*Enterobacter* sp. 638  
*Enterococcus faecalis* V583  
*Erwinia carotovora* subsp. *atroseptica* SCRI1043  
*Erythrobacter litoralis* HTCC2594  
*Escherichia coli* 536  
*Escherichia coli* APEC O1  
*Escherichia coli* ATCC 8739  
*Escherichia coli* CFT073  
*Escherichia coli* E24377A  
*Escherichia coli* HS  
*Escherichia coli* O157 H7 EDL933  
*Escherichia coli* O157 H7 str. Sakai  
*Escherichia coli* SECEC SMS-3-5  
*Escherichia coli* str. K-12 substr. DH10B  
*Escherichia coli* str. K-12 substr. MG1655  
*Escherichia coli* UTI89  
*Escherichia coli* W3110  
*Eucalyptus grandis*



Exiguobacterium sibiricum 255-15  
Fervidobacterium nodosum Rt17-B1  
Finegoldia magna ATCC 29328  
Flavobacterium johnsoniae UW101  
Flavobacterium psychrophilum JIP02 86  
Fomitiporia mediterranea  
Fomitopsis pinicola  
Fragilariopsis cylindrus  
Francisella philomiragia subsp. philomiragia ATCC 25017  
Francisella tularensis subsp. holarctica  
Francisella tularensis subsp. holarctica FTNF002-00  
Francisella tularensis subsp. holarctica OSU18  
Francisella tularensis subsp. mediasiatica FSC147  
Francisella tularensis subsp. novicida U112  
Francisella tularensis subsp. tularensis FSC198  
Francisella tularensis subsp. tularensis SCHU S4  
Francisella tularensis subsp. tularensis WY96-3418  
Frankia alni ACN14a  
Frankia sp. CcI3  
Frankia sp. EAN1pec  
Fusarium graminearum  
Fusarium oxysporum  
Fusarium verticillioides  
Fusobacterium nucleatum subsp. nucleatum ATCC 25586  
Galdieria sulphuraria  
Gallus gallus  
Ganoderma sp  
Geobacillus kaustophilus HTA426  
Geobacillus thermodenitrificans NG80-2  
Geobacter metallireducens GS-15  
Geobacter sulfurreducens PCA  
Geobacter uraniireducens Rf4  
Giardia lamblia  
Gloeobacter violaceus PCC 7421  
Gloeophyllum trabeum  
Gluconacetobacter diazotrophicus PAI 5  
Gluconobacter oxydans 621H  
Glycine max  
Gonapodya prolifera  
Gramella forsetii KT0803  
Granulibacter bethesdensis CGDNIH1  
Guillardia theta  
Haemophilus ducreyi 35000HP  
Haemophilus influenzae 86-028NP  
Haemophilus influenzae PittEE  
Haemophilus influenzae PittGG  
Haemophilus influenzae Rd KW20  
Haemophilus somnus 129PT  
Haemophilus somnus 2336  
Hahella chejuensis KCTC 2396

Haloarcula marismortui ATCC 43049  
Halobacterium salinarum R1  
Halobacterium sp. NRC-1  
Haloquadratum walsbyi DSM 16790  
Halorhodospira halophila SL1  
Hansenula polymorpha NCYC 495 leu1.1  
Helicobacter acinonychis str. Sheeba  
Helicobacter hepaticus ATCC 51449  
Helicobacter pylori 26695  
Helicobacter pylori HPAG1  
Helicobacter pylori J99  
Heliobacterium modesticaldum Ice1  
Helobdella robusta  
Hermiimonas arsenicoxydans  
Herpetosiphon aurantiacus ATCC 23779  
Heterobasidion annosum  
Histoplasma capsulatum  
Homo sapiens  
Hyaloperonospora parasitica  
Hyperthermus butylicus DSM 5456  
Hyphochytrium catenoides  
Hyphomonas neptunium ATCC 15444  
Hysterium pulicare  
Idiomarina loihiensis L2TR  
Ignicoccus hospitalis KIN4 I  
Jannaschia sp. CCS1  
Janthinobacterium sp. Marseille  
Kineococcus radiotolerans SRS30216  
Klebsiella pneumoniae subsp. pneumoniae MGH 78578  
Laccaria bicolor  
Lactobacillus acidophilus NCFM  
Lactobacillus brevis ATCC 367  
Lactobacillus casei ATCC 334  
Lactobacillus delbrueckii subsp. bulgaricus ATCC 11842  
Lactobacillus delbrueckii subsp. bulgaricus ATCC BAA-365  
Lactobacillus fermentum IFO 3956  
Lactobacillus gasseri ATCC 33323  
Lactobacillus helveticus DPC 4571  
Lactobacillus johnsonii NCC 533  
Lactobacillus plantarum WCFS1  
Lactobacillus reuteri F275  
Lactobacillus sakei subsp. sakei 23K  
Lactobacillus salivarius UCC118  
Lactococcus lactis subsp. cremoris MG1363  
Lactococcus lactis subsp. cremoris SK11  
Lactococcus lactis subsp. lactis II1403  
Lawsonia intracellularis PHE MN1-00  
Legionella pneumophila str. Corby  
Legionella pneumophila str. Lens  
Legionella pneumophila str. Paris

*Legionella pneumophila* subsp. *pneumophila* str. Philadelphia 1  
*Leifsonia xyli* subsp. *xyli* str. CTCB07  
*Leishmania major*  
*Leptosphaeria maculans*  
*Leptospira biflexa* serovar Patoc strain Patoc 1  
*Leptospira borgpetersenii* serovar Hardjo-bovis JB197  
*Leptospira borgpetersenii* serovar Hardjo-bovis L550  
*Leptospira interrogans* serovar Copenhageni str. Fiocruz L1-130  
*Leptospira interrogans* serovar Lai str. 56601  
*Leptothrix cholodnii* SP-6  
*Leuconostoc citreum* KM20  
*Leuconostoc mesenteroides* subsp. *mesenteroides* ATCC 8293  
*Lipomyces starkeyi*  
*Listeria innocua* Clip1 1262  
*Listeria monocytogenes* EGD-e  
*Listeria monocytogenes* str. 4b F2365  
*Listeria welshimeri* serovar 6b str. SLCC5334  
*Lottia gigantea*  
*Lysinibacillus sphaericus* C3-41  
*Magnaporthe grisea*  
*Magnetococcus* sp. MC-1  
*Magnetospirillum magneticum* AMB-1  
*Malassezia globosa*  
*Manihot esculenta*  
*Mannheimia succiniciproducens* MBEL55E  
*Maricaulis maris* MCS10  
*Marinobacter aquaeolei* VT8  
*Marinomonas* sp. MWYL1  
*Medicago truncatula*  
*Melampsora laricis-populina*  
*Mesoplasma florum* L1  
*Mesorhizobium loti* MAFF303099  
*Mesorhizobium* sp. BNC1  
*Metallosphaera sedula* DSM 5348  
*Methanobrevibacter smithii* ATCC 35061  
*Methanocaldococcus jannaschii* DSM 2661  
*Methanococcoides burtonii* DSM 6242  
*Methanococcus aeolicus* Nankai-3  
*Methanococcus maripaludis* C5  
*Methanococcus maripaludis* C6  
*Methanococcus maripaludis* C7  
*Methanococcus maripaludis* S2  
*Methanococcus vanniellii* SB  
*Methanocorpusculum labreanum* Z  
*Methanoculleus marisnigri* JR1  
*Methanopyrus kandleri* AV19  
*Methanosaeta thermophila* PT  
*Methanosarcina acetivorans* C2A  
*Methanosarcina barkeri* str. Fusaro  
*Methanosarcina mazei* Go1

Methanosphaera stadtmanae DSM 3091  
Methanospirillum hungatei JF-1  
Methanothermobacter thermoautotrophicus str. Delta H  
Methylibium petroleiphilum PM1  
Methylobacillus flagellatus KT  
Methylobacterium extorquens PA1  
Methylobacterium radiotolerans JCM 2831  
Methylobacterium sp. 4-46  
Methylococcus capsulatus str. Bath  
Microcystis aeruginosa NIES-843  
Micromonas pusilla CCMP1545  
Micromonas sp RCC299  
Microsporium canis  
Microsporium gypseum  
Mimulus guttatus  
Monosiga brevicollis  
Moorella thermoacetica ATCC 39073  
Mortierella elongata  
Mucor circinelloides  
Mus musculus  
Mycobacterium abscessus  
Mycobacterium avium 104  
Mycobacterium avium subsp. paratuberculosis K-10  
Mycobacterium bovis AF2122 97  
Mycobacterium bovis BCG str. Pasteur 1173P2  
Mycobacterium gilvum PYR-GCK  
Mycobacterium leprae TN  
Mycobacterium marinum M  
Mycobacterium smegmatis str. MC2 155  
Mycobacterium sp. JLS  
Mycobacterium sp. KMS  
Mycobacterium sp. MCS  
Mycobacterium tuberculosis CDC1551  
Mycobacterium tuberculosis F11  
Mycobacterium tuberculosis H37Ra  
Mycobacterium tuberculosis H37Rv  
Mycobacterium ulcerans Agy99  
Mycobacterium vanbaalenii PYR-1  
Mycoplasma agalactiae PG2  
Mycoplasma capricolum subsp. capricolum ATCC 27343  
Mycoplasma gallisepticum R  
Mycoplasma genitalium G37  
Mycoplasma hyopneumoniae 232  
Mycoplasma hyopneumoniae 7448  
Mycoplasma hyopneumoniae J  
Mycoplasma mobile 163K  
Mycoplasma mycoides subsp. mycoides SC str. PG1  
Mycoplasma penetrans HF-2  
Mycoplasma pneumoniae M129  
Mycoplasma pulmonis UAB CTIP

*Mycoplasma synoviae* 53  
*Mycosphaerella fijiensis*  
*Mycosphaerella graminicola*  
*Myxococcus xanthus* DK 1622  
*Naegleria gruberi*  
*Nanoarchaeum equitans* Kin4-M  
*Natronomonas pharaonis* DSM 2160  
*Nectria haematococca*  
*Neisseria gonorrhoeae* FA 1090  
*Neisseria meningitidis* 053442  
*Neisseria meningitidis* FAM18  
*Neisseria meningitidis* MC58  
*Neisseria meningitidis* Z2491  
*Nematostella vectensis*  
*Neorickettsia sennetsu* str. Miyayama  
*Neosartorya fischeri*  
*Neurospora crassa*  
*Neurospora tetrasperma*  
*Nitratiruptor* sp. SB155-2  
*Nitrobacter hamburgensis* X14  
*Nitrobacter winogradskyi* Nb-255  
*Nitrosococcus oceani* ATCC 19707  
*Nitrosomonas europaea* ATCC 19718  
*Nitrosomonas eutropha* C91  
*Nitrosopumilus maritimus* SCM1  
*Nitrospira multiformis* ATCC 25196  
*Nocardia farcinica* IFM 10152  
*Nocardioides* sp. JS614  
*Nostoc* sp. PCC 7120  
*Novosphingobium aromaticivorans* DSM 12444  
*Oceanobacillus iheyensis* HTE831  
*Ochrobactrum anthropi* ATCC 49188  
*Oenococcus oeni* PSU-1  
*Onion yellows phytoplasma* OY-M  
*Opitutus terrae* PB90-1  
*Orientia tsutsugamushi* Boryong  
*Oryza sativa*  
*Ostreococcus lucimarinus*  
*Ostreococcus* sp RCC809  
*Ostreococcus tauri*  
*Parabacteroides distasonis* ATCC 8503  
*Paracoccidioides brasiliensis*  
*Paracoccus denitrificans* PD1222  
*Paramecium tetraurelia*  
*Parvibaculum lavamentivorans* DS-1  
*Pasteurella multocida* subsp. *multocida* str. Pm70  
*Pediococcus pentosaceus* ATCC 25745  
*Pelobacter carbinolicus* DSM 2380  
*Pelobacter propionicus* DSM 2379  
*Pelodictyon luteolum* DSM 273

*Pelotomaculum thermopropionicum* SI  
*Petrotoga mobilis* SJ95  
*Phaeodactylum tricorutum*  
*Phanerochaete carnos*  
*Phanerochaete chrysosporium*  
*Phlebia brevispora*  
*Phlebiopsis gigantea*  
*Photobacterium profundum* SS9  
*Photorhabdus luminescens* subsp. *laumondii* TTO1  
*Phycomyces blakesleeanus*  
*Physcomitrella patens*  
*Phytophthora capsici*  
*Phytophthora infestans*  
*Phytophthora ramorum*  
*Phytophthora sojae*  
*Pichia membranifaciens*  
*Pichia stipitis*  
*Picrophilus torridus* DSM 9790  
*Piromyces* sp  
*Plasmodium yoelii*  
*Pleurotus ostreatus* PC15  
*Pleurotus ostreatus* PC9  
*Pneumocystis carinii*  
*Podospora anserina*  
*Polaromonas naphthalenivorans* CJ2  
*Polaromonas* sp. JS666  
*Polynucleobacter necessarius* STIR1  
*Polynucleobacter* sp. QLW-P1DMWA-1  
*Populus trichocarpa*  
*Porphyra umbilicalis*  
*Porphyridium cruentum*  
*Porphyromonas gingivalis* W83  
*Postia placenta*  
*Prochlorococcus marinus* str. AS9601  
*Prochlorococcus marinus* str. MIT 9211  
*Prochlorococcus marinus* str. MIT 9215  
*Prochlorococcus marinus* str. MIT 9301  
*Prochlorococcus marinus* str. MIT 9303  
*Prochlorococcus marinus* str. MIT 9312  
*Prochlorococcus marinus* str. MIT 9313  
*Prochlorococcus marinus* str. MIT 9515  
*Prochlorococcus marinus* str. NATL1A  
*Prochlorococcus marinus* str. NATL2A  
*Prochlorococcus marinus* subsp. *marinus* str. CCMP1375  
*Prochlorococcus marinus* subsp. *pastoris* str. CCMP1986  
*Propionibacterium acnes* KPA171202  
*Prosthecochloris vibrioformis* DSM 265  
*Prunus persica*  
*Pseudoalteromonas atlantica* T6c  
*Pseudoalteromonas haloplanktis* TAC125

*Pseudomonas aeruginosa* PA7  
*Pseudomonas aeruginosa* PAO1  
*Pseudomonas aeruginosa* UCBPP-PA14  
*Pseudomonas entomophila* L48  
*Pseudomonas fluorescens* Pf-5  
*Pseudomonas fluorescens* PfO-1  
*Pseudomonas mendocina* ymp  
*Pseudomonas putida* F1  
*Pseudomonas putida* GB-1  
*Pseudomonas putida* KT2440  
*Pseudomonas putida* W619  
*Pseudomonas stutzeri* A1501  
*Pseudomonas syringae* pv. *phaseolicola* 1448A  
*Pseudomonas syringae* pv. *syringae* B728a  
*Pseudomonas syringae* pv. *tomato* str. DC3000  
*Psychrobacter arcticus* 273-4  
*Psychrobacter cryohalolentis* K5  
*Psychrobacter* sp. PRwf-1  
*Psychromonas ingrahamii* 37  
*Puccinia graminis*  
*Punctularia strigosozonata*  
*Pyrenophora teres*  
*Pyrenophora tritici-repentis*  
*Pyrobaculum aerophilum* str. IM2  
*Pyrobaculum arsenaticum* DSM 13514  
*Pyrobaculum calidifontis* JCM 11548  
*Pyrobaculum islandicum* DSM 4184  
*Pyrococcus abyssi* GE5  
*Pyrococcus furiosus* DSM 3638  
*Pyrococcus horikoshii* OT3  
*Pythium ultimum*  
*Ralstonia eutropha* H16  
*Ralstonia eutropha* JMP134  
*Ralstonia metallidurans* CH34  
*Ralstonia solanacearum* GMI1000  
*Renibacterium salmoninarum* ATCC 33209  
*Rhizobium etli* CFN 42  
*Rhizobium leguminosarum* bv. *viciae* 3841  
*Rhizopus oryzae*  
*Rhodobacter sphaeroides* 2.4.1  
*Rhodobacter sphaeroides* ATCC 17025  
*Rhodobacter sphaeroides* ATCC 17029  
*Rhodococcus* sp. RHA1  
*Rhodoferax ferrireducens* T118  
*Rhodopirellula baltica* SH 1  
*Rhodopseudomonas palustris* BisA53  
*Rhodopseudomonas palustris* BisB18  
*Rhodopseudomonas palustris* BisB5  
*Rhodopseudomonas palustris* CGA009  
*Rhodopseudomonas palustris* HaA2

*Rhodospirillum rubrum* ATCC 11170  
*Rhodotorula graminis*  
*Rhystidhysteron rufulum*  
*Ricinus communis*  
*Rickettsia akari* str. Hartford  
*Rickettsia bellii* OSU 85-389  
*Rickettsia bellii* RML369-C  
*Rickettsia canadensis* str. McKiel  
*Rickettsia conorii* str. Malish 7  
*Rickettsia felis* URRWXCa2  
*Rickettsia massiliae* MTU5  
*Rickettsia prowazekii* str. Madrid E  
*Rickettsia rickettsii* str. Iowa  
*Rickettsia rickettsii* str. Sheila Smith  
*Rickettsia typhi* str. Wilmington  
*Roseiflexus castenholzii* DSM 13941  
*Roseiflexus* sp. RS-1  
*Roseobacter denitrificans* OCh 114  
*Rubrobacter xylanophilus* DSM 9941  
*Saccharomyces cerevisiae*  
*Saccharophagus degradans* 2-40  
*Saccharopolyspora erythraea* NRRL 2338  
*Saitoella complicata*  
*Salinibacter ruber* DSM 13855  
*Salinispora arenicola* CNS-205  
*Salinispora tropica* CNB-440  
*Salmonella enterica* subsp. *arizonae* serovar 62  
*Salmonella enterica* subsp. *enterica* serovar Choleraesuis str. SC-B67  
*Salmonella enterica* subsp. *enterica* serovar Paratyphi A str. ATCC 9150  
*Salmonella enterica* subsp. *enterica* serovar Paratyphi B str. SPB7  
*Salmonella enterica* subsp. *enterica* serovar Typhi str. CT18  
*Salmonella enterica* subsp. *enterica* serovar Typhi Ty2  
*Salmonella typhimurium* LT2  
*Salpingoeca rosetta*  
*Saprolegnia parasitica* cbs 223.65  
*Schizophyllum commune*  
*Schizosaccharomyces cryophilus*  
*Schizosaccharomyces japonicus*  
*Schizosaccharomyces octosporus*  
*Schizosaccharomyces pombe*  
*Sclerotinia sclerotiorum*  
*Selaginella moellendorffii*  
*Septoria musiva*  
*Septoria populicola*  
*Serpula lacrymans*  
*Serratia proteamaculans* 568  
*Setaria italica*  
*Setosphaeria turcica*  
*Shewanella amazonensis* SB2B  
*Shewanella baltica* OS155



Shewanella baltica OS185  
Shewanella baltica OS195  
Shewanella denitrificans OS217  
Shewanella frigidimarina NCIMB 400  
Shewanella halifaxensis HAW-EB4  
Shewanella loihica PV-4  
Shewanella oneidensis MR-1  
Shewanella pealeana ATCC 700345  
Shewanella putrefaciens CN-32  
Shewanella sediminis HAW-EB3  
Shewanella sp. ANA-3  
Shewanella sp. MR-4  
Shewanella sp. MR-7  
Shewanella sp. W3-18-1  
Shewanella woodyi ATCC 51908  
Shigella boydii CDC 3083-94  
Shigella boydii Sb227  
Shigella dysenteriae Sd197  
Shigella flexneri 2a str. 2457T  
Shigella flexneri 2a str. 301  
Shigella flexneri 5 str. 8401  
Shigella sonnei Ss046  
Silicibacter pomeroyi DSS-3  
Silicibacter sp. TM1040  
Sinorhizobium medicae WSM419  
Sinorhizobium meliloti 1021  
Sodalis glossinidius str. morsitans  
Solanum lycopersicum  
Solanum tuberosum  
Solibacter usitatus Ellin6076  
Sorangium cellulosum So ce 56  
Sorghum bicolor  
Spathaspora passalidarum  
Sphaeroforma arctica jp610  
Sphingomonas wittichii RW1  
Sphingopyxis alaskensis RB2256  
Spizellomyces punctatus daom br117  
Sporobolomyces roseus  
Sporotrichum thermophile  
Stagonospora nodorum  
Staphylococcus aureus RF122  
Staphylococcus aureus subsp. aureus COL  
Staphylococcus aureus subsp. aureus JH1  
Staphylococcus aureus subsp. aureus JH9  
Staphylococcus aureus subsp. aureus MRSA252  
Staphylococcus aureus subsp. aureus MSSA476  
Staphylococcus aureus subsp. aureus Mu3  
Staphylococcus aureus subsp. aureus Mu50  
Staphylococcus aureus subsp. aureus MW2  
Staphylococcus aureus subsp. aureus N315

Staphylococcus aureus subsp. aureus NCTC 8325  
Staphylococcus aureus subsp. aureus str. Newman  
Staphylococcus aureus subsp. aureus USA300  
Staphylococcus aureus subsp. aureus USA300\_TCH1516  
Staphylococcus epidermidis ATCC 12228  
Staphylococcus epidermidis RP62A  
Staphylococcus haemolyticus JCSC1435  
Staphylococcus saprophyticus subsp. saprophyticus ATCC 15305  
Staphylothermus marinus F1  
Stereum hirsutum  
Streptococcus agalactiae 2603V R  
Streptococcus agalactiae A909  
Streptococcus agalactiae NEM316  
Streptococcus gordonii str. Challis substr. CH1  
Streptococcus mutans UA159  
Streptococcus pneumoniae CGSP14  
Streptococcus pneumoniae D39  
Streptococcus pneumoniae Hungary19A-6  
Streptococcus pneumoniae R6  
Streptococcus pneumoniae TIGR4  
Streptococcus pyogenes M1 GAS  
Streptococcus pyogenes MGAS10270  
Streptococcus pyogenes MGAS10394  
Streptococcus pyogenes MGAS10750  
Streptococcus pyogenes MGAS2096  
Streptococcus pyogenes MGAS315  
Streptococcus pyogenes MGAS5005  
Streptococcus pyogenes MGAS6180  
Streptococcus pyogenes MGAS8232  
Streptococcus pyogenes MGAS9429  
Streptococcus pyogenes SSI-1  
Streptococcus pyogenes str. Manfredo  
Streptococcus sanguinis SK36  
Streptococcus suis 05ZYH33  
Streptococcus suis 98HAH33  
Streptococcus thermophilus CNRZ1066  
Streptococcus thermophilus LMD-9  
Streptococcus thermophilus LMG 18311  
Streptomyces avermitilis MA-4680  
Streptomyces coelicolor A3  
Streptomyces griseus subsp. griseus NBRC 13350  
Strongylocentrotus\_purpuratus  
Sulfolobus acidocaldarius DSM 639  
Sulfolobus solfataricus P2  
Sulfolobus tokodaii str. 7  
Sulfurimonas denitrificans DSM 1251  
Sulfurovum sp. NBC37-1  
Symbiobacterium thermophilum IAM 14863  
Synechococcus elongatus PCC 6301  
Synechococcus elongatus PCC 7942

Synechococcus sp. CC9311  
Synechococcus sp. CC9605  
Synechococcus sp. CC9902  
Synechococcus sp. JA-2-3Ba  
Synechococcus sp. JA-3-3Ab  
Synechococcus sp. PCC 7002  
Synechococcus sp. RCC307  
Synechococcus sp. WH 7803  
Synechococcus sp. WH 8102  
Synechocystis sp. PCC 6803  
Syntrophobacter fumaroxidans MPOB  
Syntrophomonas wolfei subsp. wolfei str. Goettingen  
Syntrophus aciditrophicus SB  
Takifugu rubripes  
Tetrahymena thermophila  
Thalassiosira pseudonana  
Thecamonas trahens atcc 50062  
Thermoanaerobacter pseudethanolicus ATCC 33223  
Thermoanaerobacter sp. X514  
Thermoanaerobacter tengcongensis MB4  
Thermobifida fusca YX  
Thermococcus kodakarensis KOD1  
Thermofilum pendens Hrk 5  
Thermoplasma acidophilum DSM 1728  
Thermoplasma volcanium GSS1  
Thermoproteus neutrophilus V24Sta  
Thermosipho melanesiensis BI429  
Thermosynechococcus elongatus BP-1  
Thermotoga lettingae TMO  
Thermotoga maritima MSB8  
Thermotoga petrophila RKU-1  
Thermus thermophilus HB27  
Thermus thermophilus HB8  
Thielavia terrestris  
Thiobacillus denitrificans ATCC 25259  
Thiomicrospira crunogena XCL-2  
Thraustotheca clavata  
Toxoplasma gondii  
Trametes versicolor  
transporters  
Tremella mesenterica  
Treponema denticola ATCC 35405  
Treponema pallidum subsp. pallidum str. Nichols  
Trichoderma atoviride  
Trichoderma reesei  
Trichoderma virens  
Trichodesmium erythraeum IMS101  
Trichomonas vaginalis  
Trichophyton equinum  
Trichoplax adhaerens

*Tropheryma whipplei* str. Twist  
*Tropheryma whipplei* TW08 27  
*Trypanosoma brucei*  
*Trypanosoma cruzi*  
*Uncinocarpus reesii*  
uncultured methanogenic archaeon RC-I  
*Ureaplasma parvum* serovar 3 str. ATCC 27815  
*Ureaplasma parvum* serovar 3 str. ATCC 700970  
*Ustilago maydis*  
*Verminephrobacter eiseniae* EF01-2  
*Verticillium albo-atrum*  
*Verticillium dahliae*  
*Vibrio cholerae* O1 biovar eltor str. N16961  
*Vibrio cholerae* O395  
*Vibrio fischeri* ES114  
*Vibrio harveyi* ATCC BAA-1116  
*Vibrio parahaemolyticus* RIMD 2210633  
*Vibrio vulnificus* CMCP6  
*Vibrio vulnificus* YJ016  
*Vitis vinifera*  
*Volvox carteri*  
*Walleimia sebi*  
*Wickerhamomyces anomalus*  
*Wigglesworthia glossinidia* endosymbiont of *Glossina brevipalpis*  
*Wolbachia* endosymbiont of *Drosophila melanogaster*  
*Wolbachia* endosymbiont strain TRS of *Brugia malayi*  
*Wolfiporia cocos*  
*Wolinella succinogenes* DSM 1740  
*Xanthobacter autotrophicus* Py2  
*Xanthomonas axonopodis* pv. *citri* str. 306  
*Xanthomonas campestris* pv. *campestris* str. 8004  
*Xanthomonas campestris* pv. *campestris* str. ATCC 33913  
*Xanthomonas campestris* pv. *vesicatoria* str. 85-10  
*Xanthomonas oryzae* pv. *oryzae* KACC10331  
*Xanthomonas oryzae* pv. *oryzae* MAFF 311018  
*Xanthoria parietina*  
*Xenopus tropicalis*  
*Xylella fastidiosa* 9a5c  
*Xylella fastidiosa* M12  
*Xylella fastidiosa* M23  
*Xylella fastidiosa* Temecula1  
*Yarrowia lipolytica*  
*Yersinia enterocolitica* subsp. *enterocolitica* 8081  
*Yersinia pestis* Angola  
*Yersinia pestis* Antiqua  
*Yersinia pestis* biovar *Microtus* str. 91001  
*Yersinia pestis* CO92  
*Yersinia pestis* KIM  
*Yersinia pestis* Nepal516  
*Yersinia pestis* Pestoides F

*Yersinia pseudotuberculosis* IP 31758

*Yersinia pseudotuberculosis* IP 32953

*Yersinia pseudotuberculosis* YPIII

*Zea mays*

*Zymomonas mobilis* subsp. *mobilis* ZM4