

Table S1. Distribution of lactate utilization genes across diverse bacterial species

Organism	L-LDH	Predicted L-LDH	D-LDH	Predicted D-LDH	Lactate permease	Transcript. regulators
	LldD	LldEFG	Dld	Dld-II	LldP	R1, R2, R3
Actinobacteria						
<i>Acidobacteria bacterium Ellin345</i>		+		+	+	
<i>Brevibacterium linens BL2</i>	++	+	+	+	+++	
<i>Corynebacterium diphtheriae NCTC 13129</i>		+			++	
<i>Corynebacterium efficiens YS-314</i>	+					
<i>Corynebacterium glutamicum ATCC 13032</i>	+		+			
<i>Corynebacterium glutamicum ATCC 13032</i>	+		+			
<i>Corynebacterium jeikeium K411</i>	+					
<i>Janibacter sp. HTCC2649</i>	+	+				
<i>Kineococcus radiotolerans SRS30216</i>	+					
marine actinobacterium PHSC20C1	++					
<i>Mycobacterium avium str. k10</i>	+					
<i>Mycobacterium bovis AF2122/97</i>	++					
<i>Mycobacterium leprae TN</i>	+					
<i>Mycobacterium marinum M</i>	++					
<i>Mycobacterium microti OV254</i>	++					
<i>Mycobacterium smegmatis str. MC2 155</i>	+	+			+	
<i>Mycobacterium sp. MCS</i>	+	+				
<i>Mycobacterium tuberculosis CDC1551</i>	++					
<i>Mycobacterium tuberculosis H37Rv</i>	++					
<i>Propionibacterium acnes KPA171202</i>		+		+	+	
<i>Rubrobacter xylanophilus DSM 9941</i>		+			+	
<i>Solibacter usitatus Ellin6076</i>		+			+	
<i>Streptomyces avermitilis MA-4680</i>		+			+	
<i>Streptomyces coelicolor A3(2)</i>		+		+	+	
<i>Thermobifida fusca YX</i>	+					
CFB / Flavobacteria group						
<i>Bacteroides fragilis 638R</i>		+		+	+	
<i>Bacteroides fragilis ATCC 25285</i>		+		+	+	
<i>Bacteroides fragilis NCTC 9343</i>		+		+	+	
<i>Bacteroides fragilis YCH46</i>		+		+	+	
<i>Bacteroides thetaiotaomicron VPI-5482</i>		+			+	
<i>Flavobacteriales bacterium HTCC2170</i>	+					
<i>Flavobacterium sp. MED217</i>	+					
<i>Porphyromonas gingivalis W83</i>		+			+	
<i>Robiginitalea biformata HTCC2501</i>	+					
Cyanobacteria						
<i>Trichodesmium erythraeum IMS101</i>	+				+	
<i>Prochlorococcus marinus str. MIT 9211</i>	+		+			
<i>Prochlorococcus marinus str. NATL2A</i>	+					
<i>Prochlorococcus marinus str. CCMP1375</i>	+		+		+	
Thermus/ Deinococcus						
<i>Deinococcus geothermalis DSM11300</i>		+				
<i>Deinococcus radiodurans R1</i>		+			+	
<i>Thermus thermophilus HB27</i>		+				

<i>Thermus thermophilus</i> HB8								
Bacillus / Clostridium group								
<i>Bacillus anthracis</i> str. 'Ames Ancestor'		++					+++	+
<i>Bacillus</i> B-14905		+					+	+
<i>Bacillus cereus</i> ZK		++					+++	+
<i>Bacillus clausii</i> KSM-K16		+					+	+
<i>Bacillus halodurans</i> C-125		+					+++	+
<i>Bacillus licheniformis</i> ATCC 14580		+					++	+
<i>Bacillus subtilis</i> subsp. <i>subtilis</i> str. 168		+					++	+
<i>Bacillus thuringiensis</i> serovar <i>konkukian</i> str. 97-27		+					+++	+
<i>Carboxydotherrnus hydrogenoformans</i> Z-2901		+					+	
<i>Desulfitobacterium</i> sp. Y51		++			+		++++	
<i>Geobacillus kaustophilus</i> HTA426		+					+	+
<i>Lactobacillus acidophilus</i> NCFM	+						+	
<i>Lactobacillus johnsonii</i> NCC 533							+	
<i>Lactococcus lactis</i> subsp. <i>lactis</i> I11403		+						
<i>Oceanobacillus iheyensis</i> HTE831		+					+	+
<i>Pediococcus pentosaceus</i>								
<i>Streptococcus mitis</i> NCTC 12261								
<i>Streptococcus pneumoniae</i> R6								
<i>Streptococcus pyogenes</i> M1 GAS								
Other								
<i>Blastopirellula marina</i> DSM 3645		+			+			
<i>Fusobacterium nucleatum</i> ATCC 25586		+						
<i>Pirellula</i> sp. 1		+					+	
Alpha-proteobacteria								
<i>Agrobacterium tumefaciens</i> str. C58	+++							
<i>Aurantimonas</i> sp. SI85-9A1	+	+					+	
<i>Bartonella bacilliformis</i> KC583	+							
<i>Bartonella henselae</i> str. Houston-1	+							
<i>Bartonella quintana</i> str. Toulouse	+							
<i>Bradyrhizobium japonicum</i> USDA 110	++						+	
<i>Brucella abortus</i>	+						+	
<i>Brucella melitensis</i> 16M	+						++	
<i>Brucella suis</i> 1330	+						+	
<i>Candidatus Pelagibacter ubique</i> HTCC1062	+							
<i>Caulobacter crescentus</i> CB15	+							
<i>Erythrobacter litoralis</i> HTCC2594	+							
<i>Erythrobacter</i> sp. NAP1	+							
<i>Gluconobacter oxydans</i> 621H	+	+			+		+	
<i>Hyphomonas neptunium</i> ATCC 15444	++				+			
<i>Loktanella vestfoldensis</i> SKA53	+							
<i>Magnetospirillum magneticum</i> AMB-1	+	+			+		+	
<i>Maricaulis maris</i> MCS10	+							
<i>Mesorhizobium loti</i> MAFF303099	+++							
<i>Mesorhizobium</i> sp. BNC1	++	+			+			
<i>Nitrobacter hamburgensis</i> X14	+							
<i>Novosphingobium aromaticivorans</i>	+							
<i>Oceanicola batsensis</i> HTCC2597	+							
<i>Rhizobium leguminosarum</i> bv. <i>viciae</i> 3841	+++							
<i>Rhodobacter sphaeroides</i> 2.4.1	+							
<i>Rhodobacterales bacterium</i> HTCC2654	++++				+			

<i>Rhodopseudomonas palustris</i> BisB5	+			+	
<i>Rhodopseudomonas palustris</i> CGA009	+			+	
<i>Rhodospirillum rubrum</i>		++		+	+
<i>Roseobacter denitrificans</i> OCh 114	+++	+	+		
<i>Roseobacter</i> sp. MED193	+++				
<i>Roseovarius nubinhibens</i> ISM	+++				
<i>Roseovarius</i> sp. 217	+++				
<i>Silicibacter pomeroyi</i> DSS-3	++				
<i>Silicibacter</i> sp. TM1040	++				
<i>Sinorhizobium meliloti</i> 1021	++++				
<i>Sphingopyxis alaskensis</i> RB2256	+				
<i>Sulfitobacter</i> sp. EE-36	++				
<i>Sulfitobacter</i> sp. NAS-14.1	++				
<i>Zymomonas mobilis</i> subsp. <i>mobilis</i> ZM4		+	+		
Beta-proteobacteria					
<i>Azoarcus</i> sp. EbN1		++			+
<i>Bordetella avium</i>	++				
<i>Bordetella bronchiseptica</i> RB50	+++		+	+	
<i>Bordetella parapertussis</i> 12822	++			+	
<i>Bordetella pertussis</i> Tohama I	+++		+		
<i>Burkholderia cenocepacia</i> J2315	++	+++	+	+++	+
<i>Burkholderia cepacia</i> R1808		+++	+	++	
<i>Burkholderia cepacia</i> R18194		++		++	+
<i>Burkholderia fungorum</i>	+++	++	+	+	+
<i>Burkholderia mallei</i> ATCC 23344	+++	++		+	+
<i>Burkholderia pseudomallei</i> 1710b	+++	++		+	+
<i>Burkholderia pseudomallei</i> K96243	+++	++		+	+
<i>Burkholderia vietnamiensis</i> str. G4 (R1808)		+++	+	++	
<i>Burkholderia xenovorans</i> LB400	++++	++	+	+	+
<i>Chromobacterium violaceum</i> ATCC 12472		+		+	
<i>Dechloromonas aromatica</i> RCB		++		+	+
<i>Neisseria gonorrhoeae</i> FA 1090	+	+	+	++	
<i>Neisseria lactamica</i> ST-640	+	+	+	++	
<i>Neisseria meningitidis</i> FAM18	+	+	+	++	
<i>Neisseria meningitidis</i> MC58	+	+	+	+	
<i>Neisseria meningitidis</i> Z2491	+	+	+	+	
<i>Nitrosomonas eutropha</i> C71	+				
<i>Polaromonas</i> sp. JS666	++				
<i>Ralstonia eutropha</i> JMP134	++	++		++	+
<i>Ralstonia solanacearum</i> GMI1000		+		+	+
<i>Rhodoferax ferrireducens</i> DSM 15236	+	+			
<i>Rubrivivax gelatinosus</i> PM1	++			+	
Delta-proteobacteria					
<i>Desulfotalea psychrophila</i> LSv54		++		+	++
<i>Desulfovibrio desulfuricans</i> G20		++		+	++
<i>Desulfovibrio vulgaris</i> str. Hildenborough		++		+	+++++
<i>Desulfuromonas acetoxidans</i>		+			
<i>Geobacter sulfurreducens</i> PCA		+		++	
<i>Geobacter uraniumreducens</i> Rf4		+		+	
<i>Syntrophobacter fumaroxidans</i> MPOB		++			
Epsilon-proteobacteria					
<i>Campylobacter coli</i> RM2228		+		+	+

<i>Campylobacter fetus</i> subsp. <i>fetus</i> 82-40			+			+	
<i>Campylobacter jejuni</i> RM1221			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> 260.94			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> 81-176			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> 84-25			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> CF93-6			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> HB93-13			+			+	+
<i>Campylobacter jejuni</i> subsp. <i>jejuni</i> NCTC 11168			+			+	+
<i>Campylobacter lari</i> RM2100			+			+	+
<i>Campylobacter upsaliensis</i> RM3195			+			+	+
<i>Helicobacter acinonychis</i> str. <i>Sheeba</i>			+			+	+
<i>Helicobacter hepaticus</i> ATCC 51449			+			+	+
<i>Helicobacter mustelae</i> 43772			+			+	+
<i>Helicobacter pylori</i> 26695			+			+	++
<i>Helicobacter pylori</i> J99			+			+	++
Gamma-proteobacteria							
<i>Acinetobacter</i> sp. ADP1	+			+		+	+
<i>Actinobacillus pleuropneumoniae</i> serovar 1 str. 4074	+	+		+		+	
<i>Alkalicoccus ehrlichei</i> MLHE-1		+				+	+
<i>Alteromonas macleodii</i> 'Deep ecotype'				++		+	
<i>Azotobacter vinelandii</i>	+	+			+	+	+
<i>Chromohalobacter salexigens</i> DSM 3043	++				+	+	+
<i>Colwellia psychrerythraea</i> 34H	+	+			+	+	+
<i>Erwinia carotovora</i> subsp. <i>atroseptica</i> SCRI1043	+	+		+		+	
<i>Escherichia coli</i> 042	+	+		+		+	+
<i>Escherichia coli</i> CFT073	+	+		+		+	+
<i>Escherichia coli</i> E2348/69	+	+		+		+	+
<i>Escherichia coli</i> K12	+	+		+		+	+
<i>Escherichia coli</i> O157:H7	+	+		+		+	+
<i>Escherichia coli</i> O157:H7 EDL933	+	+		+		+	+
<i>Escherichia coli</i> W3110	+	+		+		+	+
<i>Francisella tularensis</i> subsp. <i>tularensis</i> Schu 4	+						
<i>Haemophilus ducreyi</i> 35000HP	+	+					
<i>Haemophilus influenzae</i> 86-028NP	+			+		+	
<i>Haemophilus influenzae</i> R2846	+					+	
<i>Haemophilus influenzae</i> R2866	+			+		+	
<i>Haemophilus influenzae</i> Rd KW20	+			+		+	
<i>Haemophilus somnus</i> 129PT		+		+		+	
<i>Haemophilus somnus</i> 2336		+		+		+	
<i>Hahella chejuensis</i> KCTC 2396	+	+			+		+
<i>Idiomarina baltica</i> OS145	+						
<i>Mannheimia succiniciproducens</i> MBEL55E		+				+	
<i>Nitrococcus mobilis</i> Nb-231	+						
<i>Pasteurella multocida</i> subsp. <i>multocida</i> str. <i>Pm70</i>	+	+				+	
<i>Photobacterium profundum</i> SS9		++		+	+	+++	+++
<i>Photorhabdus asymbiotica</i> subsp. <i>asymbiotica</i>				+			
<i>Photorhabdus luminescens</i> subsp. <i>laumondii</i> TTO1	+			+			
<i>Proteus mirabilis</i> HI4320		++		+		+	
<i>Pseudoalteromonas atlantica</i> T6c	+				+	+	
<i>Pseudoalteromonas haloplanktis</i> TAC125		+				+	+
<i>Pseudoalteromonas tunicata</i> D2	+					+	
<i>Pseudomonas aeruginosa</i> 2192	++				+	+	+

<i>Pseudomonas entomophila</i> L48	+			+	++	+
<i>Pseudomonas fluorescens</i> Pf-5		+		+	+	+
<i>Pseudomonas fluorescens</i> PfO-1		+		+	+	+
<i>Pseudomonas fluorescens</i> SBW25	++			+	++	+
<i>Pseudomonas putida</i> KT2440	+			+	+	+
<i>Pseudomonas syringae</i> pv. <i>syringae</i> B728a	+					
<i>Psychrobacter cryohalolentis</i> K5	+				+	
<i>Psychrobacter</i> sp. 273-4	+				+	
<i>Reinekea</i> sp. MED297	+			+		
<i>Salmonella enterica</i> serovar Typhi str. CT18	+		+		+	+
<i>Salmonella typhimurium</i> LT2	+		+		+	+
<i>Serratia marcescens</i> Db11	+		+		+	+
<i>Shewanella amazonensis</i> SB2B		+		+	+	+
<i>Shewanella baltica</i> OS155		+		+	+	+
<i>Shewanella frigidimarina</i> NCIMB 400		+		+	+	+
<i>Shewanella oneidensis</i> MR-1		+		+	++	+
<i>Shewanella putrefaciens</i> CN-32		+		+	+	+
<i>Shewanella sediminis</i> HAW-EB3		+		+	+	+
<i>Shewanella</i> sp. PV-4		+		+	+	+
<i>Shigella dysenteriae</i> M131649	+		+		+	+
<i>Shigella flexneri</i> 2a str. 2457T	+	+	+		+	+
<i>Shigella sonnei</i> 53G	+	+	+		+	+
<i>Shigella sonnei</i> Ss046	+	+	+		+	+
<i>Sodalis glossinidius</i> str. 'morsitans'	+		+		+	
<i>Stenotrophomonas maltophilia</i> K279a	+		+		+	+
<i>Vibrio cholerae</i> MO10	+			+	+	+
<i>Vibrio cholerae</i> NRT36s	+			+	+	+
<i>Vibrio cholerae</i> O1 biovar eltor str. N16961	+			+	+	+
<i>Vibrio cholerae</i> O395	+			+	+	+
<i>Vibrio parahaemolyticus</i> RIMD 2210633	+		+		+	++
<i>Vibrio</i> sp. Ex25	+		+		+	++
<i>Vibrio</i> sp. MED222	+			+	+	+
<i>Vibrio splendidus</i> 12B01	+			+	+	+
<i>Vibrio vulnificus</i> CMCP6		+		+	+	+
<i>Vibrio vulnificus</i> YJ016		+		+	+	+
<i>Xanthomonas axonopodis</i> pv. <i>citri</i> str. 306	+					
<i>Xanthomonas campestris</i> pv. <i>campestris</i> ATCC 33913	+					
<i>Xanthomonas campestris</i> pv. <i>campestris</i> str. 8004	+					
<i>Xanthomonas campestris</i> pv. <i>vesicatoria</i> str. 85-10	+					
<i>Xanthomonas oryzae</i> pv. <i>oryzae</i> KACC10331	+					
<i>Yersinia enterocolitica</i> 8081			+			
<i>Yersinia pestis</i> biovar <i>Medievalis</i> str. 91001	+		+			
<i>Yersinia pestis</i> CO92	+		+			
<i>Yersinia pestis</i> KIM	+		+			
<i>Yersinia pseudotuberculosis</i> IP 32953	+		+			

Genes that are co-regulated and/or co-localized on the chromosome are shown on yellow background

"+" indicate the presence of the respective genes in the genomes