

Title	Comparative genomics of the genus <i>Lactobacillus</i> reveals robust phylogroups that provide the basis for reclassification
Authors	Salvetti, Elisa; Harris, Hugh M. B.; Felis, Giovanna E.; O'Toole, Paul W.
Publication date	2018-08-17
Original Citation	Salvetti, E., Harris, H. M. B., Felis, G. E. and O'Toole, P. W (2018) 'Comparative genomics of the genus <i>Lactobacillus</i> reveals robust phylogroups that provide the basis for reclassification'. <i>Applied and Environmental Microbiology</i> , 84(17), e00993-18 (15pp). doi: 10.1128/AEM.00993-18
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1128/AEM.00993-18
Rights	Open access - http://creativecommons.org/licenses/by/4.0/ © 2018, American Society for Microbiology.
Download date	2026-08-17 05:17:24
Item downloaded from	https://hdl.handle.net/10468/11776

Supplementary

Figure S1

Split graphs resulting from split decomposition analysis of amino acid sequences of 29 ribosomal protein (S1A) and 12 phylogenetic markers (S1B). Colours refer to the same phylogroups indicated in Figure 1. Orange: *L. delbrueckii* group; red: *L. alimentarius* group; green: *L. perolens* group; dark grey: *L. casei* group; dark pink: *L. sakei* group; violet: *L. salivarius* group; brown: *L. reuteri* group; light grey: *L. buchneri* group; light blue: *L. plantarum* group; light pink: *L. coryniformis* group.

Figure S2

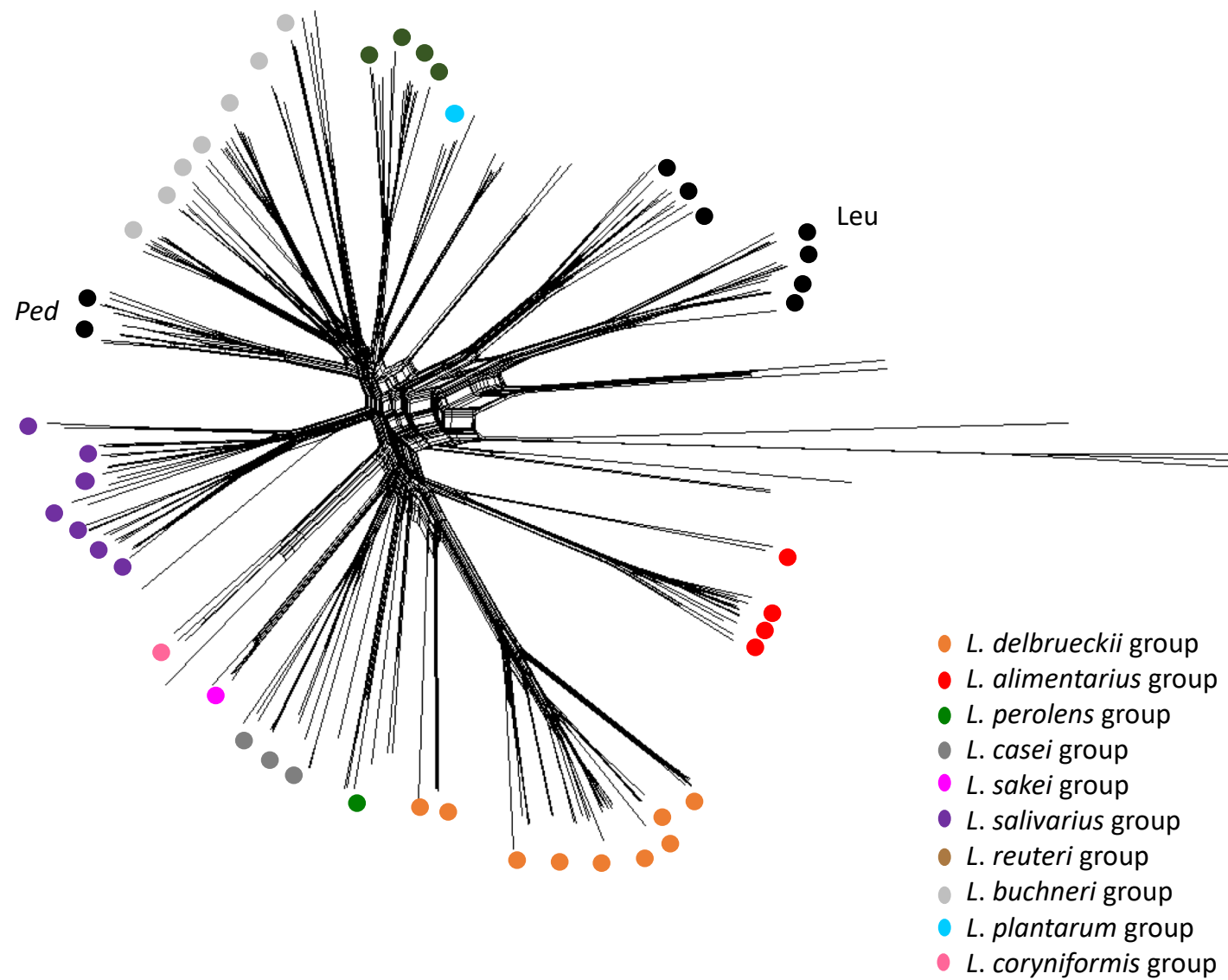
Histograms of the Average Nucleotide Identity (ANI), Average Amino acid Identity (AAI), and Percentage of Conserved Protein (POCP) values. Red bars indicate the following thresholds: <75-80% ANI indicate that genomes are too divergent to be compared based on ANI; 55-60% AAI is set as genus boundary based on AAI; 50% POCP is set as genus boundary based on POCP.

Figure S3

16S rRNA gene sequence-based phylogenetic trees of all members of each phylogroup. The tree was calculated using Tamura Three Parameters as distance matrix formula and minimum evolution as tree reconstruction method. Bootstrap values (1,000 replicates) are reported in percentage at nodes (values below 60% are not shown). The reference species for each group is indicated in red. A: *L. delbrueckii* group; B: *L. alimentarius* group; C: *L. perolens* group; D: *L. casei* group; E: *L. sakei* group; F: *L. plantarum* group; G: *L. coryniformis* group; H: *L. salivarius* group; I: *L. reuteri* group; J: *L. buchneri* group; K: genus *Pediococcus*; L: family Leuconostocaceae. *L. selangorensis* is reported in *L. casei* phylogroup; couples (*L. rossiae*-*L. siliginis*; *L. concavus*-*L. dextrinicus* are not reported). *L. curtus* have been recently described and it is associated to *L. rossiae*-*L. siliginis*.

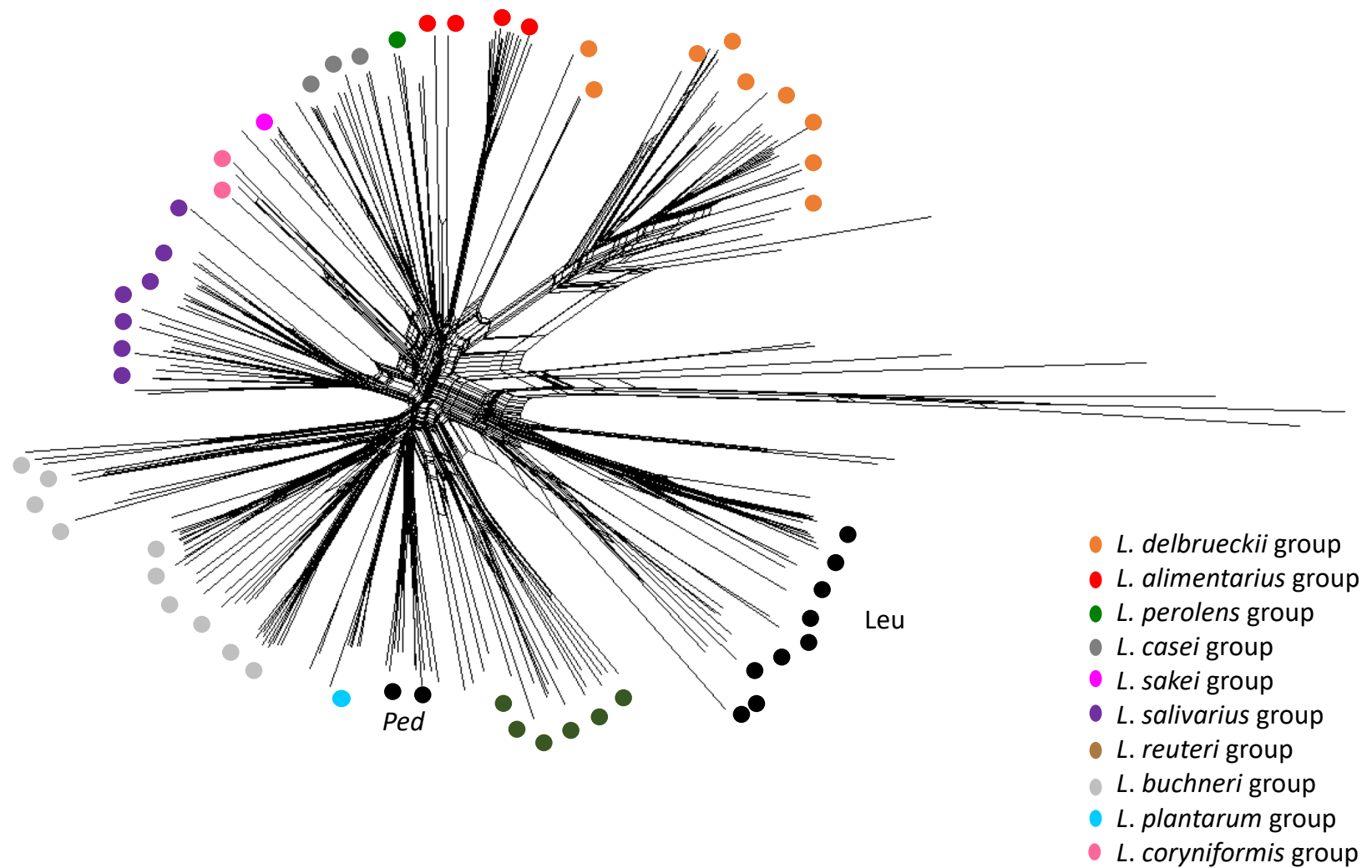
Suppl Figure S1A

10,01

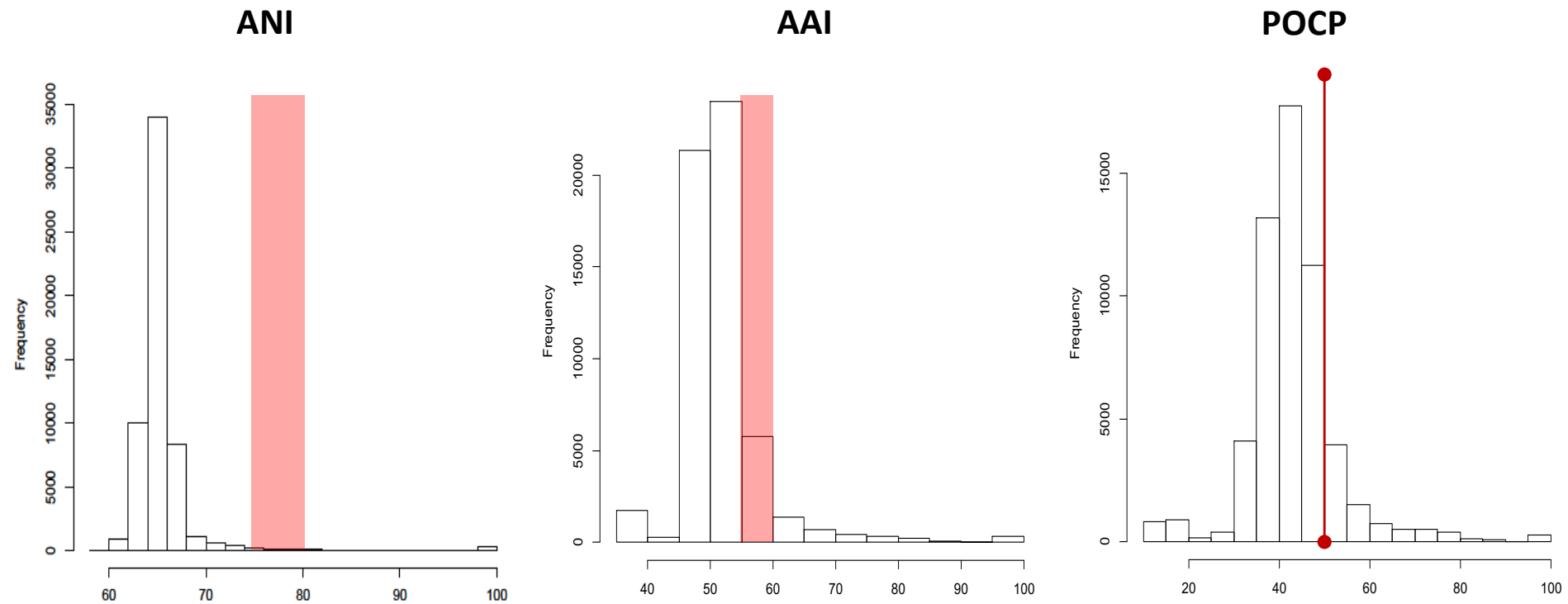


Suppl Figure S1B

0.01



Suppl Figure S2



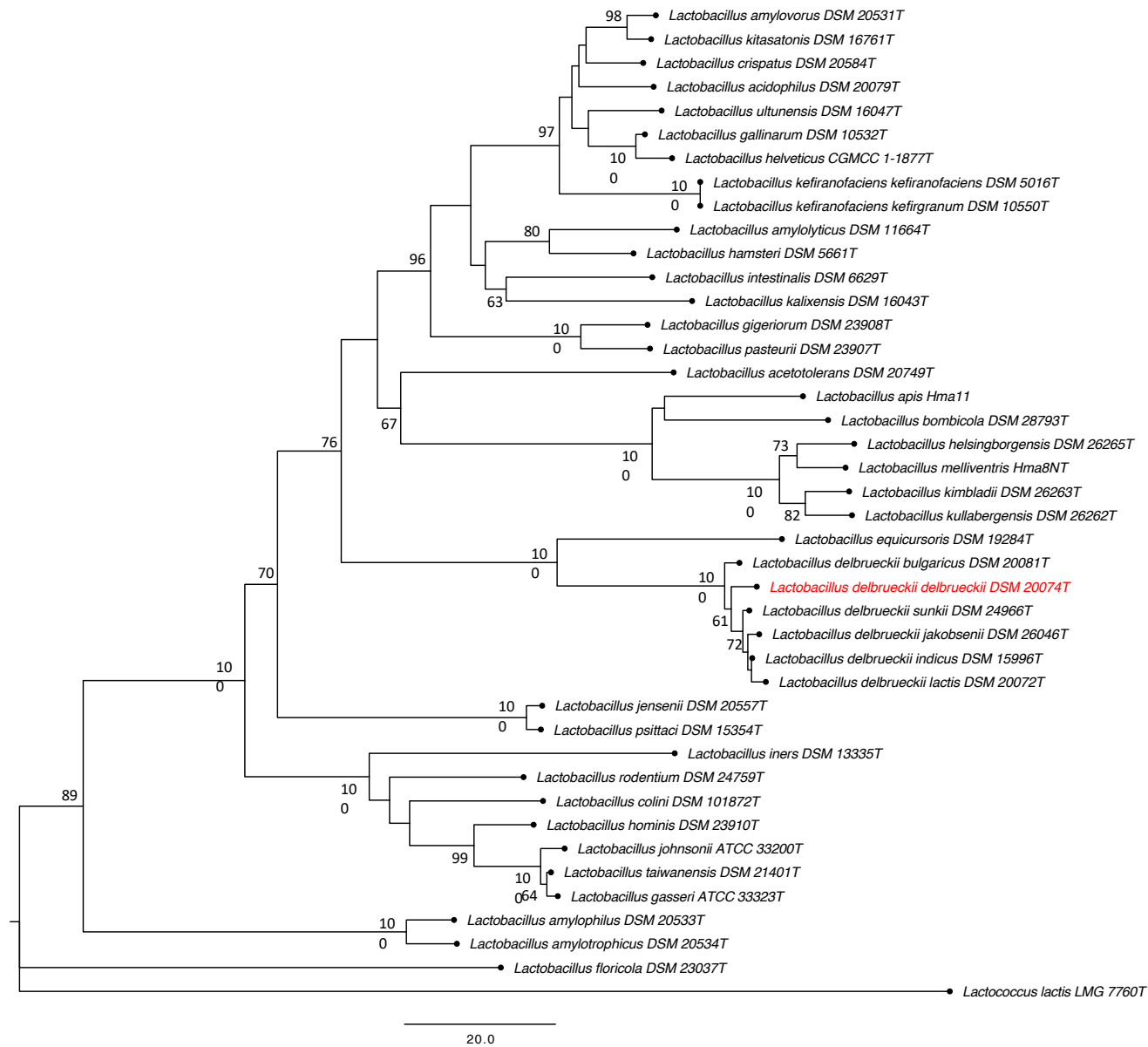


Figure S3A: *L. delbrueckii* group

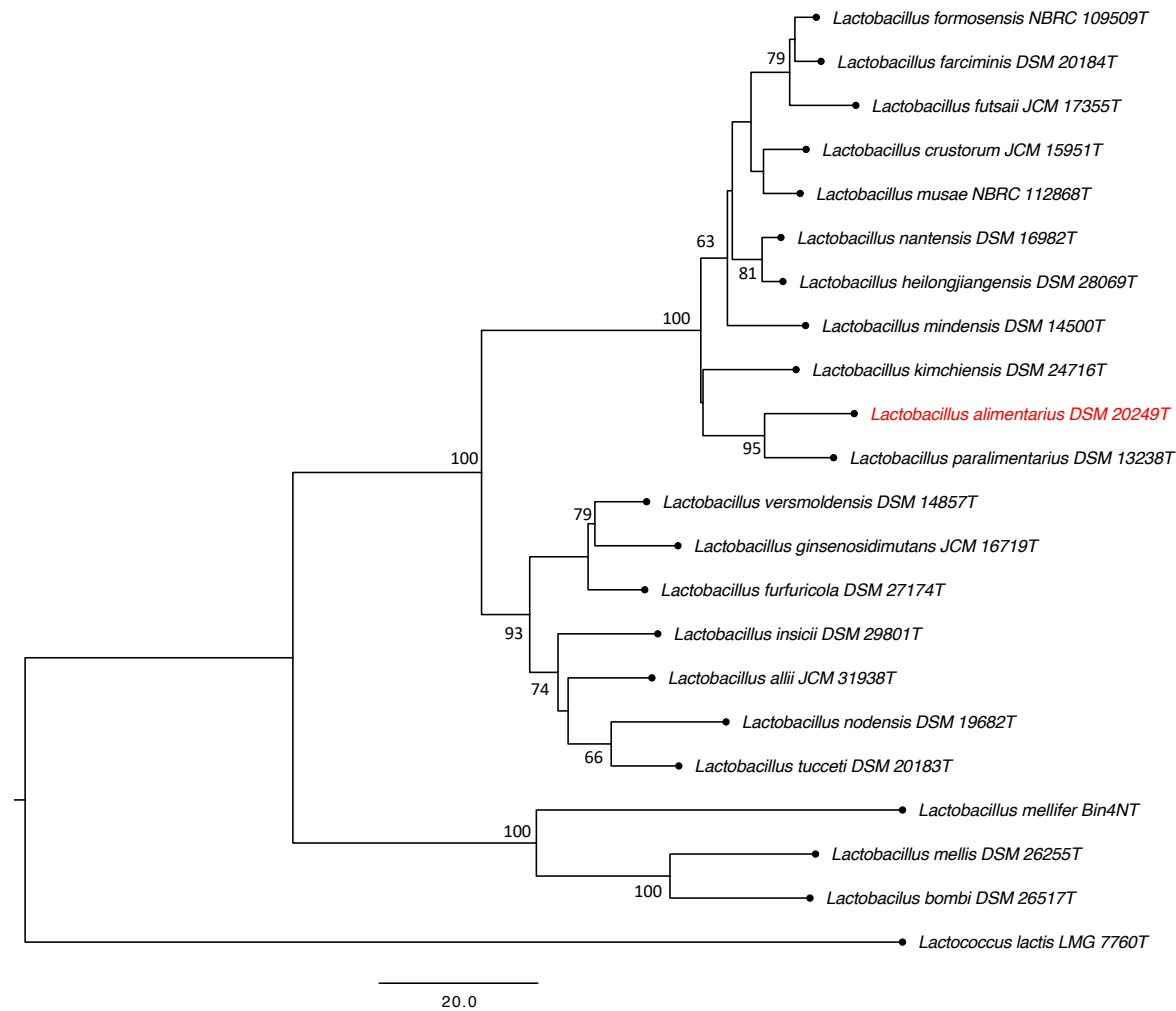


Figure S3B: *L. alimentarius* group

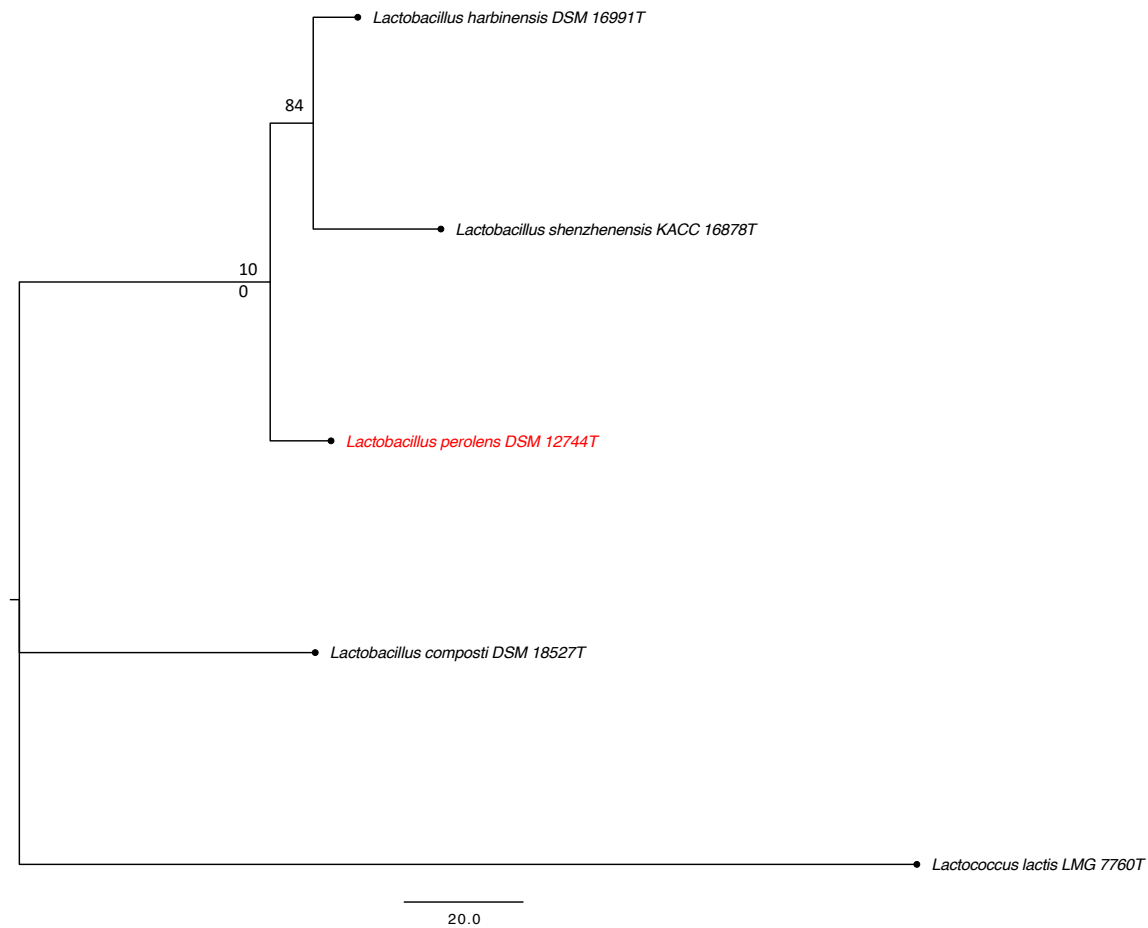


Figure S3C: *L. perolens* group

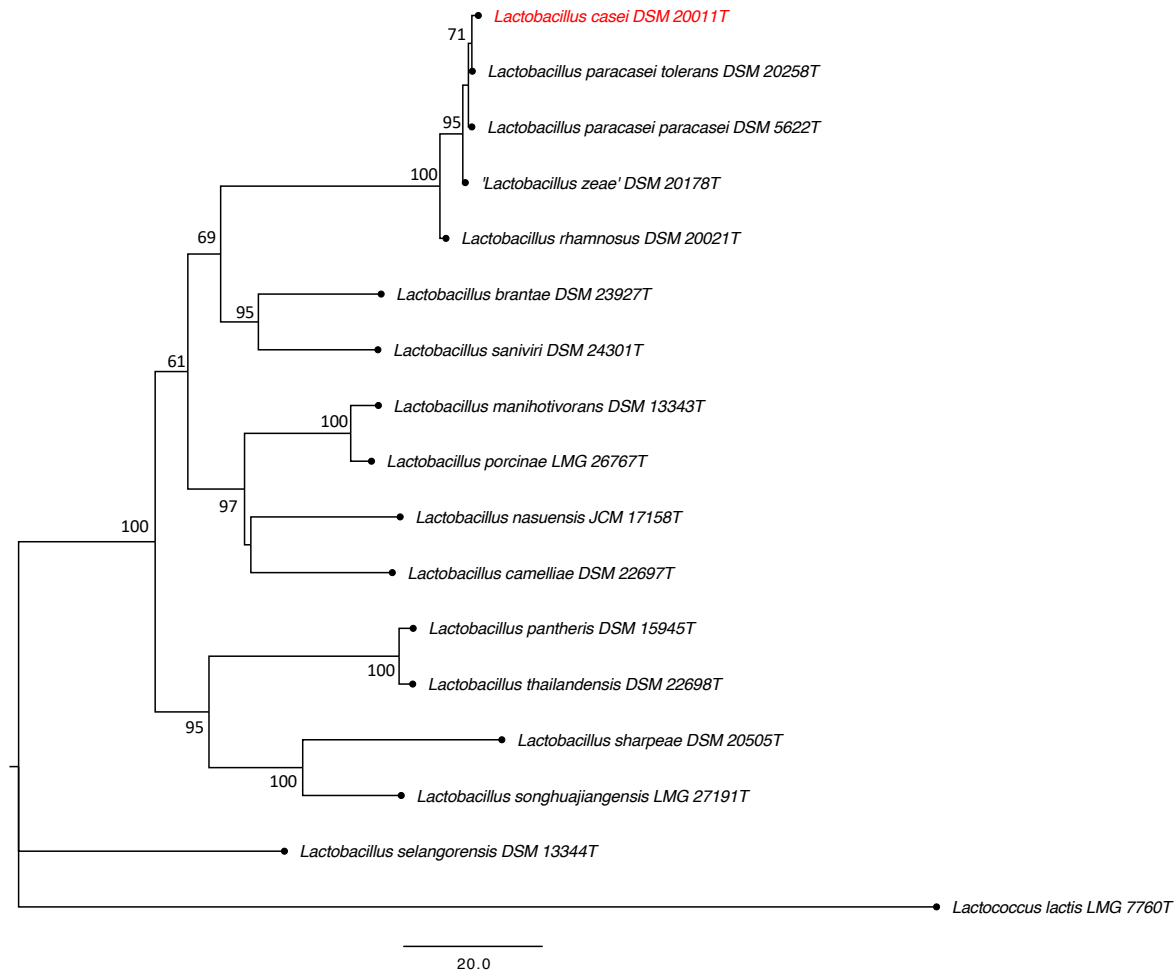


Figure S3D: *L. casei* group (*L. chiayiensis* has been recently described and it is related to *L. casei*)



Figure S3E: *L. sakei* group



Figure S3F: *L. plantarum* group

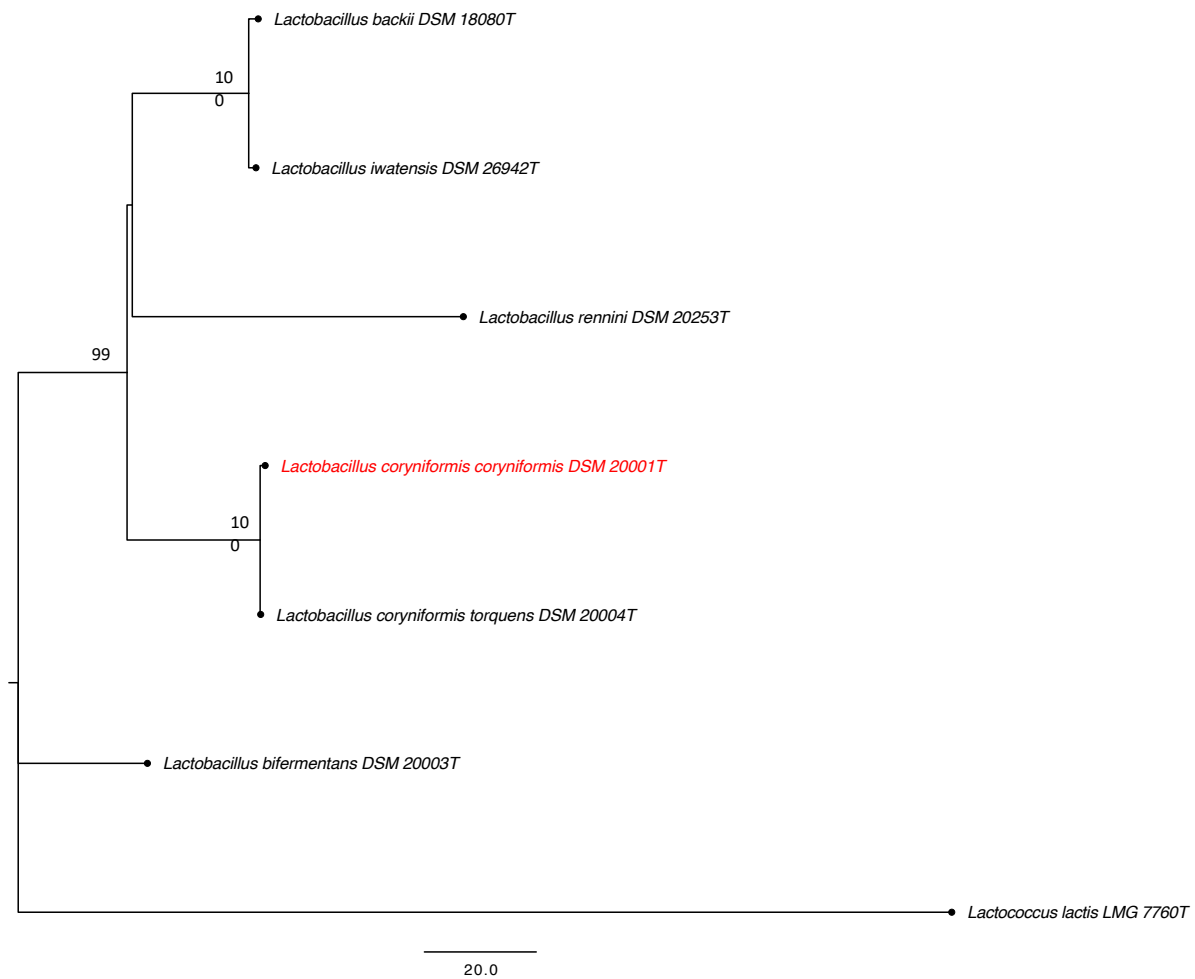


Figure S3G: *L. coryniformis* group

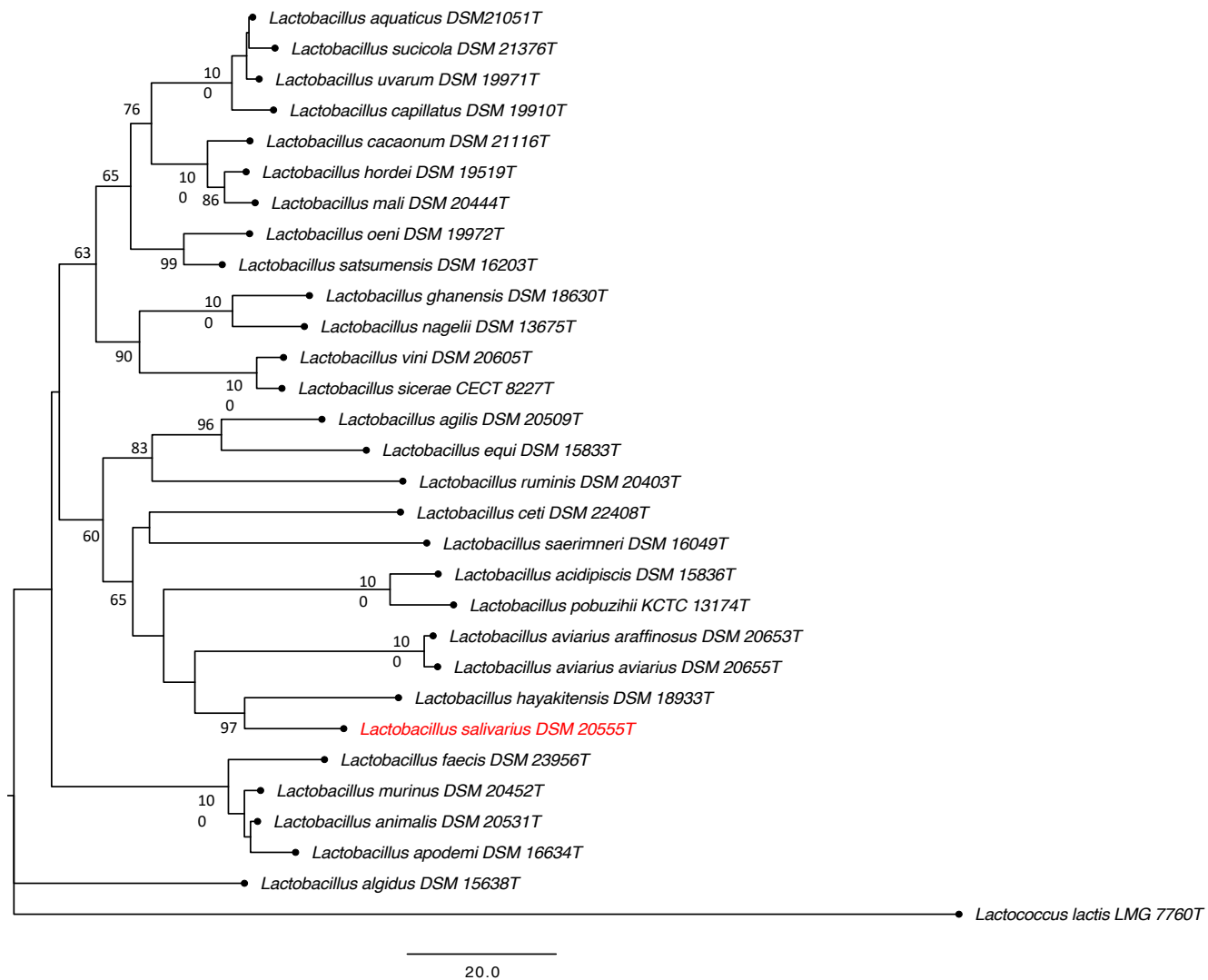


Figure S3H: *L. salivarius* group

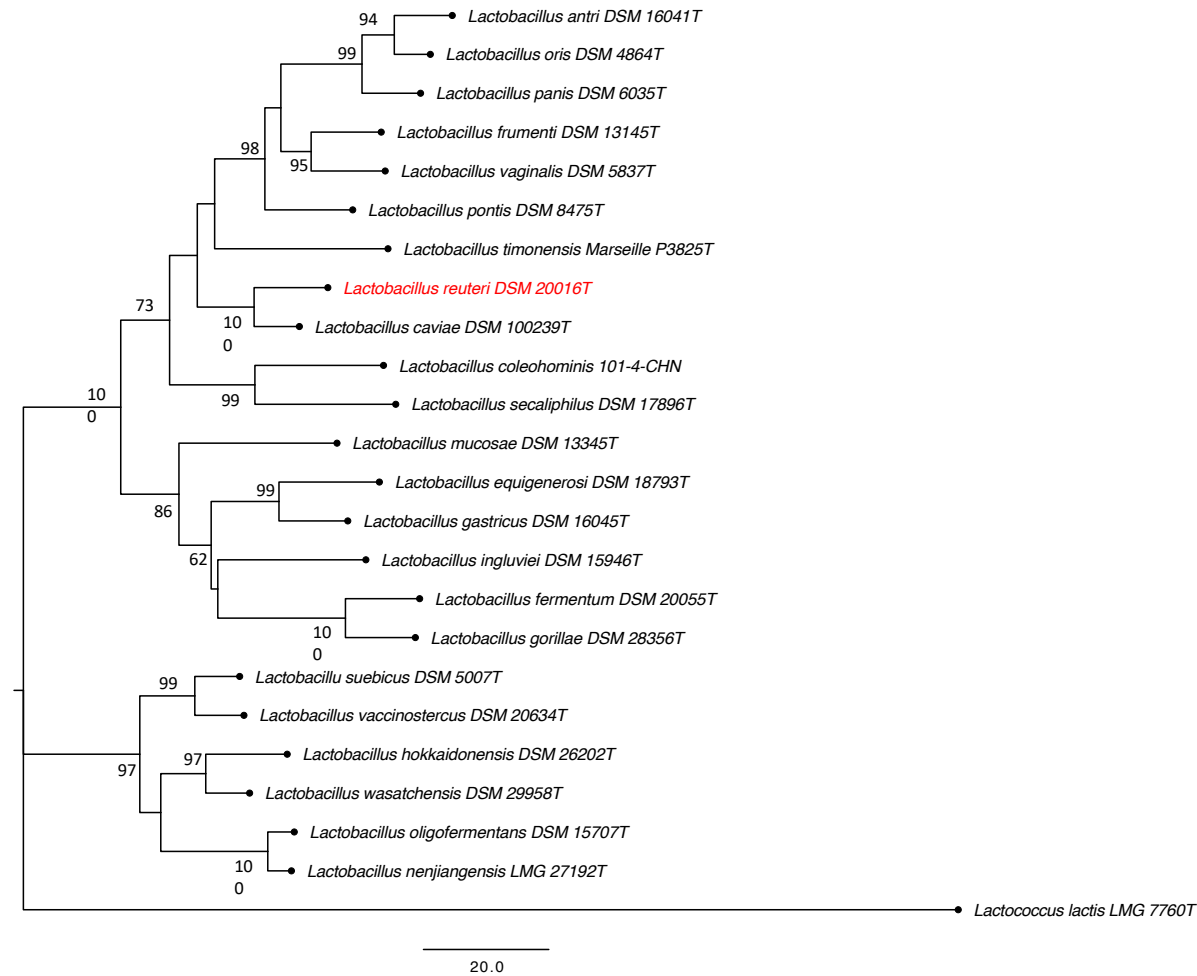


Figure S3I: *L. reuteri* group

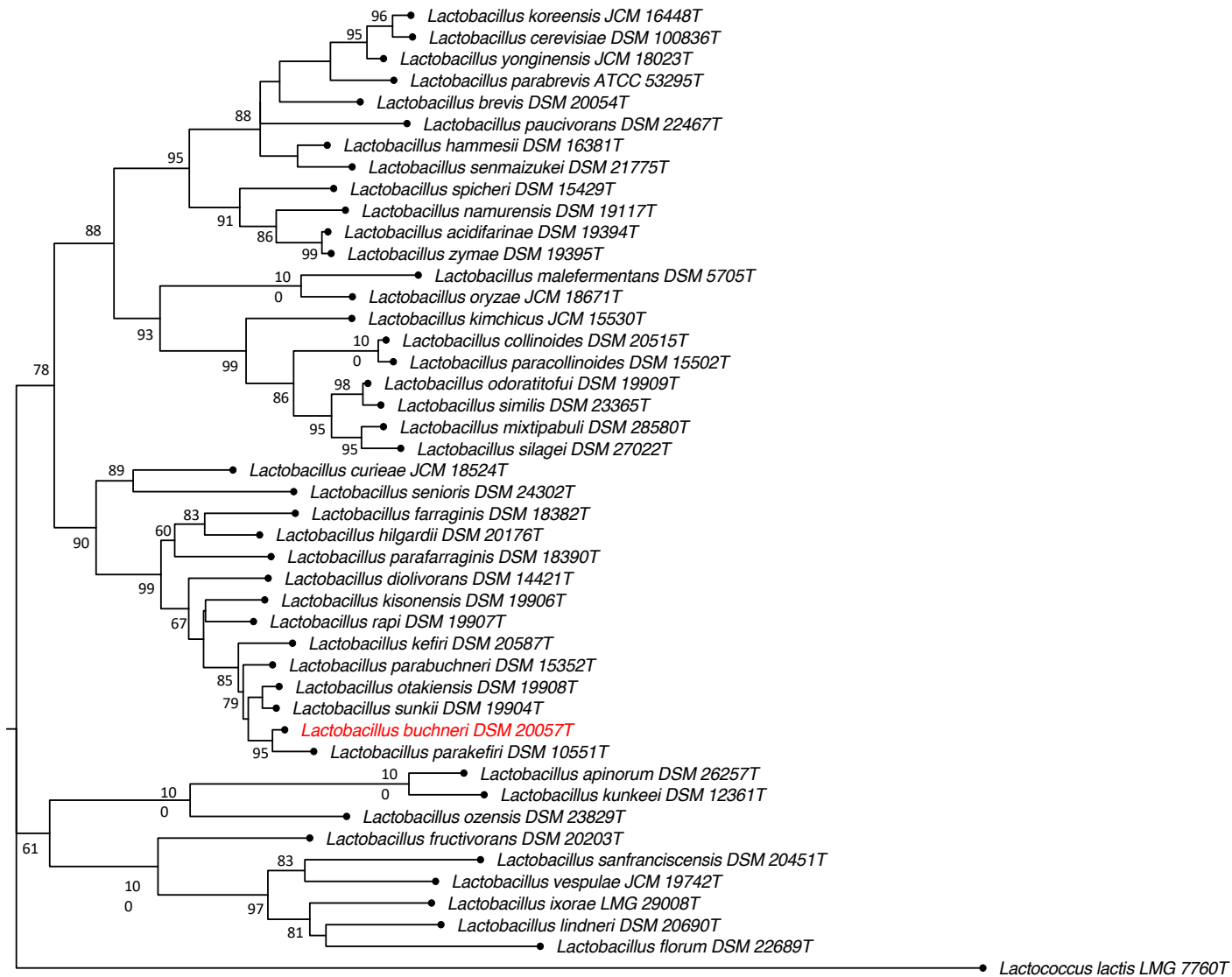


Figure S3J: *L. buchneri* group (*L. silangicola*, *L. pentosiphilus*, *L. koso*i, *L. raoultii* have been recently described, thus they are not reported in the tree but they are related to *L. mixtipabuli*, *L. silagei*, *L. kunkeei*, *L. farraginis*).

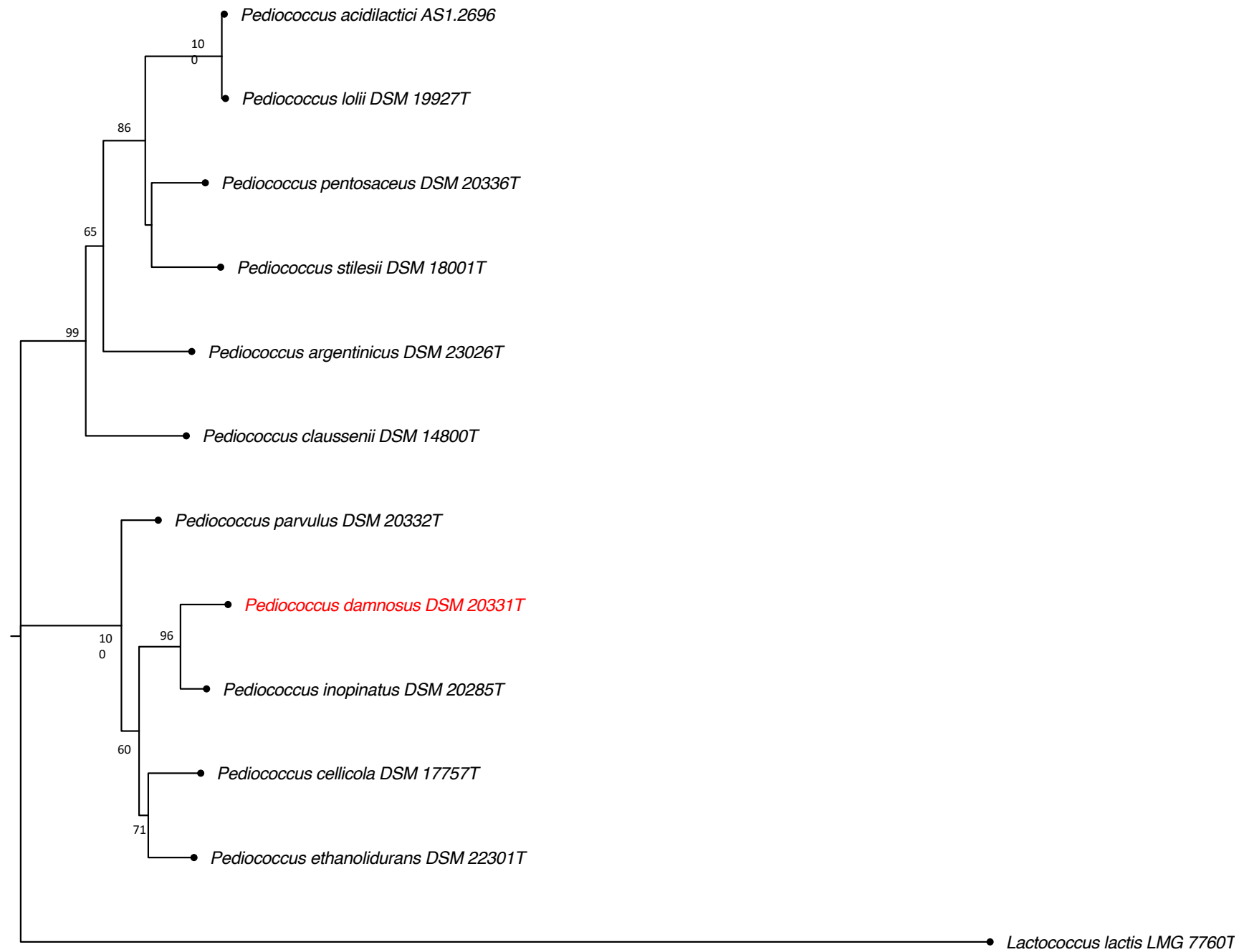


Figure S3K: *Pediococcus* genus ————— 20.0

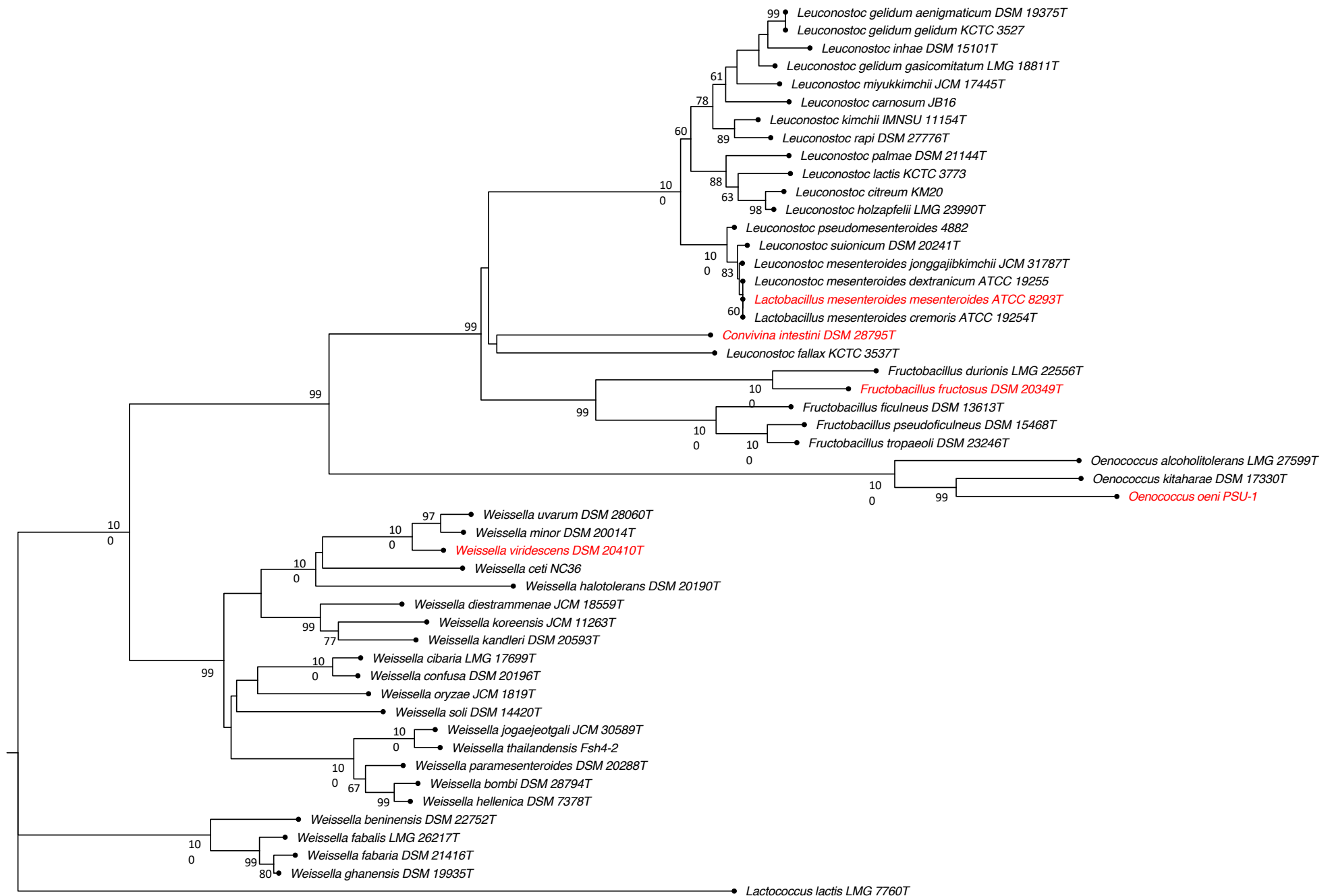


Figure S3L: family Leuconostocaceae

20.0

Table S1

Species considered in the present study and their genome features, including reference phylogroup and carbohydrate fermentation profile.

Genus	Species	Strain	Isolation year	Source	Genome size (Mbp)	GC%	Phylogroups	Metabolic Profiles	Genome Accession No.	16S rRNA Accession No.	MLST	rMLST	16s rRNA	AAI	POCP	
<i>Atopobium</i>	<i>minutum</i>	DSM 20586T	1937	Perineal abscess	1.72	48.69			JQB000000000		x	x	x	x	x	
<i>Atopobium</i>	<i>rimae</i>	DSM 7090T	1991	Human gingival crevice	1.63	1.63			JQC000000000		x	x	x	x	x	
<i>Carnobacterium</i>	<i>divergens</i>	DSM 20623T	1984	Vacuum packaged minced beef	2.59	34.95			JQBS000000000		x	x	x	x	x	
<i>Carnobacterium</i>	<i>malorumaticum</i>	DSM 20342T	1974	Milk with rambly flavour	3.76	34.31			JQBG000000000		x	x	x	x	x	
<i>Corynebacterium</i>	<i>intestini</i>	DSM 28795T	2015	Bumble bee gut			Leuconostocaceae			LK054488			x			
<i>Fructobacillus</i>	<i>durionis</i>	LMG 22556T	2005	Malaysian acid-fermented condiment, tempurak			Leuconostocaceae			AJ780981			x			
<i>Fructobacillus</i>	<i>ficulneus</i>	DSM 13613T	2002	Figs/tee	1.54	43.9	Leuconostocaceae		BBXQ00000000.1		x	x	x	x	x	
<i>Fructobacillus</i>	<i>fructosus</i>	DSM 20349T	1956	Flowers	1.48	44.56	Leuconostocaceae		JQB100000000		x	x	x	x	x	
<i>Fructobacillus</i>	<i>pseudofrucosus</i>	DSM 15468T	2006	Ripe fig	1.41	44.5	Leuconostocaceae		FNWS00000000.1		x	x	x	x	x	
<i>Fructobacillus</i>	<i>tropaeoli</i>	DSM 23246T	2011	<i>Tropaeolum majus</i> , a flower	1.69	44.2	Leuconostocaceae		BBXT00000000.1		x	x	x	x	x	
<i>Kandleria</i>	<i>vitulina</i>	DSM 20405T	1973	Calf rumen	2.14	35.03			JQBL000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>acetotolerans</i>	DSM 20749T	1986	Fermented Vinegar Brath	1.59	36.26	<i>L. delbrueckii</i>	FHE	AYZC000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>acidifarinae</i>	DSM 19394T	2005	Artisanal wheat sourdough	2.92	51.59	<i>L. buchneri</i>	OHE	AZDV000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>acidophilus</i>	DSM 15836T	1900	Fermented fish	2.33	39.07	<i>L. salivarius</i>	FHE	AZF000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>acidophilus</i>	DSM 20079T	2000	Human	1.95	34.59	<i>L. delbrueckii</i>	OHO	AZCS000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>aegilis</i>	DSM 20509T	1982	Municipal sewage	2.06	41.74	<i>L. salivarius</i>	FHE	AYYP000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>aligidus</i>	DSM 15838T	2000	Vacuum-packed beef	1.59	36.03	<i>L. salivarius</i>	FHE	AZD000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>alimentarius</i>	DSM 20249T	1970	Marinated fish product	2.34	35.4	<i>L. alimentarius</i>	FHE	AZDQ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>allii</i>	JCM 31958T	1997	Scallion kimchi			<i>L. alimentarius</i>	OHO	CP019223		x	x	x			
<i>Lactobacillus</i>	<i>amylolyticus</i>	DSM 11664T	2019	Acidified beer wort	1.54	38.24	<i>L. delbrueckii</i>	OHO	AZEP000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>amylolophilus</i>	DSM 20533T	1981	Swine waste-corn fermentation	1.56	43.61	<i>L. delbrueckii</i>	OHO	AYVS000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>amylotrophicus</i>	DSM 20534T	2006	Swine waste-corn fermentation	1.55	43.59	<i>L. delbrueckii</i>	OHO	AZCV000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>amylovorans</i>	DSM 20531T	1981	Cattle waste-corn fermentation	2.02	37.77	<i>L. delbrueckii</i>	OHO	AZCM000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>animalis</i>	DSM 20602T	1983	Dental plaque of baboon	1.89	41.06	<i>L. salivarius</i>	OHO	AYYW000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>antri</i>	DSM 16041T	2005	Gastric biopsies, Human stomach mucosa	2.24	51.11	<i>L. reuteri-vaccinostercus</i>	OHE	AZDK000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>apiunorum</i>	DSM 26257T	2014	Honey stomach of the honeybee	1.46	34.9	<i>L. buchneri</i>	OHE	JXC000000000.1		x	x	x	x	x	
<i>Lactobacillus</i>	<i>apis</i>	Hma1	2014	Stomach of honeybees	1.70	36.85	<i>L. delbrueckii</i>	OHO	JXLG00000000.1		x	x	x	x	x	
<i>Lactobacillus</i>	<i>apodemi</i>	DSM 16634T	2006	Faces of wild Japanese wood mouse	2.10	38.63	<i>L. salivarius</i>	FHE	AZF000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>aquaticus</i>	DSM 21051T	2009	Surface of a eutrophic freshwater pond	2.41	37.41	<i>L. salivarius</i>	OHO	AYZD000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>avarius</i>	DSM 20653T	1986	Intestine of chicken	1.48	38.13	<i>L. salivarius</i>	OHO	AYYZ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>avarius</i>	DSM 20655T	1985	Faeces of chicken	1.68	40.12	<i>L. salivarius</i>	OHO	AYZA000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>buckii</i>	DSM 18080T	2013	Spoiled lager beer	1.48	40.12	<i>L. coryniformis</i>	OHO		AB779648		x	x	x	x	x
<i>Lactobacillus</i>	<i>bifermans</i>	DSM 20003T	1943	Blown cheese	3.14	44.29	<i>L. coryniformis</i>	FHE	AZDA000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>bombi</i>	DSM 26517T	2014	Digestive tract of laboratory-reared bumblebees			<i>L. alimentarius</i>	FHE		KJ078643		x				
<i>Lactobacillus</i>	<i>bombicola</i>	DSM 28793T	2015	Bumble bee gut			<i>L. delbrueckii</i>	FHE		LK054485			x			
<i>Lactobacillus</i>	<i>brunae</i>	DSM 23927T	2012	Faeces of Canada goose	1.93	47.48	<i>L. casei</i>	FHE	AYZQ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>brevis</i>	DSM 20054T	1919	Faeces	2.47	45.96	<i>L. buchneri</i>	OHE	AZCP000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>buchneri</i>	DSM 20057T	1983	Tomato pulp	44.41	4.45	<i>L. buchneri</i>	OHO	AZDM000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>cacaoman</i>	DSM 21116T	2009	Cocoa bean heap fermentation	1.92	33.87	<i>L. salivarius</i>	FHE	AYZE000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>camelliae</i>	DSM 22697T	2007	Fermented tea leaves (nimes)	2.57	55.39	<i>L. casei</i>	OHO	AZJ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>capillatus</i>	DSM 19910T	2008	Fermented brine used for stinky tofu production	2.24	37.63	<i>L. salivarius</i>	OHO	AZEF000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>casei</i>	DSM 20011T	1916	Cheese	2.83	46.45	<i>L. casei</i>	FHE	AZC000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>casei</i>	DSM 100239T	2017	Old cavity of a home-bred mouse			<i>L. reuteri-vaccinostercus</i>	OHE		KT343143			x			
<i>Lactobacillus</i>	<i>casei</i>	DSM 100836T	2017	Spoiled beer			<i>L. buchneri</i>	n.d.		KT445896			x			
<i>Lactobacillus</i>	<i>ceci</i>	DSM 22408T	2008	Lungs of a beaked whale	1.40	33.73	<i>L. salivarius</i>	FHE	JQBZ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>colohominis</i>	101-4-CHN	2007	Vaginal urogenital tract	1.72	41.1	<i>L. reuteri-vaccinostercus</i>	FHE	AC0H00000000.1		x	x	x	x	x	
<i>Lactobacillus</i>	<i>coli</i>	DSM 101872T	2019	Northern Bobwhite (<i>Colinus virginianus</i>)			<i>L. delbrueckii</i>	n.d.		KU161105			x			
<i>Lactobacillus</i>	<i>collinoides</i>	DSM 20515T	1972	Fermenting apple juice	3.62	46.11	<i>L. buchneri</i>	OHE	AYYR000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>compositi</i>	DSM 18527T	2007	Composting material of distilled shochu residue	3.47	43.95	<i>L. perolens</i>	FHE	AZGA000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>convarus</i>	DSM 17758T	2005	Walls of a distilled spirit fermenting cellar	1.90	43.3	<i>L. concarus-L. destrinicus</i>	OHO	AZF000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>coryniformis</i>	DSM 20001T	1965	Silage	2.71	42.86	<i>L. coryniformis</i>	FHE	AZCN000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>coryniformis</i>	DSM 20004T	1965	Air of cow shed	2.78	42.94	<i>L. coryniformis</i>	FHE	AZDC000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>cristorum</i>	DSM 20584T	1953	Ferment	2.06	36.59	<i>L. delbrueckii</i>	OHO	AZCV000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>curvatus</i>	JCM 15951T	2007	Wheat sourdough	2.22	35	<i>L. alimentarius</i>	OHO	AZD000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>curvatus</i>	JCM 18524T	2013	Stinky tofu brine	2.10	39.8	<i>L. buchneri</i>	OHE	CP018906.1		x	x	x	x	x	
<i>Lactobacillus</i>	<i>curvatus</i>	JCM31185T	2017	Beer			<i>L. rossiae-L. siliginis</i>	n.d.		LC093898			x			
<i>Lactobacillus</i>	<i>curvatus</i>	DSM 20019T	1903	Milk	1.82	41.97	<i>L. salivarius</i>	FHE	AZDL000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii</i>	DSM 20081T	1919	Bulgarian yoghurt	1.76	49.91	<i>L. delbrueckii</i>	OHO	JQAV000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii</i>	DSM 20074T	1896	Sour grain mash	1.75	49.86	<i>L. delbrueckii</i>	OHO	AZCR000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii indicus</i>	DSM 15966T	2005	Traditional dairy fermented product (Dahi) (vni)	1.88	49.54	<i>L. delbrueckii</i>	OHO	AZFL000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii jakobsonii</i>	DSM 26046T	2013	Dolo wort (Alcoholic fermented beverage)	1.75	50.31	<i>L. delbrueckii</i>	OHO	JQCG000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii lactis</i>	DSM 20072T	1919	Emmental cheese	1.87	49.86	<i>L. delbrueckii</i>	OHO	AZDE000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>delbrueckii nankai</i>	DSM 24966T	2012	Sauerkraut, a Japanese traditional pickle			<i>L. delbrueckii</i>	OHO		AB641833			x			
<i>Lactobacillus</i>	<i>destrinicus</i>	DSM 20335T	1964	Silage	1.81	38.05	<i>L. concarus-L. destrinicus</i>	OHE	AYYK000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>divisiorum</i>	DSM 14421T	2002	Maize silage	3.27	40.01	<i>L. buchneri</i>	OHO	AZFY000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>equi</i>	DSM 15833T	2002	Faeces of horses	2.30	39.03	<i>L. salivarius</i>	OHO	AZFH000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>equicursoris</i>	DSM 19284T	2010	Healthy thoroughbred racehorse	2.05	47.71	<i>L. delbrueckii</i>	OHO	AZDU000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>equigenensis</i>	DSM 18793T	2008	Faeces of thoroughbred horse	1.60	42.65	<i>L. reuteri-vaccinostercus</i>	OHE	AZGC000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>fabifermentans</i>	DSM 21115T	2019	Cocoa bean heap fermentation	3.28	45.03	<i>L. plantarum</i>	FHE	AYGX000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>faecis</i>	DSM 23956T	2003	Animal faeces			<i>L. salivarius</i>	OHO		AB812750			x			
<i>Lactobacillus</i>	<i>farinosis</i>	DSM 20184T	1970	Sausage	2.48	36.38	<i>L. alimentarius</i>	OHO	AZDR000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>farruginis</i>	DSM 18382T	2007	Composting material of distilled shochu residue	2.86	42.05	<i>L. buchneri</i>	FHE	AZFY000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>fermentum</i>	DSM 20055T	1901	Human saliva	1.90	52.42	<i>L. reuteri-vaccinostercus</i>	OHE	JQAU000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>floricola</i>	DSM 23037T	2011	Flower of Caltha palustris	1.29	34.53	<i>L. delbrueckii</i>	OHO	AYZL000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>florum</i>	DSM 22689T	2010	Penny (Paeonia suffruticosa)	1.35	41.14	<i>L. buchneri</i>	OHE	AYZ000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>formosensis</i>	NBRC 109509T	2015	Fermented soybean meal			<i>L. alimentarius</i>	OHO		AB794060			x			
<i>Lactobacillus</i>	<i>fructivorans</i>	DSM 20203T	1934	N/A	1.37	38.88	<i>L. buchneri</i>	OHE	AZDS000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>frumenti</i>	DSM 13145T	2000	Rye-bran sourdough	1.73	42.55	<i>L. reuteri-vaccinostercus</i>	OHE	AZER000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>fructuensis</i>	DSM 14340T	2002	Vacuum-packed beef	2.12	41.78	<i>L. sakei</i>	FHE	AZEX000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>furfuricola</i>	DSM 27174T	2014	Rice bran paste			<i>L. alimentarius</i>	OHO		AB910349			x			
<i>Lactobacillus</i>	<i>futaii</i>	JCM 17355T	2010	Fu-tai, a traditional fermented mustard product	2.53	35.6	<i>L. alimentarius</i>	OHO	AZDC000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>gallinarum</i>	DSM 10532T	1992	Chicken crop	1.94	36.48	<i>L. delbrueckii</i>	OHO	AZEL000000000		x	x	x	x	x	
<i>Lactobacillus</i>	<i>gasseri</i>	ATCC 33232T	1980	Human	1.89	35.26	<i>L. delbrueckii</i>	OHO	NC_008530		x	x	x	x	x	
<i>Lactobacillus</i>	<i>gastricus</i>	DSM 16045T	2005	Gastric biopsies, Human stomach mucosa	1.85	41.64	<i>L. reuteri-vaccinostercus</i>	OHE	AZFN000000000		x	x	x	x	x	
<i>Lactobacillus</i>																

<i>Lactobacillus</i>	<i>intestinalis</i>	DSM 6629T	1974	Intestine of rat	2.01	35.37	<i>L. delbrueckii</i>	FHE	AZGN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>ivansensis</i>	DSM 26942T	2013	Ochadragras (<i>Chaetophora glomerata</i> L.) silage			<i>L. coryniformis</i>	OH0	AB773428				x	
<i>Lactobacillus</i>	<i>ivorae</i>	LMG 29008T	2016	Flower (West-Indian siamensis)			<i>L. buchneri</i>	OHE	LC094494				x	
<i>Lactobacillus</i>	<i>jensenii</i>	DSM 20557T	1970	Human vaginal discharge	1.61	34.33	<i>L. delbrueckii</i>	FHE	AYYU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>johansonii</i>	ATCC 33200T	1992	Human blood	1.77	34.43	<i>L. delbrueckii</i>	OH0	AZCY00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kaiitensis</i>	DSM 16043T	2005	Gastric biopsies, Human stomach	2.08	36.1	<i>L. delbrueckii</i>	OH0	AZFM00000000	x	x		x	x
<i>Lactobacillus</i>	<i>kefirifaciens kefirifaciens</i>	DSM 5016T	1988	Musons	2.26	37.22	<i>L. delbrueckii</i>	OH0	AZGG00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kefirifaciens kefirigramm</i>	DSM 10550T	1994	Kefir grains	2.10	37.48	<i>L. delbrueckii</i>	OH0	AZEM00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kefiri</i>	DSM 20587T	1983	Kefir grains	2.23	41.66	<i>L. buchneri</i>	OHE	AYYV00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kimbladii</i>	DSM 26263T	2014	Honey stomach of the honeybee <i>Apis melifera</i>	2.19	36	<i>L. delbrueckii</i>	FHE	JXLI00000000.1	x	x	x	x	
<i>Lactobacillus</i>	<i>kimchiac</i>	JCM 15530T	2008	Kimchi	2.59	46.59	<i>L. buchneri</i>	FHE	AZCX00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kimchiensis</i>	DSM 24716T	2013	Kimchi	2.70	35.48	<i>L. alimentarius</i>	OH0	JQCF00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kisomens</i>	DSM 19906T	2009	Sunki, a Japanese traditional pickle	3.01	41.74	<i>L. buchneri</i>	OHE	AZEB00000000	x	x	x	x	
<i>Lactobacillus</i>	<i>kisatoensis</i>	DSM 16761T	2003	Chicken intestine	1.91	37.51	<i>L. delbrueckii</i>	FHE	AZFU00000000	x	x	x	x	
<i>Lactobacillus</i>	<i>koreensis</i>	JCM 16448T	2011	Cabbage kimchi	2.97	49.15	<i>L. buchneri</i>	OHE	AZDP00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>kullabergensis</i>	DSM 26262T	2014	Honey stomach of the honeybee <i>Apis melifera</i>	2.12	35.8	<i>L. delbrueckii</i>	FHE	JXBV00000000.1	x	x	x	x	x
<i>Lactobacillus</i>	<i>kundeii</i>	DSM 12361T	1998	Commercial grape wine	1.52	36.43	<i>L. buchneri</i>	OHE	AZCK00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>linderi</i>	DSM 20690T	1901	Spout beer	1.44	34.14	<i>L. buchneri</i>	OHE	JQB700000000	x	x	x	x	
<i>Lactobacillus</i>	<i>maelfermentans</i>	DSM 5705T	1953	Sour beer	2.05	41.03	<i>L. buchneri</i>	OHE	AZGH00000000	x	x	x	x	
<i>Lactobacillus</i>	<i>maii</i>	DSM 20444T	1970	Apple juice from cider press	2.59	36.06	<i>L. salivarius</i>	OH0	AYYH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>manihotivorans</i>	DSM 13343T	1998	Cassava sour starch fermentation	3.14	47.7	<i>L. casei</i>	OH0	AZEU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>mellifer</i>	Bin4NT	2014	Honey stomach of the honeybee <i>Apis melifera</i>	1.82	39.5	<i>L. alimentarius</i>	FHE	JXJQ00000000.1	x	x	x	x	x
<i>Lactobacillus</i>	<i>mellis</i>	DSM 26255T	2014	Honey stomach of the honeybee <i>Apis melifera</i>	1.81	36.4	<i>L. alimentarius</i>	FHE	JXHZ00000000.1	x	x	x	x	x
<i>Lactobacillus</i>	<i>melliventris</i>	Hma8NT	2014	Honey stomach of the honeybee <i>Apis melifera</i>	2.12	35.9	<i>L. delbrueckii</i>	FHE	JXLI00000000.1	x	x	x	x	x
<i>Lactobacillus</i>	<i>mindensis</i>	DSM 14500T	2003	Sourdough	2.34	38.21	<i>L. alimentarius</i>	OH0	AZEZ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>mixtipahuli</i>	DSM 28580T	2015	Silage			<i>L. buchneri</i>	OHE	AB894863				x	
<i>Lactobacillus</i>	<i>moosestolitorans</i>	NBRC 107235T	2015	Traditional fermented foods			<i>L. plantarum</i>	OH0	AB907192				x	
<i>Lactobacillus</i>	<i>mucoosae</i>	DSM 13345T	2000	Pig small intestine	2.25	46.4	<i>L. reuteri-vaccinostercus</i>	OHE	AZEQ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>midanjungensis</i>	LMG 27194T	2013	Chinese traditional pickle and sourdough			<i>L. plantarum</i>	OH0	HF679037				x	
<i>Lactobacillus</i>	<i>murinus</i>	DSM 20452T	1982	Intestine of rat	2.20	40.05	<i>L. salivarius</i>	FHE	AYYN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>musae</i>	NBRC 112868T	2017	Banana fruits			<i>L. alimentarius</i>	OH0	LC184607				x	
<i>Lactobacillus</i>	<i>nagadii</i>	DSM 13675T	2007	Partially fermented wine	2.50	36.69	<i>L. salivarius</i>	OH0	AZEV00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>namurensis</i>	DSM 19117T	2000	Sourdough	2.48	51.99	<i>L. buchneri</i>	OHE	AZDT00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>nanensis</i>	DSM 16982T	2002	Wheat sourdough	2.91	36.18	<i>L. alimentarius</i>	FHE	AZFW00000000	x	x	x	x	
<i>Lactobacillus</i>	<i>nasuensis</i>	JCM 17158T	2012	Sudangeno silage sample	2.28	57.02	<i>L. casei</i>	OH0	AZD00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>nenjiangensis</i>	LMG 27192T	2013	Chinese traditional pickle and sourdough			<i>L. reuteri-vaccinostercus</i>	OHE	HF679039				x	
<i>Lactobacillus</i>	<i>nodensis</i>	DSM 19682T	2009	Japanese pickles	2.68	37.57	<i>L. alimentarius</i>	FHE	AZDZ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>odoratissifui</i>	DSM 19909T	2010	Fermented brine used for stinky tofu production	2.76	44.25	<i>L. buchneri</i>	OHE	AZEE00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>oeni</i>	DSM 19972T	2009	Bobal wine	2.12	37.33	<i>L. salivarius</i>	OH0	AZEH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>olipofermentans</i>	DSM 15701T	2005	Brewer's lea	1.83	35.57	<i>L. reuteri-vaccinostercus</i>	OHE	AZFI00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>orus</i>	DSM 4864T	1988	Human saliva	2.03	49.98	<i>L. reuteri-vaccinostercus</i>	OHE		x	x	x	x	x
<i>Lactobacillus</i>	<i>oryzae</i>	JCM 18671T	2013	Fermented rice grain (<i>Oryza sativa</i> L. subsp. <i>japonica</i>)	1.85	42.8	<i>L. buchneri</i>	OHE	BBIM00000000.1	x	x	x	x	x
<i>Lactobacillus</i>	<i>otakiensis</i>	DSM 19908T	2009	Sunki, a Japanese traditional pickle	2.35	42.39	<i>L. buchneri</i>	OHE	AZID00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>ocensis</i>	DSM 23829T	2011	Chrysanthemum, Oze National Park	1.48	31.93	<i>L. buchneri</i>	OHE	AYYQ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>ocanis</i>	DSM 6035T	1996	Sourdough	2.01	48.05	<i>L. reuteri-vaccinostercus</i>	OHE	AZGM00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paediferi</i>	DSM 15945T	2002	Jaunar faeces	2.52	52.9	<i>L. casei</i>	OH0	AZJH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>parabrevis</i>	ATCC 53295T	2006	Cheese	2.61	49.05	<i>L. buchneri</i>	OHE	AZJZ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>parabuchneri</i>	DSM 15352T	1989	Blair asbol distillery	2.61	43.47	<i>L. buchneri</i>	OHE	JQB00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paracasei paracasei</i>	DSM 5622T	1989	N/A	2.88	46.5	<i>L. casei</i>	FHE	AZJH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paracasei tolerans</i>	DSM 20258T	1965	Pasteurized milk	2.38	46.42	<i>L. casei</i>	FHE	AYYU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paracollinoides</i>	DSM 15502T	2004	Brewery environment	3.49	46.84	<i>L. buchneri</i>	OHE	AZDF00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paraferroginis</i>	DSM 18390T	2007	Composting material of distilled shochu residue	3.08	45.23	<i>L. buchneri</i>	FHE	AZJZ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>parahefieri</i>	DSM 10551T	1994	Kefir grain	4.91	42.59	<i>L. buchneri</i>	OHE	AZEN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paraalimentarius</i>	DSM 12328T	1999	Sourdough	2.55	35.1	<i>L. alimentarius</i>	OHE	AZJH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paraplantarum</i>	DSM 10667T	1996	Beer contaminant	3.40	43.69	<i>L. alimentarius</i>	OHE	AZEO00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>pastuerii</i>	DSM 23907T	2013	N/A	1.87	38.51	<i>L. delbrueckii</i>	FHE	AYZN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>paucivorans</i>	DSM 22467T	2010	Yeast storage tank containing lager beer	2.37	49.06	<i>L. buchneri</i>	FHE	JQCA00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>pentophilus</i>	DSM 102974T	2017	Silage			<i>L. buchneri</i>	n.d.	LC085284				x	
<i>Lactobacillus</i>	<i>penosus</i>	DSM 20314T	1921	N/A	3.65	46.31	<i>L. plantarum</i>	FHE	AZCU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>perolens</i>	DSM 12744T	2000	Orange lemonade	3.31	49.08	<i>L. perolens</i>	FHE	AZCU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>plagioni</i>	NBRC 107333T	2015	Traditional fermented foods			<i>L. plantarum</i>	FHE	AB907190				x	
<i>Lactobacillus</i>	<i>plantarum plantarum</i>	CGMCC 1-2437T	1919	Pickled cabbage	3.21	44.48	<i>L. plantarum</i>	FHE	AZEH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>plantarum argentinensis</i>	DSM 16365T	2005	Fermented cassava roots (fufu)	3.20	45	<i>L. plantarum</i>	FHE	AZFR00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>plantarum plantarum</i>	DSM 13273T	2010	Jogjaba meal fermentation	3.45	44.24	<i>L. plantarum</i>	FHE	JQAW00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>poebazii</i>	KCTC 31174T	1919	Pobazhi (fermented cunninghamia), <i>Cor dia dichotoma</i>	2.35	37.72	<i>L. salivarius</i>	FHE	JQCN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>pontis</i>	DSM 8475T	1994	Rye sourdough	1.67	53.43	<i>L. reuteri-vaccinostercus</i>	OHE	AZGG00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>porcineae</i>	LMG 26767T	2013	Traditional Vietnamese non chua			<i>L. casei</i>	FHE	HB616585				x	
<i>Lactobacillus</i>	<i>pruittii</i>	DSM 15354T	2001	Lang of parrot	1.54	35.64	<i>L. delbrueckii</i>	OHE	AZFB00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>raji</i>	DSM 19907T	2009	Sunki, a Japanese traditional pickle	2.86	42.95	<i>L. buchneri</i>	OHE	AZEB00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>rennini</i>	DSM 20253T	2006	Remisin	2.27	40.67	<i>L. coryniformis</i>	FHE	AYYU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>reuteri</i>	DSM 20016T	1982	Intestine of adult	1.94	38.63	<i>L. reuteri-vaccinostercus</i>	OHE	AZDD00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>rhamnosus</i>	DSM 20021T	1968	N/A	2.95	46.68	<i>L. casei</i>	OHE	AZCQ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>rodentium</i>	DSM 24759T	2014	Digestive tract of wild rodents			<i>L. delbrueckii</i>	OH0	HQ851022				x	
<i>Lactobacillus</i>	<i>rossiae</i>	DSM 15814T	2005	Wheat sourdough	2.87	43.34	<i>L. rossiae-L. siliginis</i>	OHE	AZTF00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>rumicis</i>	DSM 20403T	2008	Bovine rumen	2.01	43.39	<i>L. salivarius</i>	OH0	AYYU00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>saenimneri</i>	DSM 16049T	1996	Pig faeces	1.69	42.57	<i>L. salivarius</i>	OH0	AZFP00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>sakei carnosus</i>	DSM 15831T	2004	Fermented meat product	1.99	41.02	<i>L. sakei</i>	OHE	AZFG00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>sakei sakei</i>	DSM 20017T	1934	"Moto" starter of sake	1.91	41.07	<i>L. sakei</i>	FHE	AZDN00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>salivarius</i>	DSM 20555T	1953	Saliva	1.98	32.5	<i>L. salivarius</i>	FHE	AYYT00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>saunfranciscensis</i>	DSM 20451T	1971	Sourdough	1.23	34.7	<i>L. buchneri</i>	OHE	AYYM00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>sauviri</i>	DSM 24301T	2012	Faeces of a Japanese healthy adult male	2.44	47.73	<i>L. casei</i>	FHE	JQCE00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>satusmensis</i>	DSM 16230T	2005	Shochu mash	2.65	39.94	<i>L. salivarius</i>	OH0	AZFQ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>scaliphilus</i>	DSM 17896T	2007	Sourdough	1.65	47.71	<i>L. reuteri-vaccinostercus</i>	FHE	JQBW00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>selangorensis</i>	DSM 13344T	2007	Chili bo	2.09	46.45		OH0	JQAZ00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>senioris</i>	DSM 24302T	2012	Faeces of a healthy 100-year-old Japanese female	1.57	39.09	<i>L. buchneri</i>	OHE	AYZR00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>senmizakei</i>	DSM 21775T	2008	Senmizake, a Japanese pickle	2.22	48.64	<i>L. buchneri</i>	FHE	AYZH00000000	x	x	x	x	x
<i>Lactobacillus</i>	<i>sharpae</i>	DSM 20505T	1982	Municipal sewage	3.45	53.38	<i>L. casei</i>	OH0	AYYU00					

<i>Leuconostoc</i>	<i>carnosum</i>	JB16	1989	Kimchi	1.77	37.13	Leuconostocaceae	CP003851 - CP003853	x	x	x	x	x
<i>Leuconostoc</i>	<i>citreum</i>	KM20	2008	Kimchi	1.90	38.87	Leuconostocaceae	DQ489736 - DQ489740	x	x	x	x	x
<i>Leuconostoc</i>	<i>fallax</i>	KCTC 3537T	1992	Sauerkraut	1.64	37.53	Leuconostocaceae	AEZ0000000	x	x	x	x	x
<i>Leuconostoc</i>	<i>gelidum acenigmaticum</i>	DSM 19375T	2014	Packaged meat			Leuconostocaceae	KF57569					
<i>Leuconostoc</i>	<i>gelidum gasicomitatum</i>	LMG 18811T	2001	Tomato-marinated beefier meat strain	1.95	36.66	Leuconostocaceae	FN822744	x	x	x	x	x
<i>Leuconostoc</i>	<i>gelidum gelidum</i>	KCTC 352T	1989	Vacuum packaged beef	1.96	36.6	Leuconostocaceae	AEM0000000	x	x	x	x	x
<i>Leuconostoc</i>	<i>holzapfelii</i>	LMG 23990T	2007	Ethiopian coffee fermentation			Leuconostocaceae	AM600682			x		
<i>Leuconostoc</i>	<i>inhae</i>	DSM 15101T	2003	Kimchi			Leuconostocaceae	AF439560			x		
<i>Leuconostoc</i>	<i>kimchi</i>	BNSU 11154T	2000	Kimchi	2.10	37.91	Leuconostocaceae	CP001753 - CP001758	x	x	x	x	x
<i>Leuconostoc</i>	<i>mesenteroides cremoris</i>	ATCC 10254T	1929	Hansen's dried starter powder	1.74	37.9	Leuconostocaceae	C2K001	x	x	x	x	x
<i>Leuconostoc</i>	<i>mesenteroides destrianum</i>	ATCC 19255	1912	N/A	1.85	38.04	Leuconostocaceae	CP01209.1	x	x	x	x	x
<i>Leuconostoc</i>	<i>mesenteroides jonggukkimchi</i>	JCM 31787T	2017	Kimchi			Leuconostocaceae	CP014611	x	x	x	x	x
<i>Leuconostoc</i>	<i>mesenteroides mesenteroides</i>	ATCC 8293T	1878	Fermenting olives	2.08	37.67	Leuconostocaceae	NC_008496, NC_008531	x	x	x	x	x
<i>Leuconostoc</i>	<i>niyukkimchi</i>	JCM 17445T	2012	Brown algae (<i>Udaria nimmatifida</i>)			Leuconostocaceae	HQ263024			x		
<i>Leuconostoc</i>	<i>pulmae</i>	DSM 21144T	2009	Palm wine			Leuconostocaceae	AM940225			x		
<i>Leuconostoc</i>	<i>pyodromesenteroides</i>	4882	N/A	N/A	2.01	39.06	Leuconostocaceae	CAKV0000000	x	x	x	x	x
<i>Leuconostoc</i>	<i>rapi</i>	DSM 27776T	2015	Turnip-like vegetable			Leuconostocaceae	HG515542			x		
<i>Leuconostoc</i>	<i>suonicum</i>	DSM 20241T	2012	Sweden Cabbage and ethanol fermentation			Leuconostocaceae	HM443957			x		
<i>Oenococcus</i>	<i>alcoholitolerans</i>	LMG 27599T	2015				Leuconostocaceae	HQ009794			x		
<i>Oenococcus</i>	<i>hiatharae</i>	DSM 17330T	2006	Distilled residue of shechi mules	1.84	42.68	Leuconostocaceae	AFVZ0000000	x	x	x	x	x
<i>Oenococcus</i>	<i>oeni</i>	PSU-1	1972	Spontaneous malolactic fermentation	19.10	37.9	Leuconostocaceae	CP000411.1	x	x	x	x	x
<i>Olsonella</i>	<i>ali</i>	DSM 7084T	1991	Human gingival crevise	2.06	64.69		JQC000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>acidilactici</i>	ASL2496	N/A	N/A	1.93	42.13		JQAQ000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>argentinus</i>	DSM 23026T	2008	Fermented wheat flour	1.76	36.67		JQCQ000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>cellulosa</i>	DSM 17757T	2005	Distilled pits: fermenting cellar	2.04	39.04		QBBR000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>clausenii</i>	DSM 14800T	2002	Spoiled beer	1.88	36.74		QBHB000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>damnosus</i>	DSM 20331T	1903	Lauter beer yeast	2.19	38.23		QBBD000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>ethanolitolerans</i>	DSM 22301T	2006	Walls of a distilled- spini-fermenting cellar	2.26	37.18		QBYV000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>imuginatus</i>	DSM 20285T	1988	Brewery yeast	2.11	38.61		QBCV000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>loli</i>	DSM 19927T	1887	Ryegrass silage	2.04	42.13		JQC000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>parvulus</i>	DSM 20332T	1961	Silage	3.99	40.38		QJBE000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>pentosacrus</i>	DSM 20336T	1934	Dried American beer yeast	1.74	37.25		QJBF000000000	x	x	x	x	x
<i>Padosoccus</i>	<i>stilesii</i>	DSM 18001T	2006	White maize grains	1.84	38.11		QJBX000000000	x	x	x	x	x
<i>Weissella</i>	<i>beninensis</i>	DSM 22752T	2010	Cassava fermentations			Leuconostocaceae	EU439435			x		
<i>Weissella</i>	<i>bombi</i>	DSM 28794T	2015	Bumble bee gut			Leuconostocaceae	LK054487			x		
<i>Weissella</i>	<i>ceti</i>	NC36	2014	Farmed rainbow trout	1.35	40.8	Leuconostocaceae	ANCA0000000.1	x	x	x	x	x
<i>Weissella</i>	<i>cibaria</i>	LMG 17699T	2002	Food and clinical samples	2.32	45.1	Leuconostocaceae	AEKT01000001	x	x	x	x	x
<i>Weissella</i>	<i>confusa</i>	DSM 20196T	1969	Sugar cane	2.22	44.73	Leuconostocaceae	JQAY000000000	x	x	x	x	x
<i>Weissella</i>	<i>diestrammenae</i>	JCM 18559T	2013	Gut of a camel cricket (<i>Diestrammena corama</i>)			Leuconostocaceae	JQ646523			x		
<i>Weissella</i>	<i>fubalis</i>	LMG 26217T	2013	Cocoa bean fermentations			Leuconostocaceae	HE576795			x		
<i>Weissella</i>	<i>fubaria</i>	DSM 21416T	2010	Ghanaian cocoa fermentation			Leuconostocaceae	FM179678			x		
<i>Weissella</i>	<i>ghanensis</i>	DSM 19935T	2008	Ghanaian cocoa fermentation			Leuconostocaceae	AM882997			x		
<i>Weissella</i>	<i>holotolerans</i>	DSM 20190T	1983	Sausage	1.37	43.06	Leuconostocaceae	JQAX000000000	x	x	x	x	x
<i>Weissella</i>	<i>hollencia</i>	DSM 7378T	1994	Fermented sausages	1.82	36.9	Leuconostocaceae	NZ_FMAW00000000	x	x	x	x	x
<i>Weissella</i>	<i>jogogjogogali</i>	JCM 30589T	2015	Jogge joggal, Korean fermented food			Leuconostocaceae	KF027016			x		
<i>Weissella</i>	<i>landleri</i>	DSM 20593T	1983	Desert spring	1.33	39.67	Leuconostocaceae	QJBP000000000	x	x	x	x	x
<i>Weissella</i>	<i>koreensis</i>	JCM 11263T	2002	Kimchi	1.73	35.5	Leuconostocaceae	AKGG0000000.1	x	x	x	x	x
<i>Weissella</i>	<i>minor</i>	DSM 20014T	1983	Milking machine slime	1.77	39.29	Leuconostocaceae	JQC000000000	x	x	x	x	x
<i>Weissella</i>	<i>oryzae</i>	JCM 1819T	2013	Fermented rice grains	2.13	38.9	Leuconostocaceae		x	x	x	x	x
<i>Weissella</i>	<i>paramesenteroides</i>	DSM 20288T	1993	Fermented sausages	1.98	38	Leuconostocaceae	ACKU00000000.1	x	x	x	x	x
<i>Weissella</i>	<i>soli</i>	DSM 14420T	2002	Soil			Leuconostocaceae	AY028260			x		
<i>Weissella</i>	<i>thailandensis</i>	Fsb4-2	2000	Korean fermented seafood	1.97	40	Leuconostocaceae	HE575133-HE575182	x		x	x	x
<i>Weissella</i>	<i>uvorum</i>	DSM 20600T	2014	Wine grapes			Leuconostocaceae	KF999666			x		
<i>Weissella</i>	<i>viridescens</i>	DSM 20410T	1957	Cured meat products	1.54	41.09	Leuconostocaceae	QJBM000000000	x	x	x	x	x

Table S2

Sequence information for the 29 ribosomal proteins and 12 phylogenetic markers.

Genes MLST

<i>L. salivarius</i> UCC118 locus					
Gene	tag*	COG	Annotation	Co-ordinates*	Length*
<i>dnaK</i>	LSL_0578	COG0443O	Chaperone protein	619577..621424	1848
<i>fusA</i>	LSL_0202	COG0480J	Protein Translation Elongation Factor G	244403..246496	2094
<i>groEL</i>	LSL_1211	COG0459O	Molecular chaperone GroEL	1246385..1248007	1623
<i>gyrA</i>	LSL_0006	COG0188L	DNA gyrase subunit A	6446..8998	2553
<i>gyrB</i>	LSL_0005	COG0187L	DNA gyrase subunit B	4451..6409	1959
<i>ileS</i>	LSL_1042	COG0060J	Isoleucyl-tRNA synthetase	1065203..1067998	2796
<i>lepA</i>	LSL_0580	COG0481M	GTP-binding translation elongation factor	622843..624672	1830
<i>pheS</i>	LSL_0813	COG0016J	Phenylalanyl-tRNA synthetase subunit alpha	829184..830230	1047
<i>recA</i>	LSL_1130	COG0468L	Recombinase A	1161704..1162849	1146
<i>rpoA</i>	LSL_1409	COG0202K	DNA-directed RNA polymerase subunit alph	1482888..1483832	945
<i>rpoB</i>	LSL_0197	COG0085K	DNA-directed RNA polymerase beta chain	235025..238624	3600
<i>rpoC</i>	LSL_0198	COG0086K	DNA-directed RNA polymerase subunit beta	238653..242318	3666

Genes rMLST

<i>L. salivarius</i> UCC118 locus					
Gene	tag*	COG	Annotation	Co-ordinates*	Length*
<i>rpsA</i>	LSL_0887	COG0539J	SSU ribosomal protein S1P	910977..912024	1048
<i>rpsB</i>	LSL_0511	COG0052J	SSU ribosomal protein S2P	557234..558031	798
<i>rpsC</i>	LSL_1429	COG0092J	SSU ribosomal protein S3P	1492402..1493058	657
<i>rpsD</i>	LSL_1077	COG0522J	SSU ribosomal protein S4P	1101963..1102562	600
<i>rpsE</i>	LSL_1418	COG0098J	SSU ribosomal protein S5P	1488030..1488530	501
<i>rpsF</i>	LSL_0007	COG0360J	SSU ribosomal protein S6P	9217..9507	291
<i>rpsG</i>	LSL_0201	COG0049J	SSU ribosomal protein S7P	243812..244282	471
<i>rpsH</i>	LSL_1421	COG0096J	SSU ribosomal protein S8P	1489522..1489920	399
<i>rpsI</i>	LSL_1402	COG0103J	SSU ribosomal protein S9P	1477906..1478297	392
<i>rpsL</i>	LSL_0200	COG0048J	SSU ribosomal protein S12P	243364..243777	414
<i>rpsM</i>	LSL_1411	COG0099J	SSU ribosomal protein S13P	1484365..1484696	332
<i>rpsO</i>	LSL_0638	COG0184J	SSU ribosomal protein S15P	681490..681759	269
<i>rplA</i>	LSL_1239	COG0081J	LSU ribosomal protein L1P	1272210..1272751	542
<i>rplB</i>	LSL_1432	COG0090J	LSU ribosomal protein L2P	1493784..1494599	816
<i>rplC</i>	LSL_1435	COG0087J	LSU ribosomal protein L3P	1495557..1496180	624
<i>rplD</i>	LSL_1434	COG0088J	LSU ribosomal protein L4P	1494909..1495532	624
<i>rplE</i>	LSL_1423	COG0094J	LSU ribosomal protein L5P	1490153..1490695	543
<i>rplF</i>	LSL_1420	COG0097J	LSU ribosomal protein L6P	1488953..1489489	537
<i>rplL</i>	LSL_1237	COG0222J	LSU ribosomal protein L12P	1270893..1271206	314
<i>rplI</i>	LSL_1727	COG0359J	LSU ribosomal protein L9P	1809124..1809573	450
<i>rplJ</i>	LSL_1238	COG0244J	LSU ribosomal protein L10P	1271311..1271814	504
<i>rplK</i>	LSL_1240	COG0080J	LSU ribosomal protein L11P	1272873..1273279	407
<i>rplM</i>	LSL_1403	COG0102J	LSU ribosomal protein L13P	1478312..1478755	444
<i>rplN</i>	LSL_1425	COG0093J	LSU ribosomal protein L14P	1491066..1491428	363
<i>rplO</i>	LSL_1416	COG0200J	LSU ribosomal protein L15P	1487364..1487798	435
<i>rplQ</i>	LSL_1408	COG0203J	LSU ribosomal protein L17P	1482490..1482849	360
<i>rplT</i>	LSL_0497	COG0292J	LSU ribosomal protein L20P	546770..547101	332
<i>rplW</i>	LSL_1433	COG0089J	LSU ribosomal protein L23P	1494625..1494909	285
<i>rplX</i>	LSL_1424	COG0198J	LSU ribosomal protein L24P	1490781..1491025	245

*These columns are provided according to the reference genome *L. salivarius* UCC118

Table S3: 15 clade-specific genes

>QTS_863

MKRI GIMTSGGDAPGMNVAIRAVARKAISSGLEAYGINYGFAGLVAGDIHEFKATDLDDM
VSQGGTMLYSARYPEFAQEESQLKGIEQLKKFGIDALVVIGGDGSYHGALRLTEHGYNTI
GLPGTIDNDIPFTDFTIGFDTALNTAVDAIDKVRDTAKSHQRVFAVQVMGRHAADIALWA
GVASGADAVIAPGFDYDVEAIANKLKRNRANGKDYGIIVIAEGDANSEAAPEFIKKLKQY
GDFDARATVIGHVQRGGVPSAKDRVLASKMGAYAVELLLEGGGLAVGILDNKNVQAHDIT
DLFDAKHQADDSLYQLSEDL SF

>QTS_494

MEYTEIMVRYGELSTKGKNRKDFIARLGGNIRKSLKDFEQVVVHPNRDRTHVTLNGASSA
AVIARLKR VFGIQLNSPMLKVEKSMEAVQEGALAMMKEQLKPQMTFKINTRRSDKDFPIN
TDTMRELGGFILENFPESSQVKMKNPDITLRVEIRSNGIFLTSEVINGAGGLPVGTAGKG
MMMLSGGIDSPVAAYLGMKRGVEMEMVHFFSPPYTSEQALAKAKELSGKLAAYS GNVQFL
QVPFAEIQETIKEKCEGYLMTIQRRMMLRLTVALAQKRGGGLAIFNGESLGQVASQTMES
MMAINDVTTMPIIRPVVSMKDNEIIIEIAKEIDTYDLSIMPFEDCCTIFAPPAPKTRPDLE
KARYYESKIDVEGLMKRALDGVQVTNIHAGEEFLNQNEEVFAELL

>QTS_497

MTDNSKTRVVVGMSGGVDSSVVAYLLKKQGYDVVGVMKNWDDTDENGYCTATEDYKDVA
KVAAKIGIPYYSVNFEKEYWDRVFTYFLDEYKKGRTPNPDVICNNEIKFKAFLDYAISLG
ADYVATGHYAQVERDENGHQHLLRATDSNKDQTYFLSQLSAEQLD RVMFPLGGMVKPEVR
AIAKEAGLAVYDKKDSVGICFIGEKNFREFLSNYLPKPGKMMTL DGEVKGEHAGLMYYT
IGQRRGLGIGGSGKNNEPWFVVGKDL SKNILYVGQGF DNPHLYAASLDASDMHFVNRLGE
ERGHDFRCTAKFRYRAKDV PVTVHFSDDFS KVTVD FDEPARAITPGQALVLYDGEECIGG
GIIDAAYSESKQQLQYV

>QTS_502

MKCPHCGNNGSRVDSRPTDEGRVIRRRRECEDCGFRFTTFERVEATPLLVIKNGSREE
FDRDKILKGIVRAAEKRPVKMEQMTDIVDKVENKIRSLGESEVSSQVIGEYVMN ILVDLD
EIA YIRFASVYRQFKDMNVFLNELQDMVKKDEEEKD HK

>QTS_509

MLEVKQYDGRDYDVIVVGAGHAGSEAALAAARMGNKTLTMTINLDMVAFMPCNPSIGGPA
KGIVVREIDALGGEMGRNIDKTYVQMRMLNTGKGPAVRALRAQADKHAYHAEMKKTIEAE
PNLT LRQGIVDDLIVEDGVCKGVI TNGTARYHAKSVVLT LGTAARGKIIIGELQYSSGPN
NSQAALELTKNLTEKYHFELERFKTGTPPRVDGGTIHYAETEEQPGDEEPNHFSFQTPDS
KYLELKNQLSCWLTYTNEKTHEI IRENLSRAPMFSGVIEGVGP RYCPSIEDKIVRFADKD
RHQLFLEPEGRKTD EWYVQGLSTSMPEEVQQQILHSIKGLEDAEMMRPGYAIEYDVVAPY
QLKNTLET KLIKNLYTAGQTNGTSGYEEAAGQGLIAGINAGRRALGQEPFTLKRSDAYIG
VMIDDLVTKGTKEPYRLTSRAEYRLILRHDNADLRLTEMGHD LGLVSEEEYAAFLQKKA
DIQDELHRLEQIRIKPGQVKEFLESKGS HGLKDGVLAAEF LRPEVTYADLLKFIPASEK
QLDRRVVEQVEIEIKYAGYIKKAQERVDR LKKMEAKVIPDRIDYNAISGLATEGRQKLEK
IRPTTIAQASRISGVT PADIAILSVYIQQGI AKI

>QTS_514

VEKKDLFDQITEVTHNAEDLLNKLHETQSAMVEIMEENAELKIENQH LRERLQATAAEH
ENEGTKNTKHGLSKSLQNL EKLYASGYHICNEFFGKHRQDDEECAFLTVIYGDR

>QTS_569

MKKYRINSGVNLVILPTTQFKTLHIAVDVFAPALTSNISARSLLSYLMAVSARRYPTQQD
VAQKTIDLYGAQYQTDVYRFGQTHHLRV TMQLPAPDYVSDGSNLLVSAFD FLKDMMF DPL
VGEQKFDDDVFAKEKQSLINELESISDDKSRYAISQLRNITYDVPNLQSSSAGDIDL VKN
LTSES VYTTYKNMITNDLVNIVVLGDVNDSEVASLVSGWSVPARRLPFLQPFYRQALRPA
TVEKEKHLQDINQAMLTAMHLDV PPLDKQRF AAMVMNALLGGSPLSKLFMNVREKASLA
YSIYSKWQYDTGFL LIAAGLDADKVAQTEKMIHQEILAMQNGDFDEKVVASIKKSLINDY
LSQQDSPNSQIEIAFSRLLTGSETSEFEWIKQVQAVTSNDIALVAQKLQIQSRFILLPKE

>QTS_898

MQNVVLKGHKNGYVIAIRADSKFEDVLA EVTTL FADLQKDKKRDSAQPI SFNITTGTRLL
SAEEKKKIEDVVS NYPLFSIHKFTSDVMLVQDAIEMVESKV VHLNANTVRNGQIEYIKGD
VLFIGNLHRGGILRATGNVFL LGNCEGIIHAGYLSDAQAI IAGNVSKAQQVRIADVVDII
SDDEEKMARDSEVVVVVNDLHALDYTERDQVKVIRPKLFAHMGGY

>QTS_1754

MDKFLTMNDLQEMTLKEIYNLAREYKISYYSQMNNKELSLAVLRAQAKKQSFVEMEGVLD
IIGNEGYGFLRPINYGSSQEDIYISASQITRFGLRNGDLVGGEARHPRPGERYYGLMRVT

SVNNKDPEEAKQRPHPALTPFIYPNQQLTLATTPDVLSTRLVDLFAPIGFGQRGLVVAPP
KAGKTTLLKAIANGISKNHPPNAKLIVLLIDERPEEVTDLERSIDGEVVYSTFDQEPRNHT
RVSELVLQRAMRLVEDKQDVVILLDSITRLTRAYNLVTAPSGRTLSSGGVDPASFYKPKKF
FGAARNIEEGGSLTIIIGTALVDTGSRMDDVIYEEFKGTGNSSELVLSRNLAERRVFPALDI
RQSGTRKEELMISRDLVLEQLWNIIRRSMRGDALEYTEQILQLMKNTKNNDEFIANLKNLNF
GKKS

>QTS_2490

LTEDKKNTEETQEKEEFEVFMPEANRVEMPATEFKEQPDYLKTFANFYISKFDESLEIM
DVYDGNHDVIEINTYLTNNMAFSRQNLVKHVLNIHANRFLDMLNNIQKQTGVDPQNMKTY
EDWEKWYTDRRNEIKQTLS

>QTS_2524

MSHASQDNFLLLAKEAKKHNDLPQAKQYLLEALRLGHDSDIVCELCEIYLSQEKGDQAYS
LIKEEPDLFSNQRVYNTYLIKILAFQHYAIEAAELEHLLQKKLPVKIEPVSQIKQLEIMRN
FKQLKYIQEKDYLLLYCLSTENFTNLAKSILIDPSPNFALRLSLCEDLIKLGysekvQVY
ILGELKDFIPKETDLLEKSLIYREVCVSLADYFRQDPSKLPIMIGEMNVCLGMLYPRLND
YIRDPDQFAHDFRNYLEQKKGGANQKLLNKIYEYLAIEKATNSDF

>QTS_2525

VKFPFGLRLNAKVNNITKLGIFVTLPHQHHLIFHKDFGDKWESVKKKYSVGDEIRVVVI
NNHEGKISLSLSQVNNPDLVDPTNEFKDSDKDFTPLAKLLEKSTDKIANLKNQLNLSDR

>QTS_3870

MLDSIFSRNTEADKMVVKQQPRYVFGVLNLKTDAGYEIHFLNIPDLSAKGVTYAETLYYA
YRVLSHFLEPFKEDAAQILQYTFRELPIFKKDKNSFLTLITVTHDLDPHKMEMTFLLPQT
RASELADEADQVGRLIRFLPNRSTSDQA

>QTS_4397

MLNFKEKDLRAAVETPQSIGDTRQALTDLYHQRLNYLSGKAQWTTNDQALFELNCSYSRL
LLDRIWEAYTDNDTIKDSSELLDHTWLQVRGSTSNNVSLDVNYATEDHNTTLFSIQQPLTE
RAVLAHNLPTLTCKGDEFMLPESDYEPLIQMIKLLYKADYRFTSARETILQPVNNLTFP
VVFNQPKNFTATEQVGTVNKNLIHLDQTIGRYDVRSFKVVEDGNNVTKEGKPQISASGL
FTWKAENIAPLLDHELTTLTVGVETESLPSLDKLFISAANNSILMKTGDTMSSYRLELPN
KKTGLGSVDARSESLVLHYPDDETQVYELIKQYPFLGEWLNDVIIKK

>QTS_4707

MNRHNNNSNKNMTRESFRKRKPFYKRKPFIIISLILIIILIIIGLLIFWKSTSSKDNTHTT
QPSHKIEKVKPKKETKKKVTKKKHVKKAKKQKADEITAKQQENDNKPKNDQQKKTTNQI
KNAGTYTDLTYDWDWYTFEISNDVKLVKDSNGDAALLVKYNYTNKTQSNEIPQRVQNTAI
MLKQDNQQLTATTASGEYSTIVNSSNNGLVQPNKSFDGALLVKVKDTDSEVTMYFKNIQT
NDWLDTTQPLKLLK