CORA Cork Open Research Archive
Cartlann Taighde Oscailte Chorcaí

Title	Comparative genomics of the genus Lactobacillus 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 Lactobacillus reveals robust phylogroups that provide the basis for reclassification'. Applied and Environmental Microbiology, 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	2026-11-16 11:35:55
Item downloaded from	https://hdl.handle.net/10468/11776

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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.

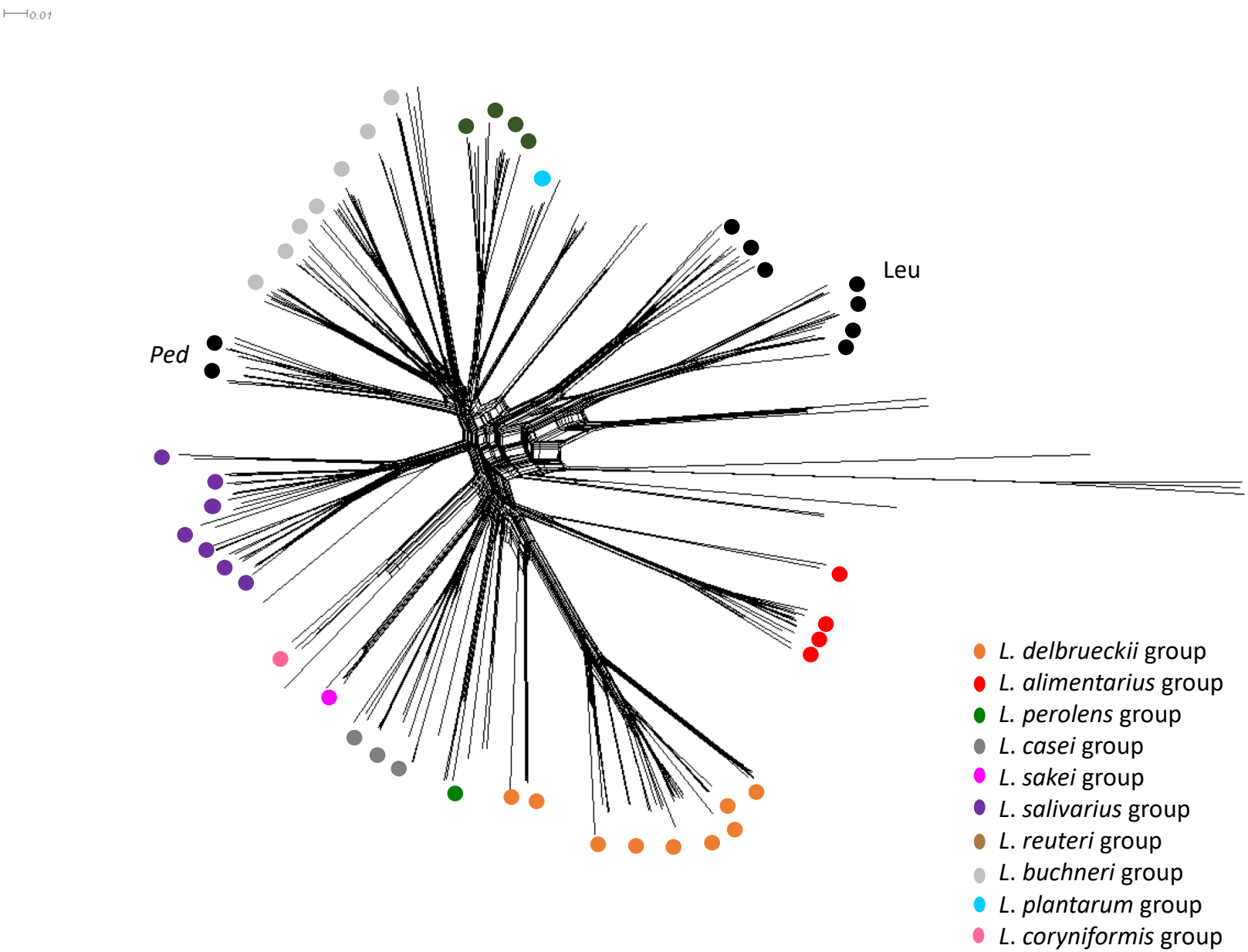
Figure S2

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.

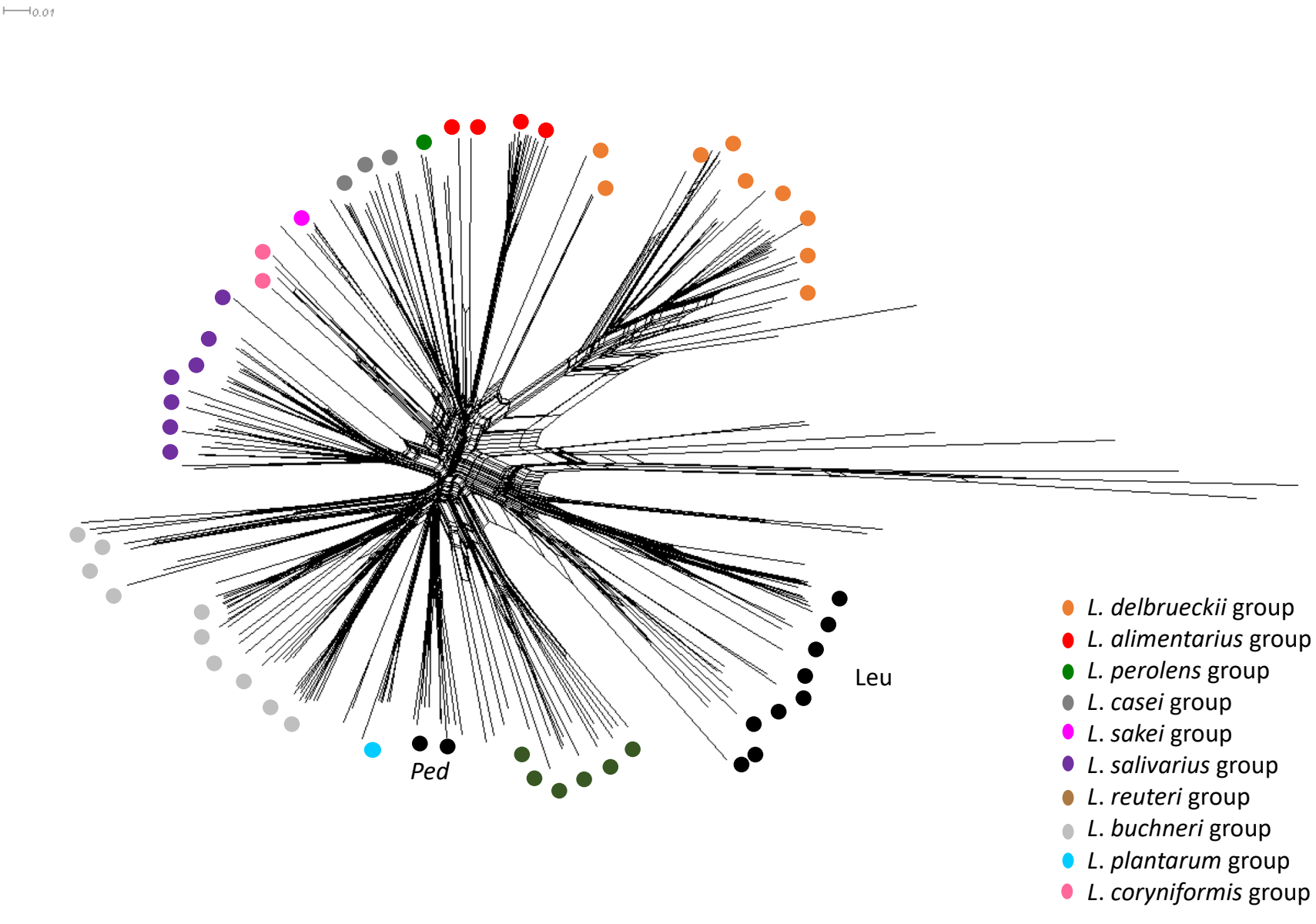
Figure S3

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*.

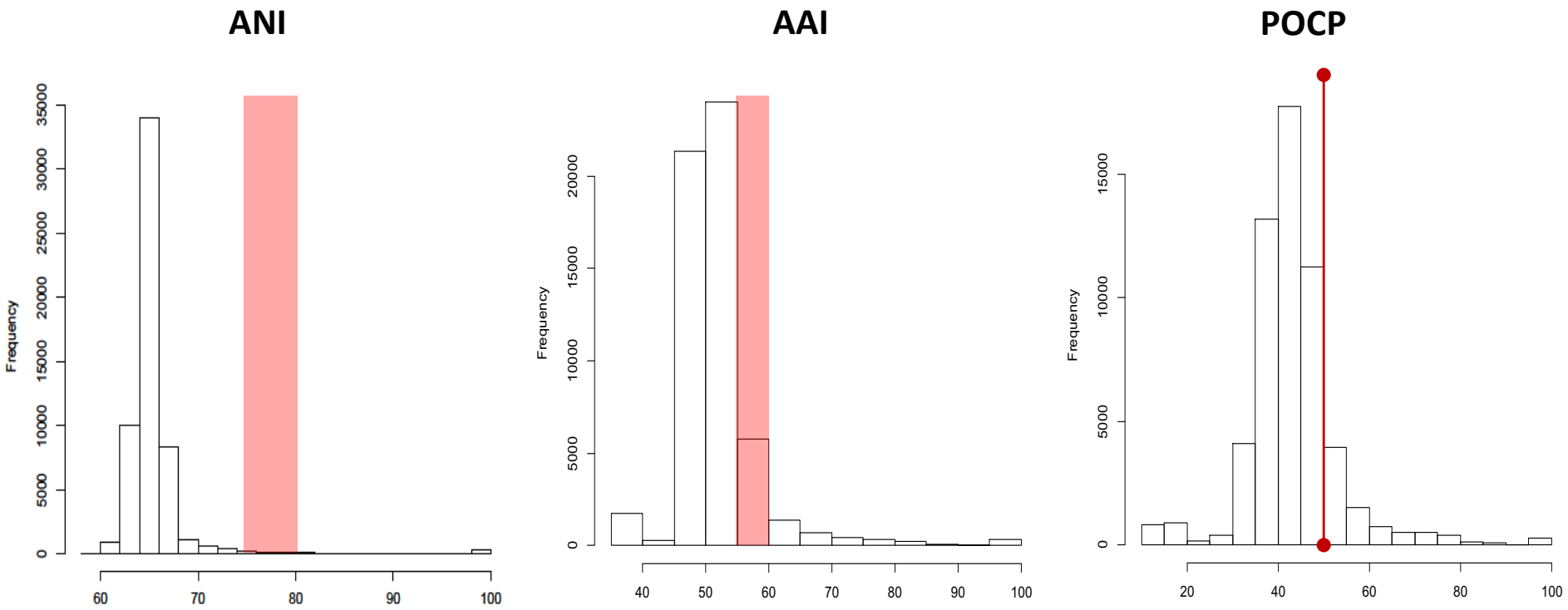
Suppl Figure S1A



Suppl Figure S1B



Suppl Figure S2



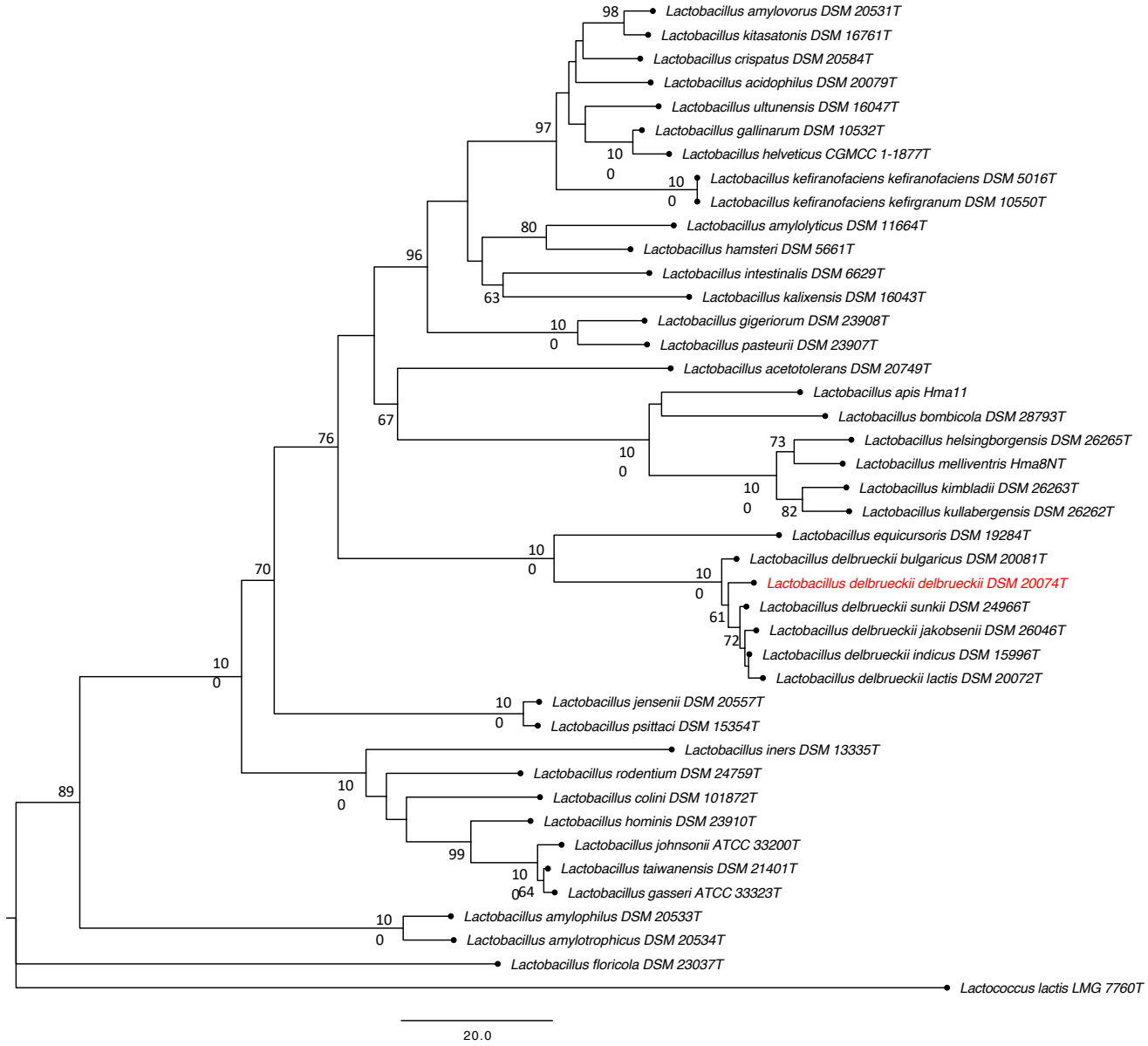


Figure S3A: *L. delbrueckii* group

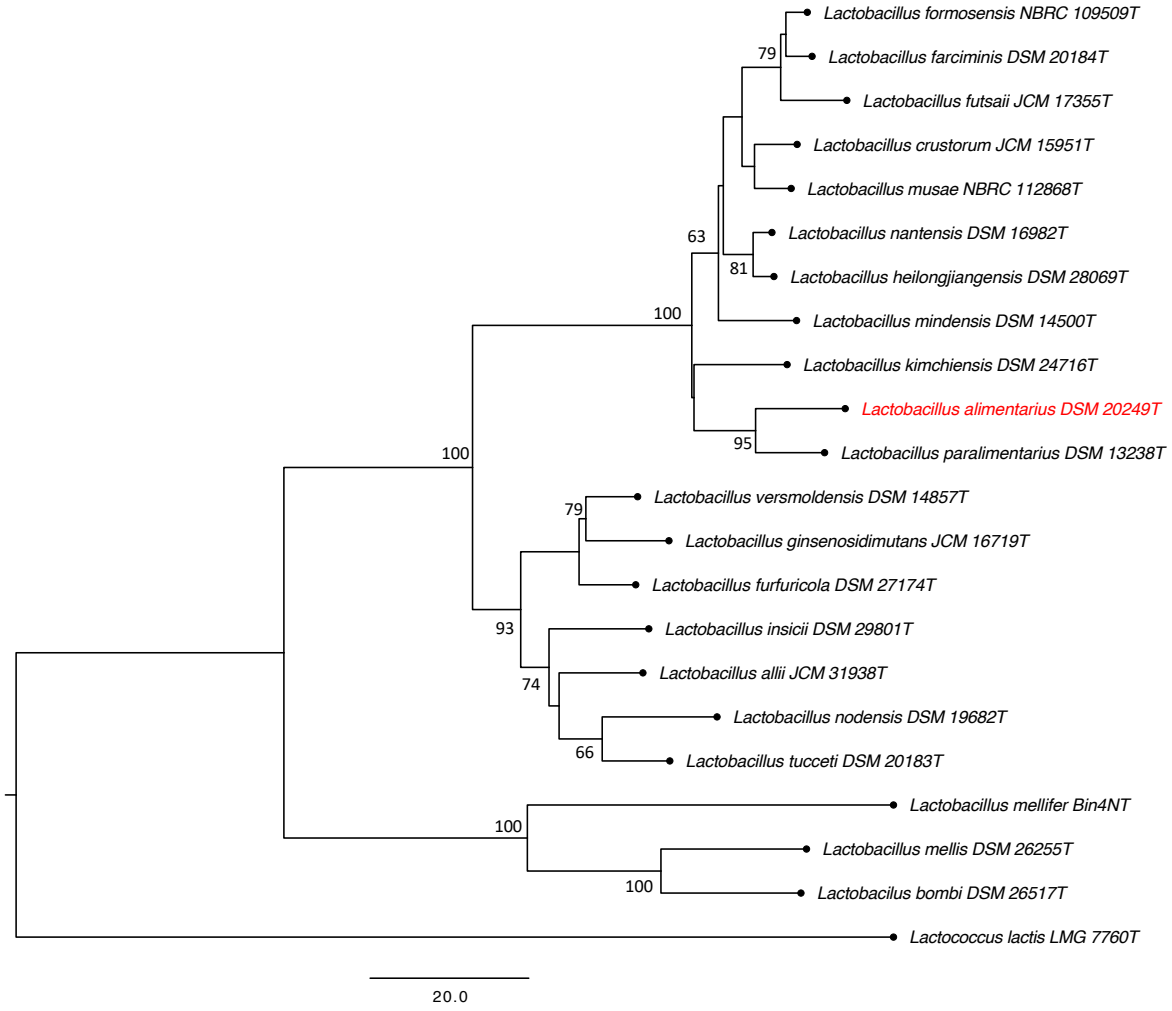


Figure S3B: *L. alimentarius* group

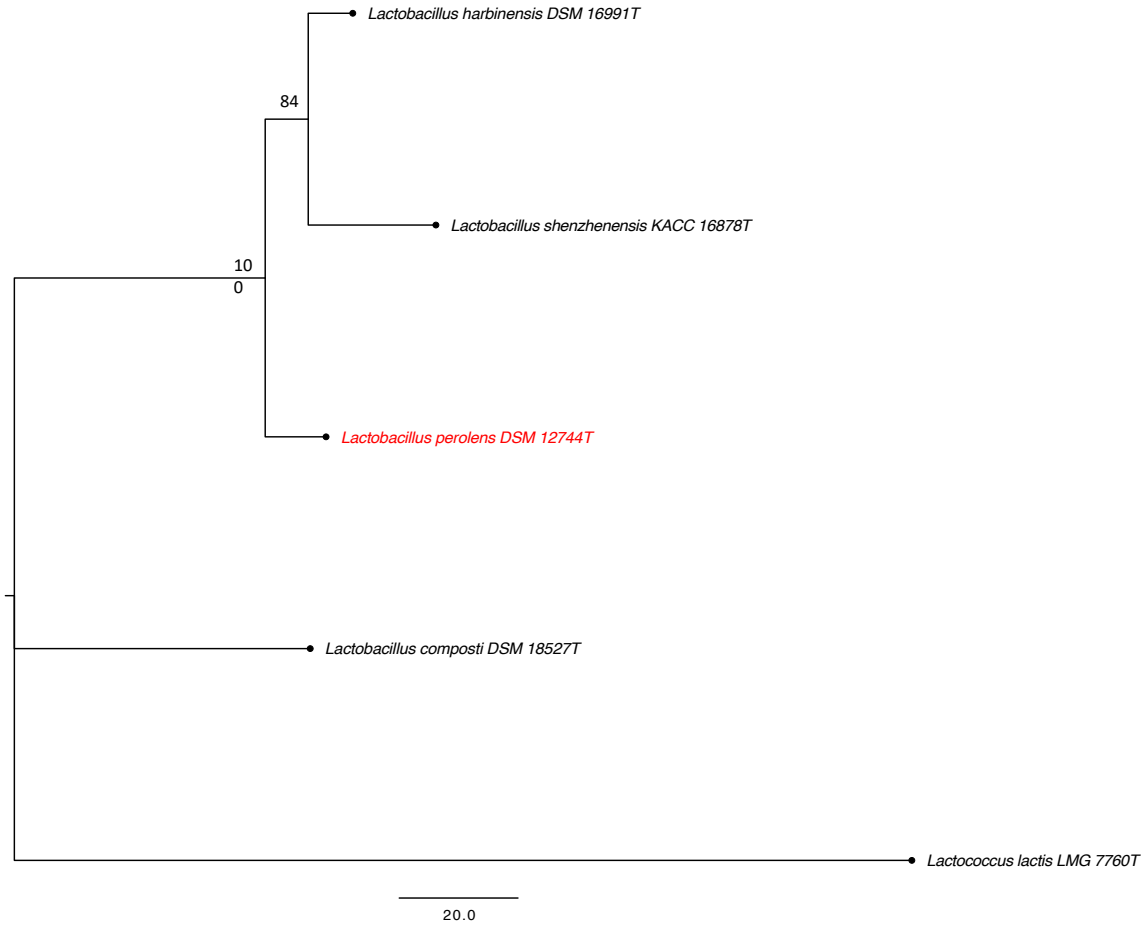


Figure S3C: *L. perolens* group

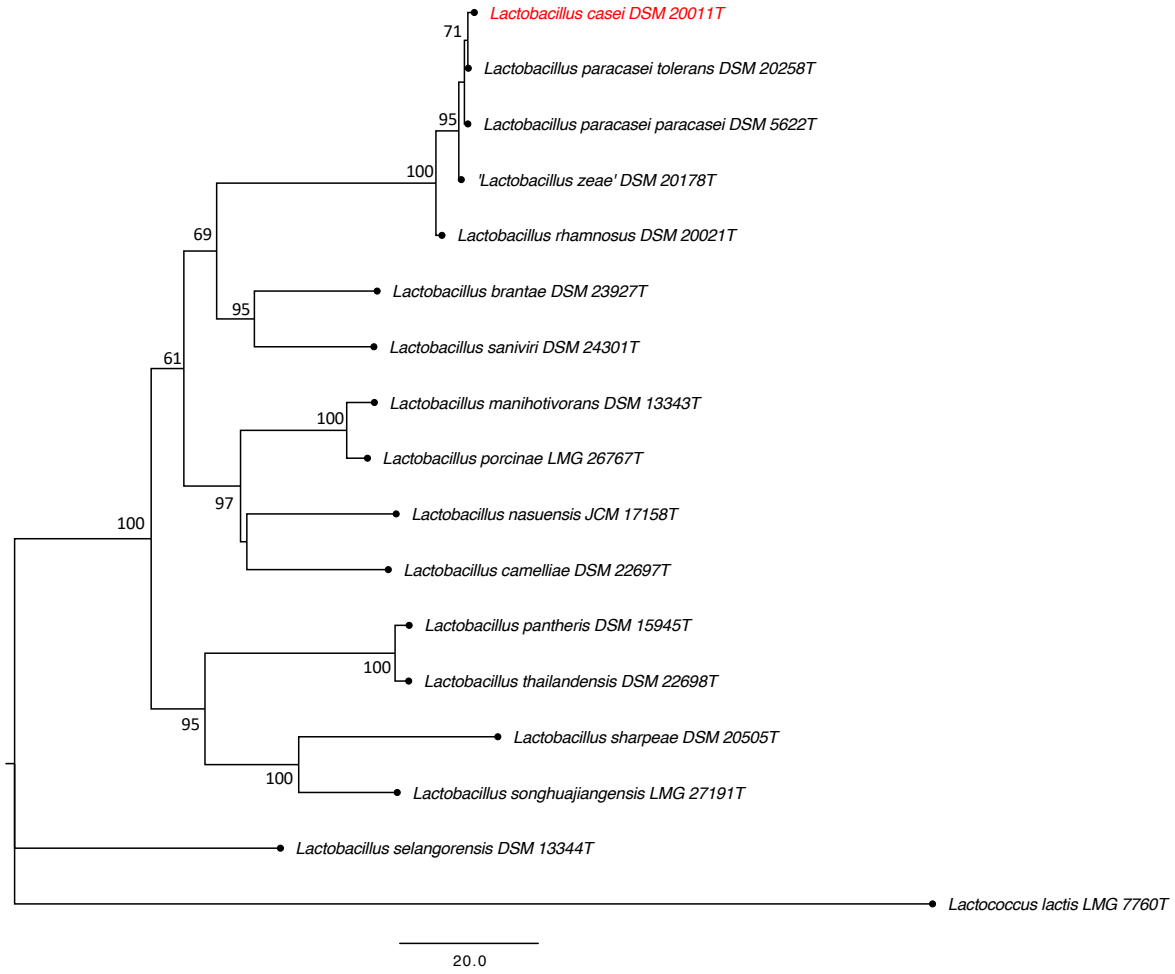


Figure S3D: *L. casei* group (*L. chiayiensis* has been recently described and it is related to *L. casei*)

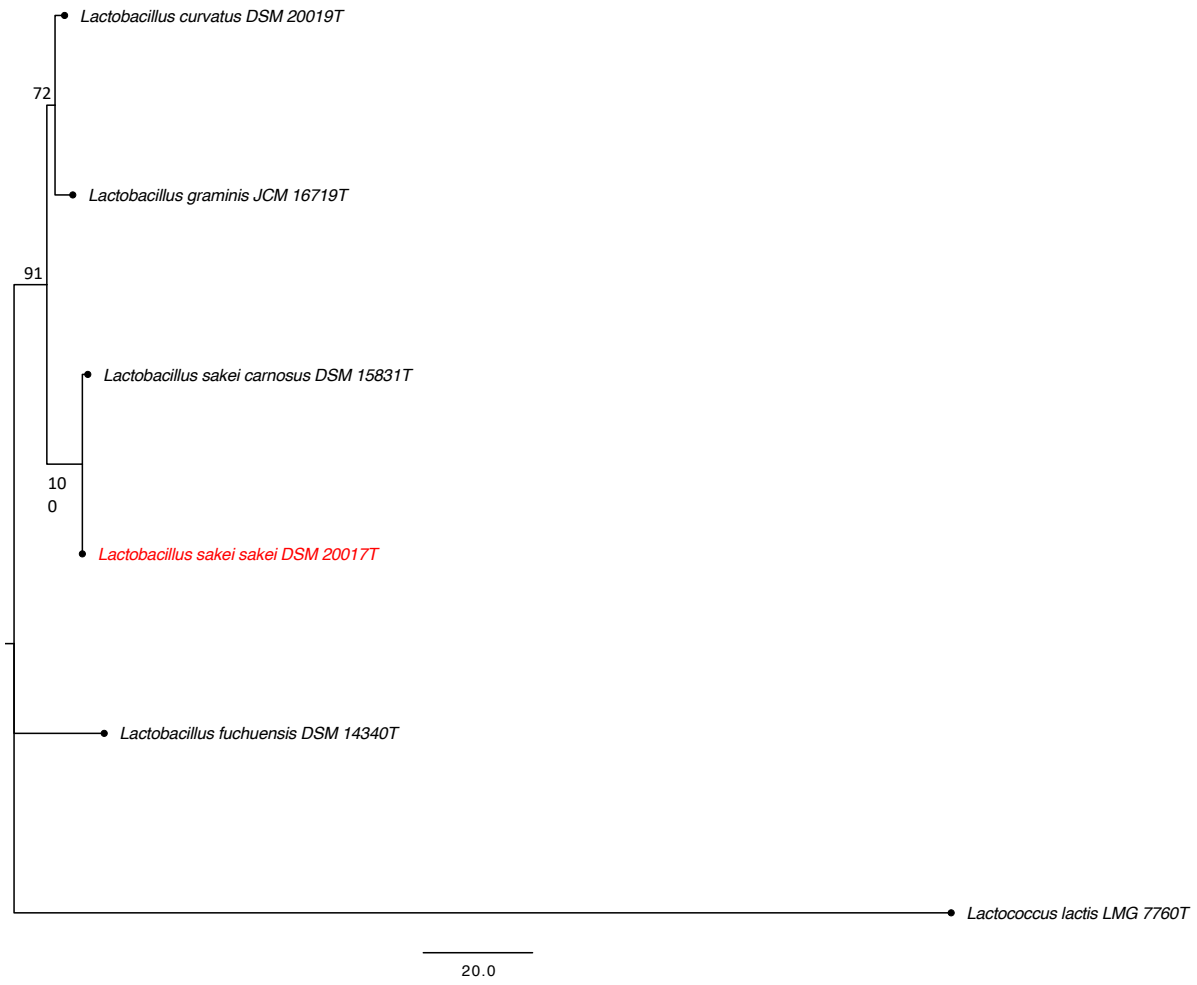


Figure S3E: *L. sakei* group

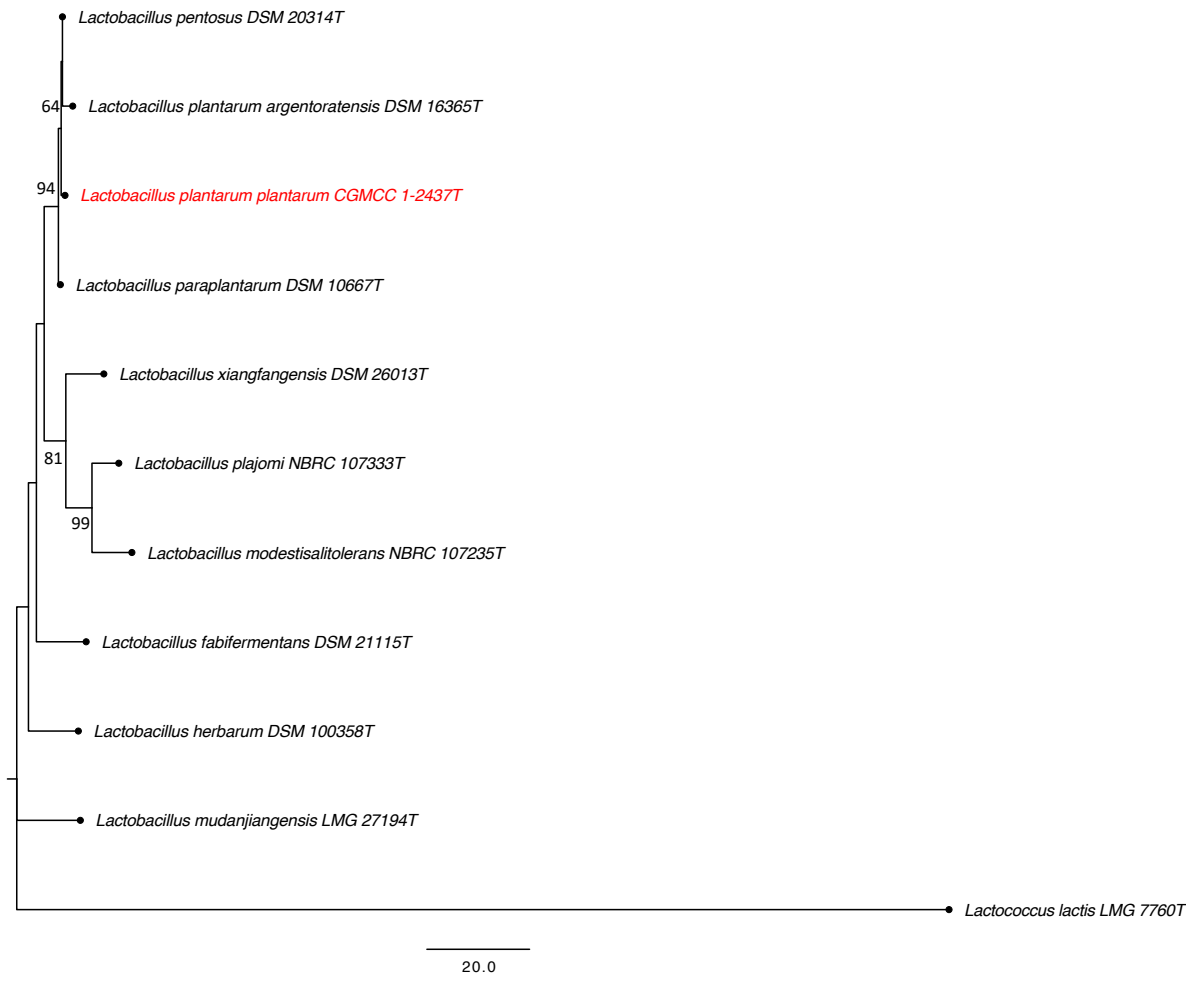


Figure S3F: *L. plantarum* group

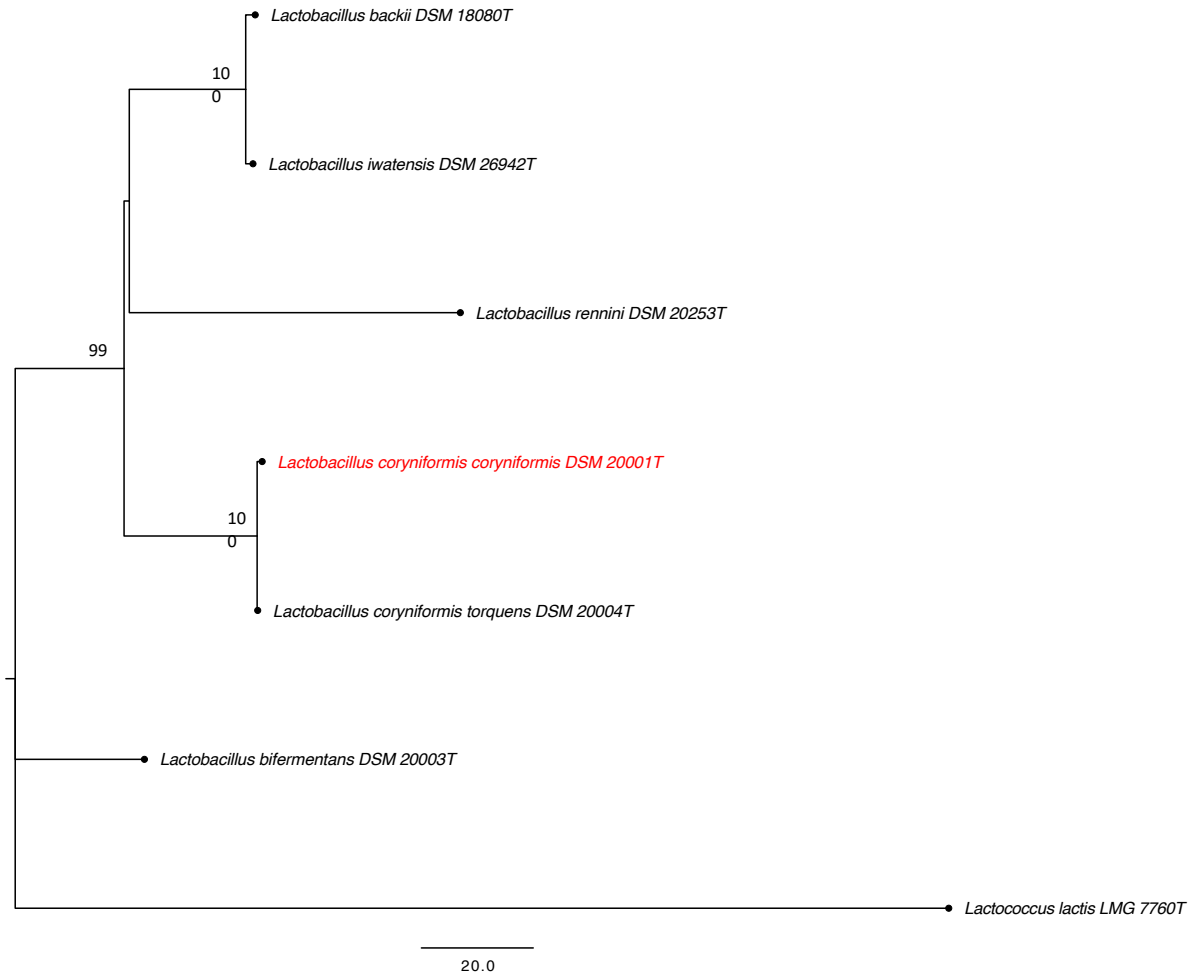


Figure S3G: *L. coryniformis* group

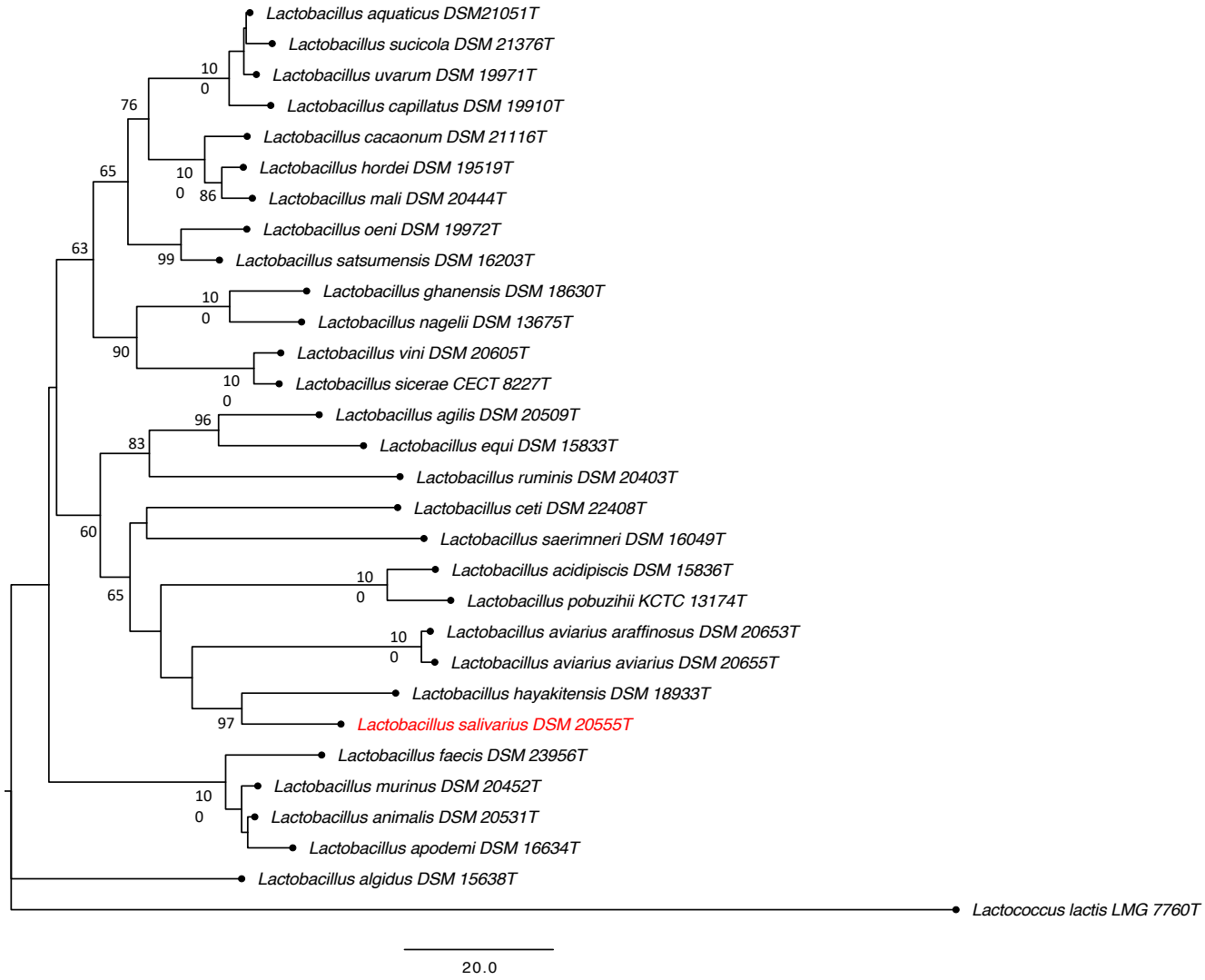


Figure S3H: *L. salivarius* group

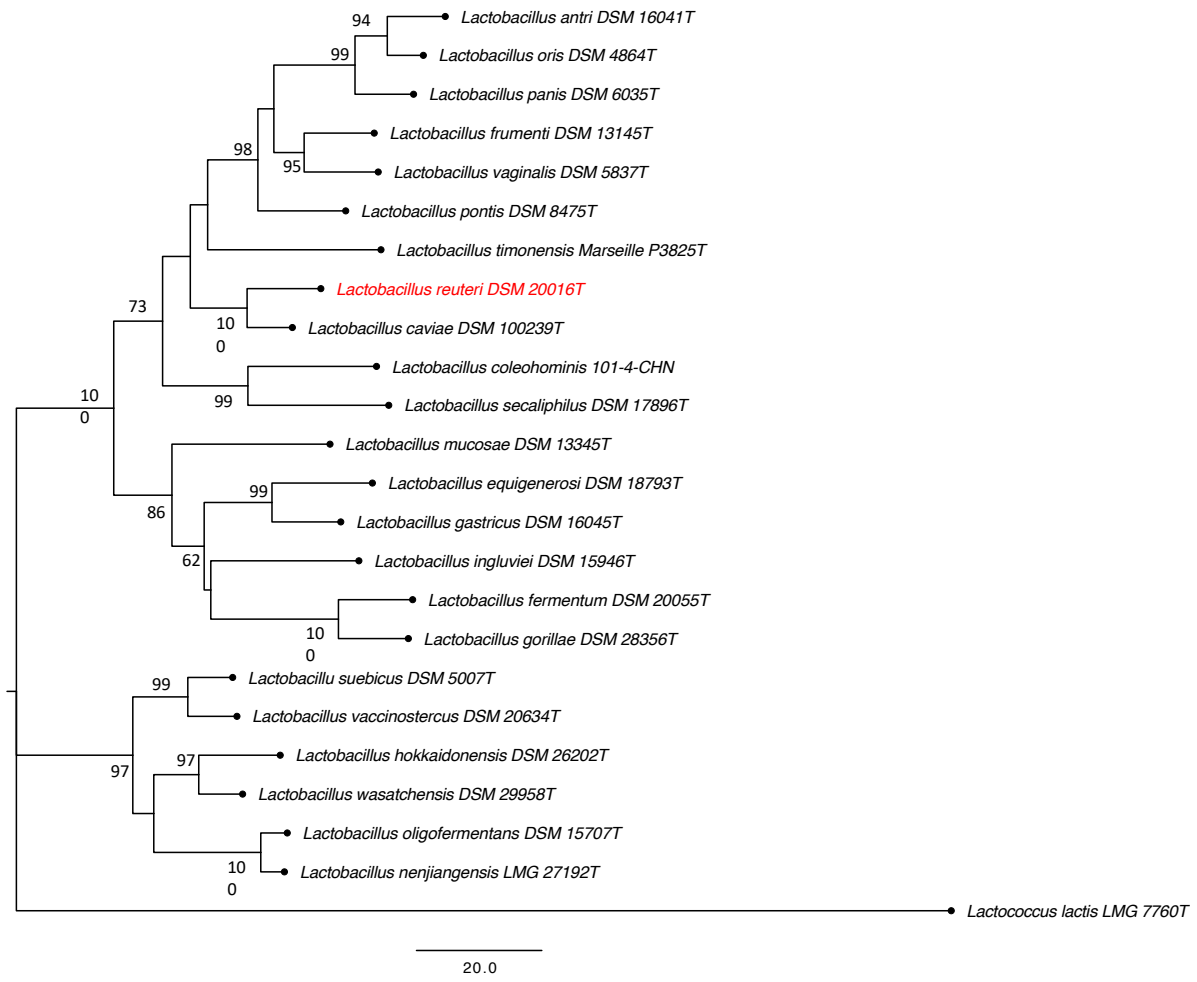


Figure S3I: *L. reuteri* group

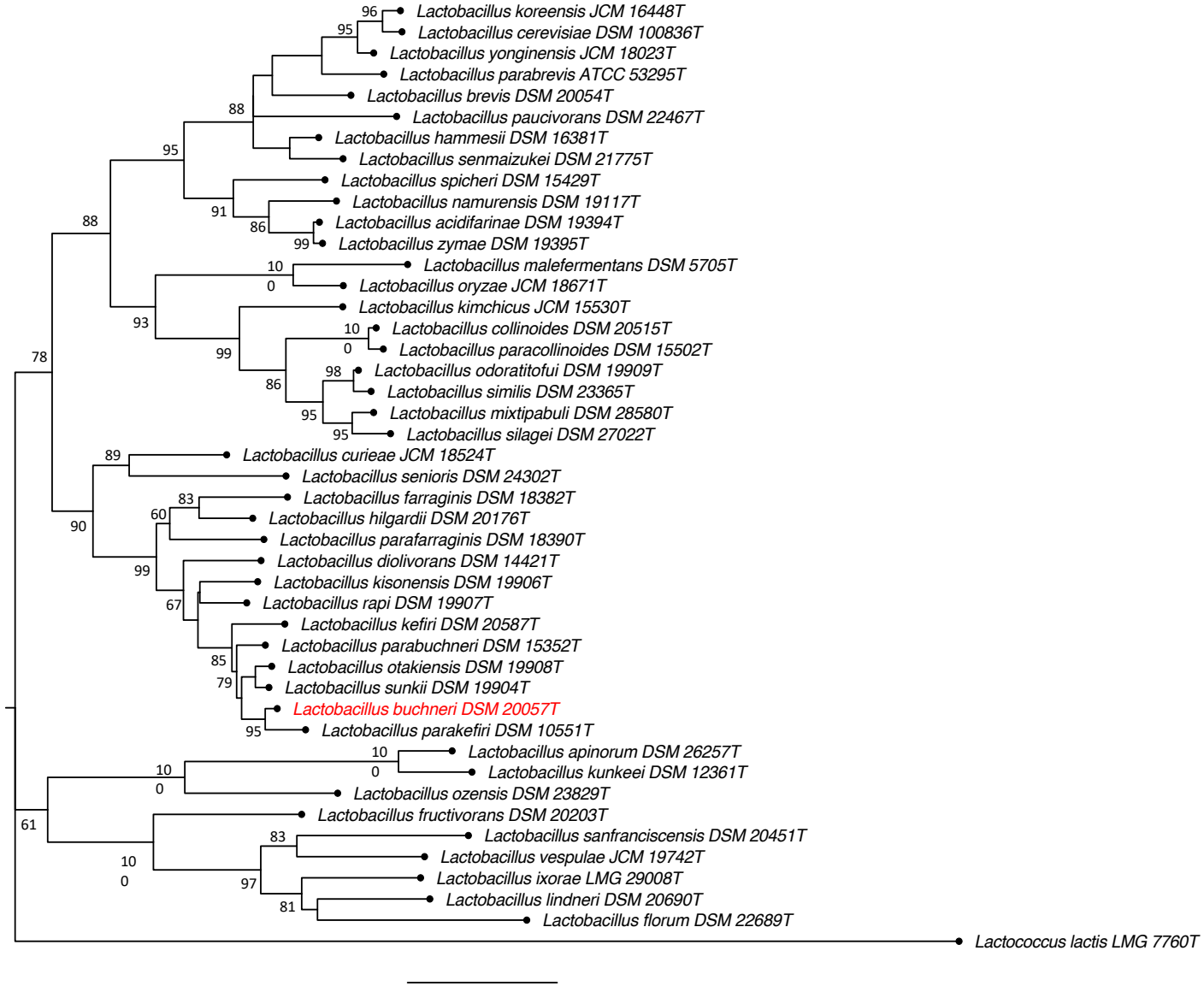


Figure S3J*: L. buchneri* group (*L. silangicola*, *L. pentosiphilus*, *L. kosoi*, *L. raoultii* have been recently described, thus they are not reported in the tree but they are related to *L. mixtipabuli*, *L. silagei*, *L. kunkeei*, *L. farraginis*).

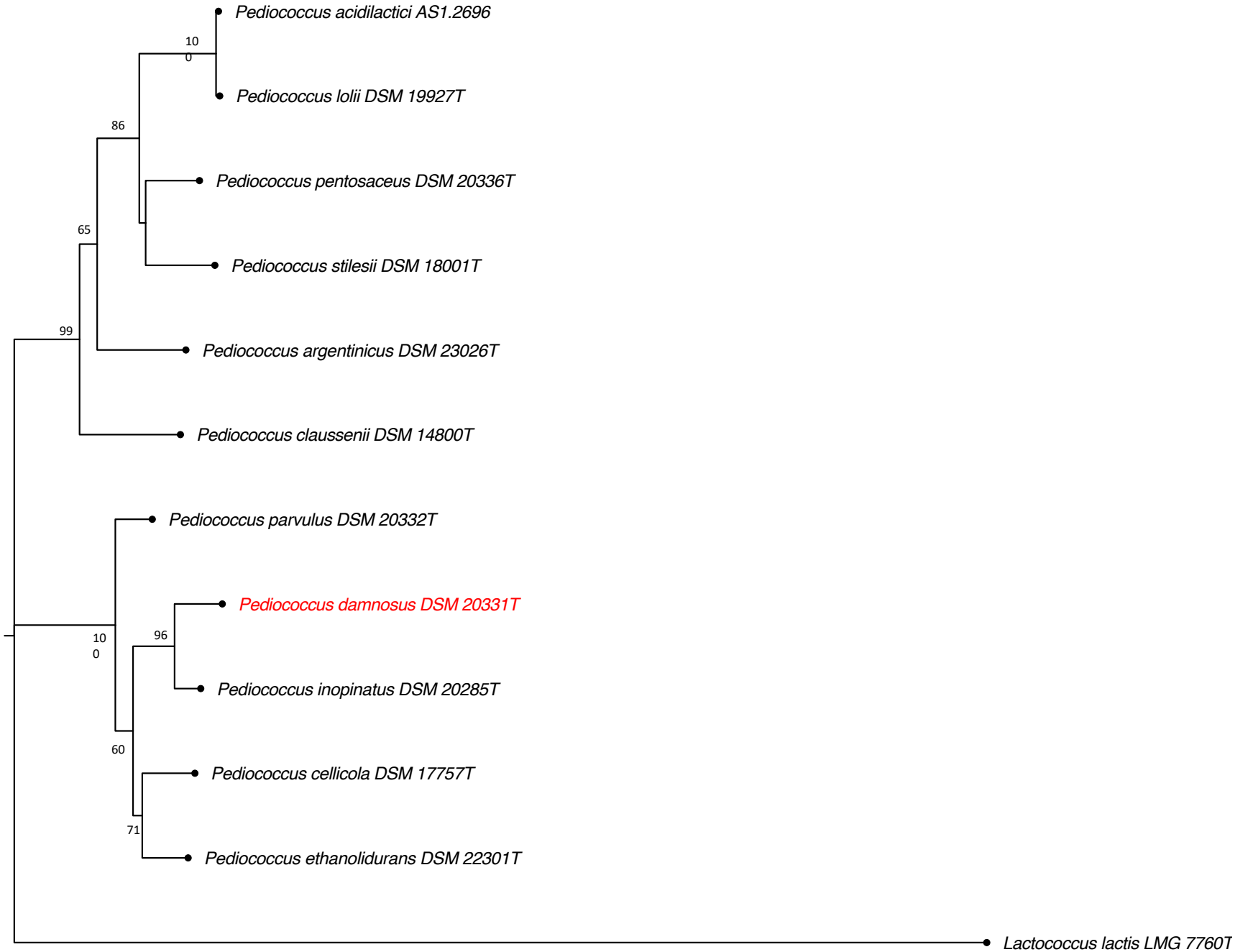


Figure S3K: *Pediococcus* genus

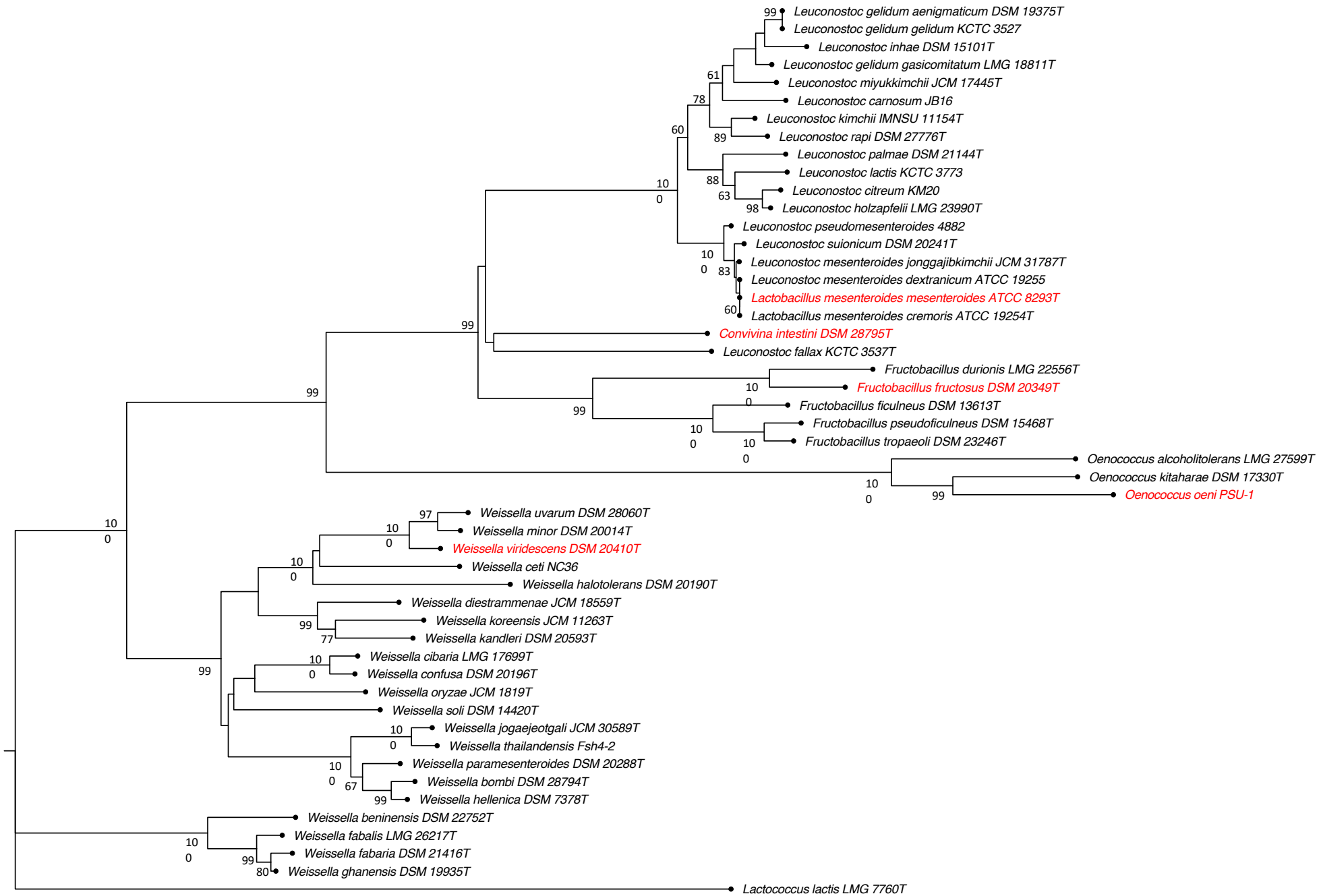


Figure S3L: family Leuconostocaceae

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
Atopobium	*minutum*	DSM 20586T	1937	Perineal abscess	1.72	48.69			JQBO00000000		x	x	x	x	x
Atopobium	*rimae*	DSM 7090T	1991	Human gingival crevice	1.63	1.63			JQCP00000000		x	x	x	x	x
Carnobacterium	*divergens*	DSM 20623T	1984	Vacuum packaged minced beef	2.59	34.95			JQBS00000000		x	x	x	x	x
Carnobacterium	*maltaromaticum*	DSM 20342T	1974	Milk with malty flavour	3.76	34.31			JQBG00000000		x	x	x	x	x
Comvivina	*intestini*	DSM 28795T	2015	Bumble bee eut			Leuconostocaceae			LK054488			x		
Fructobacillus	*durionis*	LMG 22556T	2005	Malaysian acid-fermented condiment, tempoyak			Leuconostocaceae			AJ780981			x		
Fructobacillus	*ficulneus*	DSM 13613T	2002	Fig-tree	1.54	43.9	Leuconostocaceae		BBXQ00000000.1		x	x	x	x	x
Fructobacillus	*fructosus*	DSM 20349T	1956	Flowers	1.48	44.56	Leuconostocaceae		JQBH00000000		x	x	x	x	x
Fructobacillus	*pseudoficulneus*	DSM 15468T	2006	Ripe fig	1.41	44.5	Leuconostocaceae		FNWS00000000.1		x	x	x	x	x
Fructobacillus	*tropaeoli*	DSM 23246T	2011	*Tropaeolum majus* , a flower	1.69	44.2	Leuconostocaceae		BBXT00000000.1		x	x	x	x	x
Kandleria	*vitulina*	DSM 20405T	1973	Calf rumen	2.14	35.03			JQBL00000000		x	x	x	x	x
Lactobacillus	*acetotolerans*	DSM 20749T	1986	Fermented Vinegar Broth	1.59	36.26	*L. delbrueckii*	FHE	AYZC00000000		x	x	x	x	x
Lactobacillus	*acidifarinae*	DSM 19394T	2005	Artisanal wheat sourdough	2.92	51.59	*L. buchneri*	OHE	AZDV00000000		x	x	x	x	x
Lactobacillus	*acidipiscis*	DSM 15836T	2000	Fermented fish	2.33	39.07	*L. salivarius*	FHE	AZFI00000000		x	x	x	x	x
Lactobacillus	*acidophilus*	DSM 20079T	1900	Human	1.95	34.59	*L. delbrueckii*	OHO	AZCS00000000		x	x	x	x	x
Lactobacillus	*agilis*	DSM 20509T	1982	Municinal sewage	2.06	41.74	*L. salivarius*	FHE	AYYP00000000		x	x	x	x	x
Lactobacillus	*algidus*	DSM 15638T	2000	Vacuum-packed beef	1.59	36.03	*L. salivarius*	FHE	AZDI00000000		x	x	x	x	x
Lactobacillus	*alimentarius*	DSM 20249T	1970	Marinated fish product	2.34	35.4	*L. alimentarius*	FHE	AZDQ00000000		x	x	x	x	x
Lactobacillus	*allii*	JCM 31938T	2017	Scallion kimchi			*L. alimentarius*	OHO	CP019323				x		
Lactobacillus	*amylolyticus*	DSM 11664T	1999	Acidified beer wort	1.54	38.24	*L. delbrueckii*	OHO	AZEP00000000		x	x	x	x	x
Lactobacillus	*amylophilus*	DSM 20533T	1981	Swine waste-corn fermentation	1.56	43.61	*L. delbrueckii*	OHO	AYYS00000000		x	x	x	x	x
Lactobacillus	*amylotrophicus*	DSM 20534T	2006	Swine waste-corn fermentation	1.55	43.59	*L. delbrueckii*	OHO	AZCV00000000		x	x	x	x	x
Lactobacillus	*amylovorus*	DSM 20531T	1981	Cattle waste-corn fermentation	2.02	37.77	*L. delbrueckii*	OHO	AZCM00000000		x	x	x	x	x
Lactobacillus	*animalis*	DSM 20602T	1983	Dental plaque of baboon	1.89	41.06	*L. salivarius*	OHO	AYYW00000000		x	x	x	x	x
Lactobacillus	*antri*	DSM 16041T	2005	Gastric biopsies, Human stomach mucosa	2.24	51.11	*L. reuteri-vaccinostercus*	OHE	AZDK00000000		x	x	x	x	x
Lactobacillus	*apinorum*	DSM 26257T	2014	Honey stomach of the honeybee	1.46	34.9	*L. buchneri*	OHE	JXCT00000000.1		x	x	x	x	x
Lactobacillus	*apis*	Hma11	2014	Stomach of honeybees	1.70	36.85	*L. delbrueckii*	OHO	JXLG00000000.1		x	x	x	x	x
Lactobacillus	*apodemi*	DSM 16634T	2006	Faeces of wild Japanese wood mouse	2.10	38.63	*L. salivarius*	FHE	AZFT00000000		x	x	x	x	x
Lactobacillus	*aquaticus*	DSM 21051T	2009	Surface of a eutrophic freshwater nond	2.41	37.41	*L. salivarius*	OHO	AYZD00000000		x	x	x	x	x
Lactobacillus	*aviarius araffinosus*	DSM 20653T	1986	Intestine of chicken	1.48	38.13	*L. salivarius*	OHO	AYYZ00000000		x	x	x	x	x
Lactobacillus	*aviarius aviarius*	DSM 20655T	1985	Faeces of chicken	1.68	40.12	*L. salivarius*	OHO	AYZA00000000		x	x	x	x	x
Lactobacillus	*backii*	DSM 18080T	2013	Spoiled lager beer			*L. coryniformis*	OHO		AB779648			x		
Lactobacillus	*bifermentans*	DSM 20003T	1943	Blown cheese	3.14	44.29	*L. coryniformis*	FHE	AZDA00000000		x	x	x	x	x
Lactobacillus	*bombi*	DSM 26517T	2014	Digestive tract of laboratory-reared bumblebee queens			*L. alimentarius*	FHE		KJ078643			x		
Lactobacillus	*bombicola*	DSM 28793T	2015	Bumble bee gut			*L. delbrueckii*	FHE		LK054485			x		
Lactobacillus	*brantae*	DSM 23927T	2012	Faeces of Canada goose	1.93	47.48	*L. casei*	FHE	AYZQ00000000		x	x	x	x	x
Lactobacillus	*brevis*	DSM 20054T	1919	Faeces	2.47	45.96	*L. buchneri*	OHE	AZCP00000000		x	x	x	x	x
Lactobacillus	*buchneri*	DSM 20057T	1903	Tomato pulp	2.45	44.41	*L. buchneri*	OHE	AZDM00000000		x	x	x	x	x
Lactobacillus	*cacaonum*	DSM 21116T	2009	Cocoa bean heap fermentation	1.92	33.87	*L. salivarius*	FHE	AYZE00000000		x	x	x	x	x
Lactobacillus	*camelliae*	DSM 22697T	2007	Fermented tea leaves (miane)	2.57	55.39	*L. casei*	OHO	AYZJ00000000		x	x	x	x	x
Lactobacillus	*capillatus*	DSM 19910T	2008	Fermented brine used for stinky tofu production	2.24	37.63	*L. salivarius*	OHO	AZEF00000000		x	x	x	x	x
Lactobacillus	*casei*	DSM 20011T	1916	Cheese	2.83	46.45	*L. casei*	FHE	AZCO00000000		x	x	x	x	x
Lactobacillus	*caviae*	DSM 100239T	2017	Oral cavity of a home-bred guinea pig			*L. reuteri-vaccinostercus*	OHE		KT343143			x		
Lactobacillus	*cerevisiae*	DSM 100836T	2017	Spoiled beer			*L. buchneri*	n.d.		KT445896			x		
Lactobacillus	*ceti*	DSM 22408T	2008	Lungs of a beaked whale	1.40	33.73	*L. salivarius*	FHE	JQBZ00000000		x	x	x	x	x
Lactobacillus	*coleohominis*	101-4-CHN	2009	Vaginal urogenital tract	1.72	41.1	*L. reuteri-vaccinostercus*	FHE	ACOH00000000.1		x	x	x	x	x
Lactobacillus	*colini*	DSM 101872T	2017	Northern Bobwhite (*Colinus virginianus*)			*L. delbrueckii*	n.d.		KU161105			x		
Lactobacillus	*collinoides*	DSM 20515T	1972	Fermenting apple juice	3.62	46.11	*L. buchneri*	OHE	AYYR00000000		x	x	x	x	x
Lactobacillus	*composti*	DSM 18527T	2007	Composting material of distilled shochu residue	3.47	43.95	*L. perolens*	FHE	AZGA00000000		x	x	x	x	x
Lactobacillus	*concavus*	DSM 17758T	2005	Walls of a distilled spirit fermenting cellar	1.90	43.3	*L. concavus-L. dextrinicus*	OHO	AZFX00000000		x	x	x	x	x
Lactobacillus	*coryniformis coryniformis*	DSM 20001T	1965	Silage	2.71	42.86	*L. coryniformis*	FHE	AZCN00000000		x	x	x	x	x
Lactobacillus	*coryniformis torquens*	DSM 20004T	1965	Air of cow shed	2.78	42.94	*L. coryniformis*	FHE	AZDC00000000		x	x	x	x	x
Lactobacillus	*crispatus*	DSM 20584T	1953	Eye	2.06	36.59	*L. delbrueckii*	OHO	AZCW00000000		x	x	x	x	x
Lactobacillus	*crustorum*	JCM 15951T	2007	Wheat sourdough	2.22	35	*L. alimentarius*	OHO	AZDB00000000		x	x	x	x	x
Lactobacillus	*curieae*	JCM 18524T	2013	Stinkv tofu brine	2.10	39.8	*L. buchneri*	OHE	CP018906.1		x	x	x	x	x
Lactobacillus	*curtus*	JCM31185T	2017	Beer			*L. rossiae-L.silginis*	n.d.		LC093898					
Lactobacillus	*curvatus*	DSM 20019T	1903	Milk	1.82	41.97	*L. sakei*	FHE	AZDL00000000		x	x	x	x	x
Lactobacillus	*delbrueckii bulgaricus*	DSM 20081T	1919	Bulgarian yoghourt	1.76	49.91	*L. delbrueckii*	OHO	JQAV00000000		x	x	x	x	x
Lactobacillus	*delbrueckii delbrueckii*	DSM 20074T	1896	Sour grain mash	1.75	49.86	*L. delbrueckii*	OHO	AZCR00000000		x	x	x	x	x
Lactobacillus	*delbrueckii indicus*	DSM 15996T	2005	Traditional dairy fermented product (Dahi tvne)	1.88	49.54	*L. delbrueckii*	OHO	AZFL00000000		x	x	x	x	x
Lactobacillus	*delbrueckii jakobsenii*	DSM 26046T	2013	Dolo wort (Alcholic fermented beverage)	1.75	50.31	*L. delbrueckii*	OHO	JQCG00000000		x	x	x	x	x
Lactobacillus	*delbrueckii lactis*	DSM 20072T	1919	Emmental cheese	1.87	49.86	*L. delbrueckii*	OHO	AZDE00000000		x	x	x	x	x
Lactobacillus	*delbrueckii sunkii*	DSM 24966T	2012	Sunki, a Japanese traditional pickle			*L. delbrueckii*	OHO		AB641833			x		
Lactobacillus	*dextrinicus*	DSM 20335T	1964	Silage	1.81	38.05	*L. concavus-L. dextrinicus*	OHE	AYYK00000000		x	x	x	x	x
Lactobacillus	*diolivorans*	DSM 14421T	2002	Maize silage	3.27	40.01	*L. buchneri*	OHE	AZEY00000000		x	x	x	x	x
Lactobacillus	*equi*	DSM 15833T	2002	Faeces of horses	2.30	39.03	*L. salivarius*	OHO	AZFH00000000		x	x	x	x	x
Lactobacillus	*equicursoris*	DSM 19284T	2010	Healthy thoroughbred racehorse	2.05	47.71	*L. delbrueckii*	OHO	AZDU00000000		x	x	x	x	x
Lactobacillus	*equigenerosi*	DSM 18793T	2008	Faeces of thoroughbred horse	1.60	42.65	*L. reuteri-vaccinostercus*	OHE	AZGC00000000		x	x	x	x	x
Lactobacillus	*fabifermentans*	DSM 21115T	2009	Cocoa bean heap fermentation	3.28	45.03	*L. plantarum*	FHE	AYGX00000000		x	x	x	x	x
Lactobacillus	*faecis*	DSM 23956T	2013	Animal faeces			*L. salivarius*	OHO		AB812750			x		
Lactobacillus	*farciminis*	DSM 20184T	1970	Sausage	2.48	36.38	*L. alimentarius*	OHO	AZDR00000000		x	x	x	x	x
Lactobacillus	*farraginis*	DSM 18382T	2007	Composting material of distilled shochu residue	2.86	42.05	*L. buchneri*	FHE	AZFY00000000		x	x	x	x	x
Lactobacillus	*fermentum*	DSM 20055T	1901	Human saliva	1.90	52.42	*L. reuteri-vaccinostercus*	OHE	JQAU00000000		x	x	x	x	x
Lactobacillus	*floricola*	DSM 23037T	2011	Flower of Caltha palustris	1.29	34.53	*L. delbrueckii*	OHO	AYZL00000000		x	x	x	x	x
Lactobacillus	*florum*	DSM 22689T	2010	Peony (Paeonia suffruticosa)	1.35	41.14	*L. buchneri*	OHE	AYZI00000000		x	x	x	x	x
Lactobacillus	*formosensis*	NBRC 109509T	2015	Fermented soybean meal			*L. alimentarius*	OHO		AB794060.			x		
Lactobacillus	*fructivorans*	DSM 20203T	1934	N/A	1.37	38.88	*L. buchneri*	OHE	AZDS00000000		x	x	x	x	x
Lactobacillus	*frumenti*	DSM 13145T	2000	Rye-bran sourdough	1.73	42.55	*L. reuteri-vaccinostercus*	OHE	AZER00000000		x	x	x	x	x
Lactobacillus	*fuchuensis*	DSM 14340T	2002	Vacuum-packaged beef	2.12	41.78	*L. sakei*	FHE	AZEX00000000		x	x	x	x	x
Lactobacillus	*furfuricola*	DSM 27174T	2014	Rice bran paste			*L. alimentarius*	OHO		AB910349			x		
Lactobacillus	*futsaii*	JCM 17355T	2010	Fu-tsai, a traditional fermented mustard product	2.53	35.6	*L. alimentarius*	OHO	AZDO00000000		x	x	x	x	x
Lactobacillus	*gallinarum*	DSM 10532T	1992	Chicken cron	1.94	36.48	*L. delbrueckii*	OHO	AZEL00000000		x	x	x	x	x
Lactobacillus	*gasseri*	ATCC 33323T	1980	Human	1.89	35.26	*L. delbrueckii*	OHO	NC_008530		x	x	x	x	x
Lactobacillus	*gastricus*	DSM 16045T	2005	Gastric biopsies, Human stomach mucosa	1.85	41.64	*L. reuteri-vaccinostercus*	OHE	AZFN00000000		x	x	x	x	x
Lactobacillus	*ghanensis*	DSM 18630T	2007	Cocoa fermentation	2.61	37.09	*L. salivarius*	OHO	AZGB00000000		x	x	x	x	x
Lactobacillus	*gigeriorum*	DSM 23908T	2012	Chicken crop	1.91	36.9	*L. delbrueckii*	OHO	AYZO00000000		x	x	x	x	x
Lactobacillus	*ginsenosidimutans*	JCM 16719T	2013	Kimchi	2.59	36.7	*L. alimentarius*	OHO	CP012034.1		x	x	x	x	x
Lactobacillus	*gorillae*	DSM 28356T	2014	Faeces of captive and wild western lowland gorillas (*Gorilla gorilla gorilla*)			*L. reuteri-vaccinostercus*	FHE		AB904716			x		
Lactobacillus	*graminis*	JCM 16719T	1989	Grass silage	1.84	40.26	*L. sakei*	FHE	AYZB00000000		x	x	x	x	x
Lactobacillus	*hammesii*	DSM 16381T	2005	Wheat sourdough	2.82	49.38	*L. buchneri*	FHE	AZFS00000000		x	x	x	x	x
Lactobacillus	*hamsteri*	DSM 5661T	1988	Faeces of hamster	1.84	35.08	*L. delbrueckii*	FHE	AZGI00000000		x	x	x	x	x
Lactobacillus	*harbinensis*	DSM 16991T	2006	Chinese traditional fermented vegetable Suan cai	3.14	53.08	*L. perolens*	FHE	AZFW00000000		x	x	x	x	x
Lactobacillus	*hayakitensis*	DSM 18933T	2007	Faeces of thoroughbred horse	1.70	34.08	*L. salivarius*	OHO	AZGD00000000		x	x	x	x	x
Lactobacillus	*heilongjiangensis*	DSM 28069T	2013	Chinese pickle	2.79	37.5	*L. alimentarius*	OHO	CP012559.1		x	x	x	x	x
Lactobacillus	*helsingborgensis*	DSM 26265T	2014	Honey stomach of the honeybee *Apis mellifera*	2.02	36.4	*L. delbrueckii*	OHO	JXJR00000000.1		x	x	x	x	x
Lactobacillus	*helveticus*	CGMCC 1-1877T	1919	Emmental cheese	1.83	36.78	*L. delbrueckii*	OHO	AZEK00000000		x	x	x	x	x
Lactobacillus	*herbarum*	DSM 100358T	2015	Chinese fermented radish	2.90	43.5	*L. plantarum*	OHE	LFEE00000000.1		x		x	x	x
Lactobacillus	*hilgardii*	DSM 20176T	1936	Wine	2.60	39.58	*L. buchneri*	OHE	AZDF00000000		x	x	x	x	x
Lactobacillus	*hokkaidonensis*	DSM 26202T	2013	timothy grass (*Phleum pratense* L.) silaee	2.33	38.13	*L. reuteri-vaccinostercus*	OHE	JQCH00000000		x	x	x	x	x
Lactobacillus	*hominis*	DSM 23910T	2013	Human intestine	1.93	35.15	*L. delbrueckii*	OHO	AYZP00000000		x	x	x	x	x
Lactobacillus	*homohiochii*	DSM 20571T	1957	Spoiled sake	1.39	38.85	*L. buchneri*	FHE	JQBN00000000		x	x	x	x	x
Lactobacillus	*hordei*	DSM 19519T	2008	Malted barley	2.30	34.77	*L. salivarius*	OHO	AZDX00000000		x	x	x	x	x
Lactobacillus	*iners*	DSM 13335T	1999	Human urine	1.27	32.52	*L. delbrueckii*	OHO	AZET00000000		x	x	x	x	x
Lactobacillus	*ingluviei*	DSM 15946T	2003	Pigeon, crop	2.16	49.88	*L. reuteri-vaccinostercus*	OHE	AZFK00000000		x	x	x	x	x
Lactobacillus	*insicii*	DSM 29801T	2016	Pork salami			*L. alimentarius*	OHO		KP677494			x		

Lactobacillus	*intestinalis*	DSM 6629T	1974	Intestine of rat	2.01	35.37	*L. delbrueckii*	FHE	AZGN00000000		x	x	x	x	x
Lactobacillus	*iwatensis*	DSM 26942T	2013	Orchardgrass (*Dactylis glomerata* L.) silage			*L. coryniformis*	OHO		AB773428			x		
Lactobacillus	*ixorae*	LMG 29008T	2016	Flower (West-Indian jasmine)			*L. buchneri*	OHE		LC094494			x		
Lactobacillus	*jensenii*	DSM 20557T	1970	Human vaginal discharae	1.61	34.33	*L. delbrueckii*	FHE	AYYU00000000		x	x	x	x	x
Lactobacillus	*johnsonii*	ATCC 33200T	1992	Human blood	1.77	34.43	*L. delbrueckii*	OHO	AZCY00000000		x	x	x	x	x
Lactobacillus	*kalixensis*	DSM 16043T	2005	Gastric biopsies, Human stomach mucosa	2.08	36.1	*L. delbrueckii*	OHO	AZFM00000000		x	x	x	x	x
Lactobacillus	*kefiranofaciens kefiranofaciens*	DSM 5016T	1988	Kefir grains	2.26	37.22	*L. delbrueckii*	OHO	AZGG00000000		x	x	x	x	x
Lactobacillus	*kefiranofaciens kefirgranum*	DSM 10550T	1994	Kefir grains	2.10	37.48	*L. delbrueckii*	OHO	AZEM00000000		x	x	x	x	x
Lactobacillus	*kefiri*	DSM 20587T	1983	Kefir grains	2.23	41.66	*L. buchneri*	OHE	AYYV00000000		x	x	x	x	x
Lactobacillus	*kimbladii*	DSM 26263T	2014	Honey stomach of the honeybee *Apis mellifera*	2.19	36	*L. delbrueckii*	FHE	JXLH00000000.1		x	x	x	x	x
Lactobacillus	*kimchicus*	JCM 15530T	2008	Kimchi	2.59	46.59	*L. buchneri*	FHE	AZCX00000000		x	x	x	x	x
Lactobacillus	*kimchiensis*	DSM 24716T	2013	Kimchi	2.70	35.48	*L. alimentarius*	OHO	JQCF00000000		x	x	x	x	x
Lactobacillus	*kisonensis*	DSM 19906T	2009	Sunki, a Japanese traditional nickle	3.01	41.74	*L. buchneri*	OHE	AZEB00000000		x	x	x	x	x
Lactobacillus	*kitasatonis*	DSM 16761T	2003	Chicken intestine	1.91	37.51	*L. delbrueckii*	FHE	AZFU00000000		x	x	x	x	x
Lactobacillus	*koreensis*	JCM 16448T	2011	Cabbage kimchi	2.97	49.15	*L. buchneri*	OHE	AZDP00000000		x	x	x	x	x
Lactobacillus	*kullabergensis*	DSM 26262T	2014	Honey stomach of the honeybee *Apis mellifera*	2.12	35.8	*L. delbrueckii*	FHE	JXBY00000000.1		x	x	x	x	x
Lactobacillus	*kunkeei*	DSM 12361T	1998	Commerical grape wine	1.52	36.43	*L. buchneri*	OHE	AZCK00000000		x	x	x	x	x
Lactobacillus	*lindneri*	DSM 20690T	1901	Spoit beer	1.44	34.14	*L. buchneri*	OHE	JQBT00000000		x	x	x	x	x
Lactobacillus	*malefermentans*	DSM 5705T	1953	Sour beer	2.05	41.03	*L. buchneri*	OHE	AZGJ00000000		x	x	x	x	x
Lactobacillus	*mali*	DSM 20444T	1970	Apple juice from cider press	2.59	36.06	*L. salivarius*	OHO	AYYH00000000		x	x	x	x	x
Lactobacillus	*manihotivorans*	DSM 13343T	1998	Cassava sour starch fermentation	3.14	47.7	*L. casei*	OHO	AZEU00000000		x	x	x	x	x
Lactobacillus	*mellifer*	Bin4NT	2014	Honey stomach of the honeybee Apis mellifera	1.82	39.5	*L. alimentarius*	FHE	JXJQ00000000.1		x	x	x	x	x
Lactobacillus	*mellis*	DSM 26255T	2014	Honey stomach of the honeybee Apis mellifera	1.81	36.4	*L. alimentarius*	FHE	JXBZ00000000.1		x	x	x	x	x
Lactobacillus	*melliventris*	Hma8NT	2014	Honey stomach of the honeybee Apis mellifera	2.12	35.9	*L. delbrueckii*	FHE	JXLI00000000.1		x	x	x	x	x
Lactobacillus	*mindensis*	DSM 14500T	2003	Sourdough	2.34	38.21	*L. alimentarius*	OHO	AZEZ00000000		x	x	x	x	x
Lactobacillus	*mixtipabuli*	DSM 28580T	2015	Silage			*L. buchneri*	OHE		AB894863			x		
Lactobacillus	*modestisalitolerans*	NBRC 107235T	2015	Traditional fermented foods			*L. plantarum*	OHO		AB907192			x		
Lactobacillus	*mucosae*	DSM 13345T	2000	Pig small intestine	2.25	46.4	*L. reuteri-vaccinostercus*	OHE	AZEQ00000000		x	x	x	x	x
Lactobacillus	*mudanjiangensis*	LMG 27194T	2013	Chinese traditional nickle and sourdouah			*L. plantarum*	OHO		HF679037			x		
Lactobacillus	*murinus*	DSM 20452T	1982	Intestine of rat	2.20	40.05	*L. salivarius*	FHE	AYYN00000000		x	x	x	x	x
Lactobacillus	*musae*	NBRC 112868T	2017	Banana fruits			*L. alimentarius*	OHO		LC184607			x		
Lactobacillus	*nageli*	DSM 13675T	2000	Partially fermented wine	2.50	36.69	*L. salivarius*	OHO	AZEV00000000		x	x	x	x	x
Lactobacillus	*namurensis*	DSM 19117T	2007	Sourdough	2.48	51.99	*L. buchneri*	OHE	AZDT00000000		x	x	x	x	x
Lactobacillus	*nantensis*	DSM 16982T	2006	Wheat sourdough	2.91	36.18	*L. alimentarius*	FHE	AZFV00000000		x	x	x	x	x
Lactobacillus	*nasuensis*	JCM 17158T	2012	Sudangrass silage sample	2.28	57.02	*L. casei*	OHO	AZDJ00000000		x	x	x	x	x
Lactobacillus	*nenjiangensis*	LMG 27192T	2013	Chinese traditional nickle and sourdouah			*L. reuteri-vaccinostercus*	OHE		HF679039			x		
Lactobacillus	*nodensis*	DSM 19682T	2009	Japanese pickles	2.68	37.57	*L. alimentarius*	FHE	AZDZ00000000		x	x	x	x	x
Lactobacillus	*odoratitofui*	DSM 19909T	2010	Fermented brine used for stinky tofu production	2.76	44.25	*L. buchneri*	OHE	AZEE00000000		x	x	x	x	x
Lactobacillus	*oeni*	DSM 19972T	2009	Bobal wine	2.12	37.33	*L. salivarius*	OHO	AZEH00000000		x	x	x	x	x
Lactobacillus	*oligofermentans*	DSM 15707T	2005	Broiler leg	1.83	35.57	*L. reuteri-vaccinostercus*	OHE	AZFE00000000		x	x	x	x	x
Lactobacillus	*oris*	DSM 4864T	1988	Human saliva	2.03	49.98	*L. reuteri-vaccinostercus*	OHE	AZGE00000000		x	x	x	x	x
Lactobacillus	*oryzae*	JCM 18671T	2013	Fermented rice grain (*Oryza sativa* L. subsp. *japonica*)	1.85	42.8	*L. buchneri*	OHE	BBJM00000000.1		x	x	x	x	x
Lactobacillus	*otakiensis*	DSM 19908T	2009	Sunki, a Japanese traditional pickle	2.35	42.39	*L. buchneri*	OHE	AZED00000000		x	x	x	x	x
Lactobacillus	*ozensis*	DSM 23829T	2011	(*Chrysanthemum* , Oze National Park	1.48	31.93	*L. buchneri*	OHE	AYYQ00000000		x	x	x	x	x
Lactobacillus	*panis*	DSM 6035T	1996	Sourdough	2.01	48.05	*L. reuteri-vaccinostercus*	OHE	AZGM00000000		x	x	x	x	x
Lactobacillus	*pantheris*	DSM 15945T	2002	Jaguar faeces	2.55	52.9	*L. casei*	OHO	AZFJ00000000		x	x	x	x	x
Lactobacillus	*parabrevis*	ATCC 53295T	2006	Cheese	2.61	49.05	*L. buchneri*	OHE	AZCZ00000000		x	x	x	x	x
Lactobacillus	*parabuchneri*	DSM 15352T	1989	Blast ethol distillery	2.61	43.47	*L. buchneri*	OHE	JQBJ00000000		x	x	x	x	x
Lactobacillus	*paracasei paracasei*	DSM 5622T	1989	N/A	2.88	46.5	*L. casei*	FHE	AZGH00000000		x	x	x	x	x
Lactobacillus	*paracasei tolerans*	DSM 20258T	1965	Pasteurized milk	2.38	46.42	*L. casei*	FHE	AYYJ00000000		x	x	x	x	x
Lactobacillus	*paracollinoides*	DSM 15502T	2004	Brewery environment	3.49	46.84	*L. buchneri*	OHE	AZFD00000000		x	x	x	x	x
Lactobacillus	*parafarraginis*	DSM 18390T	2007	Composting material of distilled shochun residue	3.08	45.23	*L. buchneri*	FHE	AZFZ00000000		x	x	x	x	x
Lactobacillus	*parakefiri*	DSM 10551T	1994	Kefir grain	4.91	42.59	*L. buchneri*	OHE	AZEN00000000		x	x	x	x	x
Lactobacillus	*paralimentarius*	DSM 13238T	1999	Sourdough	2.55	35.1	*L. alimentarius*	FHE	AZES00000000		x	x	x	x	x
Lactobacillus	*paraplantarum*	DSM 10667T	1996	Beer contaminant	3.40	43.69	*L. plantarum*	FHE	AZEC00000000		x	x	x	x	x
Lactobacillus	*pasteurii*	DSM 23907T	2013	N/A	1.87	38.51	*L. delbrueckii*	FHE	AYZN00000000		x	x	x	x	x
Lactobacillus	*paucivorans*	DSM 22467T	2010	Yeast storage tank containing lager beer	2.37	49.06	*L. buchneri*	FHE	JQCA00000000		x	x	x	x	x
Lactobacillus	*pentosiphilus*	DSM 102974T	2017	Silage			*L. buchneri*	n.d.		LC085284			x		
Lactobacillus	*pentosus*	DSM 20314T	1921	N/A	3.65	46.31	*L. plantarum*	FHE	AZCU00000000		x	x	x	x	x
Lactobacillus	*perolens*	DSM 12744T	2000	Orange lemonade	3.31	49.08	*L. perolens*	FHE	AZEC00000000		x	x	x	x	x
Lactobacillus	*plajomi*	NBRC 107333T	2015	Traditional fermented foods			*L. plantarum*	FHE		AB907190			x		
Lactobacillus	*plantarum plantaurm*	CGMCC 1-2437T	1919	Pickled cabbage	3.21	44.48	*L. plantarum*	FHE	AZEJ00000000		x	x	x	x	x
Lactobacillus	*plantarum argentoratensis*	DSM 16365T	2005	Fermented cassava roots (fufu)	3.20	45	*L. plantarum*	FHE	AZFR00000000		x	x	x	x	x
Lactobacillus	*plantarum plantarum*	DSM 13273T	1919	Jojoba meal fermentation	3.45	44.24	*L. plantarum*	FHE	JQAW00000000		x	x	x	x	x
Lactobacillus	*pobuzihii*	KCTC 13174T	2010	Pobuzih (fermented cumningeordia), *Cordia dichotoma*	2.35	37.72	*L. salivarius*	FHE	JQCN00000000		x	x	x	x	x
Lactobacillus	*pontis*	DSM 8475T	1994	Rye sourdough	1.67	53.43	*L. reuteri-vaccinostercus*	OHE	AZGO00000000		x	x	x	x	x
Lactobacillus	*porcinae*	LMG 26767T	2013	Traditional Vietnamese nem chua			*L. casei*	FHE		HE616585			x		
Lactobacillus	*psittaci*	DSM 15354T	2001	Lung of parrott	1.54	35.64	*L. delbrueckii*	OHE	AZFB00000000		x	x	x	x	x
Lactobacillus	*rapi*	DSM 19907T	2009	Sunki, a Japanese traditional pickle	2.86	42.95	*L. buchneri*	OHE	AZEI00000000		x	x	x	x	x
Lactobacillus	*rennini*	DSM 20253T	2006	Rennin	2.27	40.67	*L. coryniformis*	FHE	AYYJ00000000		x	x	x	x	x
Lactobacillus	*reuteri*	DSM 20016T	1982	Intestine of adult	1.94	38.63	*L. reuteri-vaccinostercus*	OHE	AZFD00000000		x	x	x	x	x
Lactobacillus	*rhamnosus*	DSM 20021T	1968	N/A	2.95	46.68	*L. casei*	FHE	AZCQ00000000		x	x	x	x	x
Lactobacillus	*rodentium*	DSM 24759T	2014	Digestive tract of wild rodents			*L. delbrueckii*	OHO		HQ851022			x		
Lactobacillus	*rossiae*	DSM 15814T	2005	Wheat sourdough	2.87	43.34	*L. rossiae-L.siliginis*	OHE	AZFF00000000		x	x	x	x	x
Lactobacillus	*ruminis*	DSM 20403T	1973	Bovine rumen	2.01	43.39	*L. salivarius*	OHO	AYYL00000000		x	x	x	x	x
Lactobacillus	*saerimneri*	DSM 16049T	2004	Pig faeces	1.69	42.57	*L. salivarius*	OHO	AZFP00000000		x	x	x	x	x
Lactobacillus	*sakei carnosus*	DSM 15831T	1996	Fermented meat product	1.99	41.02	*L. sakei*	FHE	AZFG00000000		x	x	x	x	x
Lactobacillus	*sakei sakei*	DSM 20017T	1934	"Moto" starter of sake	1.91	41.07	*L. sakei*	FHE	AZDN00000000		x	x	x	x	x
Lactobacillus	*salivarius*	DSM 20555T	1953	Saliva	1.98	32.5	*L. salivarius*	FHE	AYYT00000000		x	x	x	x	x
Lactobacillus	*sanfranciscensis*	DSM 20451T	1971	Sourdough	1.23	34.7	*L. buchneri*	OHE	AYYM00000000		x	x	x	x	x
Lactobacillus	*saniviri*	DSM 24301T	2012	Faeces of a Japanese healthy adult male	2.44	47.73	*L. casei*	FHE	JQCE00000000		x	x	x	x	x
Lactobacillus	*satsumensis*	DSM 16230T	2005	Shochu mash	2.65	39.94	*L. salivarius*	OHO	AZFQ00000000		x	x	x	x	x
Lactobacillus	*secaliphilus*	DSM 17896T	2007	Sourdough	1.65	47.71	*L. reuteri-vaccinostercus*	FHE	JQBW00000000		x	x	x	x	x
Lactobacillus	*selangorensis*	DSM 13344T	2000	Chili bo	2.09	46.45		OHO	JQAZ00000000		x	x	x	x	x
Lactobacillus	*senioris*	DSM 24302T	2012	Faeces of a healthy 100-year-old Japanese female	1.57	39.09	*L. buchneri*	OHE	AYZR00000000		x	x	x	x	x
Lactobacillus	*senmaizukei*	DSM 21775T	2008	Senmaizuke, a Japanese pickle	2.22	48.64	*L. buchneri*	FHE	AYZH00000000		x	x	x	x	x
Lactobacillus	*sharpeae*	DSM 20505T	1982	Municipal sewage	2.45	53.38	*L. casei*	OHO	AYYO00000000		x	x	x	x	x
Lactobacillus	*shenzhenensis*	KACC 16878T	2013	Fermented dairy beverage	3.27	56.3	*L. perolens*	OHE	AVAA00000000.1		x	x	x	x	x
Lactobacillus	*sicerae*	CECT 8227T	2014	Spanish natural cider			*L. salivarius*	OHO		HG794492			x		
Lactobacillus	*silagei*	DSM 27022T	2013	Silage			*L. buchneri*	OHE		AB786910			x		
Lactobacillus	*silagincola*	DSM 102973	2017	Silage			*L. buchneri*	n.d.		LC085283			x		
Lactobacillus	*siliginis*	DSM 22696T	2006	Wheat sourdough	2.07	44.08	*L. rossiae-L.siliginis*	OHE	JQCB00000000		x	x	x	x	x
Lactobacillus	*similis*	DSM 23365T	2010	Fermented cane molasses at alcohol plants	3.49	46.99	*L. buchneri*	OHE	AYZM00000000		x	x	x	x	x
Lactobacillus	*songhuajiangensis*	LMG 27191T	2013	Chinese traditional nickle and sourdouah			*L. casei*	OHO		HF679038			x		
Lactobacillus	*spicheri*	DSM 15429T	2004	Rice sourdough	2.75	55.91	*L. buchneri*	FHE	AZFC00000000		x	x	x	x	x
Lactobacillus	*sucicola*	DSM 21376T	2009	Sap of an Oak tree	2.46	38.48	*L. salivarius*	OHO	AYZF00000000		x	x	x	x	x
Lactobacillus	*suebicus*	DSM 5007T	1989	Apple mash	2.65	38.98	*L. reuteri-vaccinostercus*	OHE	AZGF00000000		x	x	x	x	x
Lactobacillus	*sunkii*	DSM 19904T	2009	Sunki, a Japanese traditional pickle	2.69	42.06	*L. buchneri*	OHE	AZEA00000000		x	x	x	x	x
Lactobacillus	*taiwanensis*	DSM 21401T	2009	Silage cattle feed	1.88	33.97	*L. delbrueckii*	OHO	AYZG00000000		x	x	x	x	x
Lactobacillus	*timonensis*	Marseille P3825T	2017	Human gut			*L. reuteri-vaccinostercus*			LT838231			x		
Lactobacillus	*thailandensis*	DSM 22698T	2007	Fermented tea leaves (miane)	2.06	53.5	*L. casei*	OHO	AYZK00000000		x	x	x	x	x
Lactobacillus	*tucceti*	DSM 20183T	2009	Sausage	2.17	34.07	*L. alimentarius*	OHO	AZDG00000000		x	x	x	x	x
Lactobacillus	*ultunensis*	DSM 16047T	2005	Gastric biopsies, Human stomach mucosa	2.16	35.95	*L. delbrueckii*	OHO	AZFO00000000		x	x	x	x	x
Lactobacillus	*uvarum*	DSM 19971T	2009	Must of Bobal grape variety	2.69	36.88	*L. salivarius*	OHO	AZEG00000000		x	x	x	x	x
Lactobacillus	*vaccinostercus*	DSM 20634T	1983	Cow dung	2.57	43.48	*L. reuteri-vaccinostercus*	OHE	AYYY00000000		x	x	x	x	x
Lactobacillus	*vaginalis*	DSM 5837T	1989	Vaginal swab	1.79	40.46	*L. reuteri-vaccinostercus*	OHE	AZGL00000000		x	x	x	x	x
Lactobacillus	*versmoldensis*	DSM 14857T	2003	Poultry salami	2.37	38.27	*L. alimentarius*	OHO	AZFA00000000		x	x	x	x	x
Lactobacillus	*vespulae*	JCM 19742T	2015	Gut of a queen wasp			*L. buchneri*	OHE		JX863367			x		
Lactobacillus	*vini*	DSM 20605T	2006	Must of grape	2.24	37.54	*L. salivarius*	FHE	AYYX00000000		x	x	x	x	x
Lactobacillus	*wasatchensis*	DSM 29958T	2016	Aged Cheddar cheese	1.90	39.8	*L. reuteri-vaccinostercus*	OHE	AWTT00000000.1		x	x	x	x	x
Lactobacillus	*xiangfangensis*	DSM 26013T	2012	Chinese nickle	2.99	45.1	*L. plantarum*	FHE	JQCL00000000.1		x	x	x	x	x
Lactobacillus	*yonginensis*	JCM 18023T	2013	Kimchi			*L. buchneri*	FHE		JN128640			x		
Lactobacillus	*zeae*	DSM 20178T	1959	Corn steep liquor	3.12	47.74	*L. casei*	FHE	AZCT00000000		x	x	x	x	x
Lactobacillus	*zymae*	DSM 19395T	2005	Artisanal wheat sourdough	2.71	53.57	*L. buchneri*	OHE	AZDW00000000		x	x	x	x	x
Lactococcus	*lactis*	LMG 7760T	1873	Anchu mash	2.25	35.02			JQCM00000000		x	x	x	x	x
Leuconostoc	*argentinum_lactis*	KCTC 3773	1993	Raw milk	1.72	42.89	Leuconostocaceae		AEGQ00000000		x	x	x	x	x

Leuconostoc	*carnosum*	JB16	1989	Kimchi	1.77	37.13	Leuconostocaceae	CP003851 - CP003853		x	x	x	x	x
Leuconostoc	*citreum*	KM20	2008	Kimchi	1.90	38.87	Leuconostocaceae	DQ489736 - DQ489740		x	x	x	x	x
Leuconostoc	*fallax*	KCTC 3537T	1992	Sauerkraut	1.64	37.53	Leuconostocaceae	AEIZ00000000		x	x	x	x	x
Leuconostoc	*gelidum aenigmaticum*	DSM 19375T	2014	Packaged meat			Leuconostocaceae		KF577569					
Leuconostoc	*gelidum gasicomitatum*	LMG 18811T	2001	Tomato-marinated broiler meat strips	1.95	36.66	Leuconostocaceae	FN822744		x	x	x	x	x
Leuconostoc	*gelidum gelidum*	KCTC 3527	1989	Vacuum packaged beef	1.96	36.6	Leuconostocaceae	AEMI00000000		x	x	x	x	x
Leuconostoc	*holzapfelii*	LMG 23990T	2007	Ethopian coffee fermentation			Leuconostocaceae		AM600682			x		
Leuconostoc	*inhae*	DSM 15101T	2003	Kimchi			Leuconostocaceae		AF439560			x		
Leuconostoc	*kimchii*	IMNSU 11154T	2000	Kimchi	2.10	37.91	Leuconostocaceae	CP001753 - CP001758		x	x	x	x	x
Leuconostoc	*mesenteroides cremoris*	ATCC 19254T	1929	Hansen's dried starter powder	1.74	37.9	Leuconostocaceae	C2KK01		x	x	x	x	x
Leuconostoc	*mesenteroides dextranicum*	ATCC 19255	1912	N/A	1.85	38.04	Leuconostocaceae	CP012009.1		x	x	x	x	x
Leuconostoc	*mesenteroides jonggajibkimchii*	JCM 31787T	2017	Kimchi			Leuconostocaceae		CP014611					
Leuconostoc	*mesenteroides mesenteroides*	ATCC 8293T	1878	Fermenting olives	2.08	37.67	Leuconostocaceae	NC_008496, NC_008531		x	x	x	x	x
Leuconostoc	*miyukkimchii*	JCM 17445T	2012	Brown algae (*Undaria pinnatifida*)			Leuconostocaceae		HQ263024			x		
Leuconostoc	*palmae*	DSM 21144T	2009	Palm wine			Leuconostocaceae		AM940225			x		
Leuconostoc	*pseudomesenteroides*	4882	N/A	N/A	2.01	39.06	Leuconostocaceae	CAKV00000000		x	x	x	x	x
Leuconostoc	*rapi*	DSM 27776T	2015	Turnip-like vegetable			Leuconostocaceae		HG515542			x		
Leuconostoc	*suionicum*	DSM 20241T	2012	Sweden			Leuconostocaceae		HM443957			x		
Oenococcus	*alcoholitolerans*	LMG 27599T	2015	Cachaça and ethanol fermentation processes			Leuconostocaceae		HQ009794			x		
Oenococcus	*kitaharae*	DSM 17330T	2006	Distilled residue of shochu mashes	1.84	42.68	Leuconostocaceae	AFVZ00000000		x	x	x	x	x
Oenococcus	*oeni*	PSU-1	1972	Spontaneous malolactic fermentation	19.10	37.9	Leuconostocaceae	CP000411.1		x	x	x	x	x
Olsenella	*uli*	DSM 7084T	1991	Human gingival crevice	2.06	64.69		JQCO00000000		x	x	x	x	x
Pediococcus	*acidilactici*	AS1.2696	N/A	N/A	1.93	42.13		JQAQ00000000		x	x	x	x	x
Pediococcus	*argentinicus*	DSM 23026T	2008	Fermented wheat flour	1.76	36.67		JQCQ00000000		x	x	x	x	x
Pediococcus	*cellicola*	DSM 17757T	2005	Distilled pirit-fermentine cellar	2.04	39.04		JQBR00000000		x	x	x	x	x
Pediococcus	*claussenii*	DSM 14800T	2002	Spoiled beer	1.88	36.74		JQBB00000000		x	x	x	x	x
Pediococcus	*damnosus*	DSM 20331T	1903	Lauer beer yeast	2.19	38.23		JQBD00000000		x	x	x	x	x
Pediococcus	*ethanolidurans*	DSM 22301T	2006	Walls of a distilled-spirit-fermenting cellar	2.26	37.18		JQBY00000000		x	x	x	x	x
Pediococcus	*inopinatus*	DSM 20285T	1988	Brewery yeast	2.11	38.61		JQBC00000000		x	x	x	x	x
Pediococcus	*lolii*	DSM 19927T	1887	Ryegrass silage	2.04	42.13		JQCC00000000		x	x	x	x	x
Pediococcus	*parvulus*	DSM 20332T	1961	Silage	3.99	40.38		JQBE00000000		x	x	x	x	x
Pediococcus	*pentosaceus*	DSM 20336T	1934	Dried American beer yeast	1.74	37.25		JQBF00000000		x	x	x	x	x
Pediococcus	*stilesii*	DSM 18001T	2006	White maize grains	1.84	38.11		JQBX00000000		x	x	x	x	x
Weissella	*beninensis*	DSM 22752T	2010	Cassava fermentations			Leuconostocaceae		EU439435			x		
Weissella	*bombi*	DSM 28794T	2015	Bumble bee gut			Leuconostocaceae		LK054487			x		
Weissella	*ceti*	NC36	2014	Farmed rainbow trout	1.35	40.8	Leuconostocaceae	ANCA00000000.1		x	x	x	x	x
Weissella	*cibaria*	LMG 17699T	2002	Food and clinical samples	2.32	45.1	Leuconostocaceae	AEKT01000001		x	x	x	x	x
Weissella	*confusa*	DSM 20196T	1969	Sugar cane	2.22	44.73	Leuconostocaceae	JQAY00000000		x	x	x	x	x
Weissella	*diestrammenae*	JCM 18559T	2013	Gut of a camel cricket (*Diestrammena coreana*)			Leuconostocaceae		JQ646523			x		
Weissella	*fabalis*	LMG 26217T	2013	Cocoa bean fermentations			Leuconostocaceae		HE576795			x		
Weissella	*fabaria*	DSM 21416T	2010	Ghanaian cocoa fermentation			Leuconostocaceae		FM179678			x		
Weissella	*ghanensis*	DSM 19935T	2008	Ghanaian cocoa fermentation			Leuconostocaceae		AM882997			x		
Weissella	*halotolerans*	DSM 20190T	1983	Sausage	1.37	43.06	Leuconostocaceae	JQAX00000000		x	x	x	x	x
Weissella	*hellenica*	DSM 7378T	1994	Fermented sausages	1.82	36.9	Leuconostocaceae	NZ_FMAW00000000		x	x	x	x	x
Weissella	*jogaejeotgali*	JCM 30589T	2015	Jogae jeotgal, Korean fermented food			Leuconostocaceae		KP027016			x		
Weissella	*kandleri*	DSM 20593T	1983	Desert spring	1.33	39.67	Leuconostocaceae	JQBP00000000		x	x	x	x	x
Weissella	*koreensis*	JCM 11263T	2002	Kimchi	1.73	35.5	Leuconostocaceae	AKGG00000000.1		x	x	x	x	x
Weissella	*minor*	DSM 20014T	1983	Milking machine slime	1.77	39.29	Leuconostocaceae	JQCD00000000		x	x	x	x	x
Weissella	*oryzae*	JCM 1819T	2013	Fermented rice grains	2.13	38.9	Leuconostocaceae			x	x	x	x	x
Weissella	*paramesenteroides*	DSM 20288T	1993	Fermented sausages	1.98	38	Leuconostocaceae	ACKU00000000.1		x	x	x	x	x
Weissella	*soli*	DSM 14420T	2002	Soil			Leuconostocaceae		AY028260			x		
Weissella	*thailandensis*	Fsh4-2	2000	Korean fermented seafood	1.97	40	Leuconostocaceae	HE575133-HE575182		x		x	x	x
Weissella	*uvarum*	DSM 28060T	2014	Wine grapes			Leuconostocaceae		KF999666			x		
Weissella	*viridescens*	DSM 20410T	1957	Cured meat products	1.54	41.09	Leuconostocaceae	JQBM00000000		x	x	x	x	x

Table S2

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

Genes MLST

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

Genes rMLST

Gene	*L. salivarius* UCC118 locus tag*	COG	Annotation	Co-ordinates*	Length*
rpsA	LSL_0887	COG0539J	SSU ribosomal protein S1P	910977..912024	1048
rpsB	LSL_0511	COG0052J	SSU ribosomal protein S2P	557234..558031	798
rpsC	LSL_1429	COG0092J	SSU ribosomal protein S3P	1492402..1493058	657
rpsD	LSL_1077	COG0522J	SSU ribosomal protein S4P	1101963..1102562	600
rpsE	LSL_1418	COG0098J	SSU ribosomal protein S5P	1488030..1488530	501
rpsF	LSL_0007	COG0360J	SSU ribosomal protein S6P	9217..9507	291
rpsG	LSL_0201	COG0049J	SSU ribosomal protein S7P	243812..244282	471
rpsH	LSL_1421	COG0096J	SSU ribosomal protein S8P	1489522..1489920	399
rpsI	LSL_1402	COG0103J	SSU ribosomal protein S9P	1477906..1478297	392
rpsL	LSL_0200	COG0048J	SSU ribosomal protein S12P	243364..243777	414
rpsM	LSL_1411	COG0099J	SSU ribosomal protein S13P	1484365..1484696	332
rpsO	LSL_0638	COG0184J	SSU ribosomal protein S15P	681490..681759	269
rplA	LSL_1239	COG0081J	LSU ribosomal protein L1P	1272210..1272751	542
rplB	LSL_1432	COG0090J	LSU ribosomal protein L2P	1493784..1494599	816
rplC	LSL_1435	COG0087J	LSU ribosomal protein L3P	1495557..1496180	624
rplD	LSL_1434	COG0088J	LSU ribosomal protein L4P	1494909..1495532	624
rplE	LSL_1423	COG0094J	LSU ribosomal protein L5P	1490153..1490695	543
rplF	LSL_1420	COG0097J	LSU ribosomal protein L6P	1488953..1489489	537
rplL	LSL_1237	COG0222J	LSU ribosomal protein L12P	1270893..1271206	314
rplI	LSL_1727	COG0359J	LSU ribosomal protein L9P	1809124..1809573	450
rplJ	LSL_1238	COG0244J	LSU ribosomal protein L10P	1271311..1271814	504
rplK	LSL_1240	COG0080J	LSU ribosomal protein L11P	1272873..1273279	407
rplM	LSL_1403	COG0102J	LSU ribosomal protein L13P	1478312..1478755	444
rplN	LSL_1425	COG0093J	LSU ribosomal protein L14P	1491066..1491428	363
rplO	LSL_1416	COG0200J	LSU ribosomal protein L15P	1487364..1487798	435
rplQ	LSL_1408	COG0203J	LSU ribosomal protein L17P	1482490..1482849	360
rplT	LSL_0497	COG0292J	LSU ribosomal protein L20P	546770..547101	332
rplW	LSL_1433	COG0089J	LSU ribosomal protein L23P	1494625..1494909	285
rplX	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
MKRIGIMTSGGDAPGMNVAIRAVARKAISSGLEAYGINYGFAGLVAGDIHEFKATDLDDM
VSQGGTMLYSARYPEFAQEESQLKGIEQLKKFGIDALVVIGGDGSYHGALRLTEHGYNTI
GLPGTIDNDIPFTDFTIGFDTALNTAVDAIDKVRDTAKSHQRVFAVQVMGRHAADIALWA
GVASGADAVIAPGFDYDVEAIANKLKRNRANGKDYGIIVIAEGDANSEAAPEFIKKLKQY
GDFDARATVIGHVQRGGVPSAKDRVLASKMGAYAVELLLEGKGGLAVGILDNKVQAHDIT
DLFDAKHQADDSLYQLSEDLSF
>QTS_494
MEYTEIMVRYGELSTKGKNRKDFIARLGGNIRKSLKDFEQVVVHPNRDRTHVTLNGASSA
AVIARLKRVFGIQNLSPMLKVEKSMEAVQEGALAMMKEQLKPQMTFKINTRRSDKDFPIN
TDTMNRELGGFILENFPESQVKMKNPDITLRVEIRSNGIFLTSEVINGAGGLPVGTAGKG
MMMLSGGIDSPVAAYLGMKRGVEMEMVHFFSPPYTSEQALAKAKELSGKLAAYSGNVQFL
QVPFAEIQETIKEKCPEGYLMTIQRRMMLRLTVALAQKRGGLAIFNGESLGQVASQTMES
MMAINDVTTMPIIRPVVSMDKNEIIEIAKEIDTYDLSIMPFEDCCTIFAPPAPKTRPDLE
KARYYESKIDVEGLMKRALDGVQVTNIHAGEEFLNQNEEVFAELL
>QTS_497
MTDNSKTRVVVGMSGGVDSSVVAYLLKKQGYDVVGVFMKNWDDTDENGYCTATEDYKDVA
KVAAKIGIPYYSVNFEKEYWDRVFTYFLDEYKKGRTPNPDVICNNEIKFKAFLDYAISLG
ADYVATGHYAQVERDENGHQHLLRATDSNKDQTYFLSQLSAEQLDRVMFPLGGMVKPEVR
AIAKEAGLAVYDKKDSVGICFIGEKNFREFLSNYLPAKPGKMMTLDGEVKGEHAGLMYYT
IGQRRGLGIGGGSKNNEPWFVVGKDLSKNILYVGQGFDNPHLYAASLDASDMHFVNRLGE
ERGHDFRCTAKFRYRAKDVPVTVHFSDDFSKVTVDFDEPARAITPGQALVLYDGEECIGG
GIIDAAYSESKQQLQYV
>QTS_502
MKCPHCGNNGSRVVDSRPTDEGRVIRRRRECEDCGFRFTTFERVEATPLLVIKKNGSREE
FDRDKILKGIVRAAEKRPVKMEQMTDIVDKVENKIRSLGESEVSSQVIGEYVMNILVDLD
EIAYIRFASVYRQFKDMNVFLNELQDMVKKDEEEKDHK
>QTS_509
MLEVKQYDGRDYDVIVVGAGHAGSEAALAAARMGNKTLLMTINLDMVAFMPCNPSIGGPA
KGIVVREIDALGGEMGRNIDKTYVQMRMLNTGKGPAVRALRAQADKHAYHAEMKKTIEAE
PNLTLRQGIVDDLIVEDGVCKGVITNTGARYHAKSVVLTLGTAARGKIIIGELQYSSGPN
NSQAALELTKNLTEKYHFELERFKTGTPPRVDGGTIHYAETEEQPGDEEPNHFSFQTPDS
KYLELKNQLSCWLTYTNEKTHEIIRENLSRAPMFSGVIEGVGPRYCPSIEDKIVRFADKD
RHQLFLEPEGRKTDEWYVQGLSTSMPEEVQQQILHSIKGLEDAEMMRPGYAIEYDVVAPY
QLKNTLETKLIKNLYTAGQTNGTSGYEEAAGQGLIAGINAGRRALGQEPFTLKRSDAYIG
VMIDDLVTKGTKEPYRLLTSRAEYRLILRHDNADLRLTEMGHDLGLVSEEEYAAFLQKKA
DIQDELHRLEQIRIKPGQVKEFLESKGSHGLKDGVLAAEFLRRPEVTYADLLKFIPASEK
QLDRRVVEQVEIEIKYAGYIKKAQERVDRLKKMEAKVIPDRIDYNAISGLATEGRQKLEK
IRPTTIAQASRISGVTPADIAILSVYIQQGKIAKI
>QTS_514
VEKKDLFDQITEVTHNAEDLLNKLHETQSAMVEIMEENAELKIENQHLRERLKQATAAEH
ENEGTKNTKHGLSKSLQNLEKLYASGYHICNEFFGKHRQDDEECAFCLTVIYGDR
>QTS_569
MKKYRINSGVNLVILPTTQFKTLHIAVDFVAPALTSNISARSLLSYLMAVSARRYPTQQD
VAQKTIDLYGAQYQTDVYRFGQTHHLRVTMQLPAPDYVSDGSNLLVSAFDFLKDMMFDPL
VGEQKFDDDVFAKEKQSLINELESISDDKSRYAISQLRNITYDVPNLQSSSAGDIDLVKN
LTSESVYTTYKNMITNDLVNIVVLGDVNDSEVASLVSGWSVPARRLPFLQPFYRQALRPA
TVEKEKHLQDINQAMLTLAMHLDVPPLDKQRFAAMVMNALLGGSPLSKLFMNVREKASLA
YSIYSKWQYDTGFLLIAAGLDADKVAQTEKMIHQEILAMQNGDFDEKVVASIKKSLINDY
LSQQDSPNSQIEIAFSRLLTGSETSEFEWIKQVQAVTSNDIALVAQKLQIQSRFILLPKE
>QTS_898
MQNVVLKGHKNGYVIAIRADSKFEDVLAEVTTLFADLQKDKKRDSAQPISFNITTGTRLL
SAEEKKKIEDVVSNYPLFSIHKFTSDVMLVQDAIEMVESKVVHLNANTVRNGQIEYIKGD
VLFIGNLHRGGILRATGNVFLLGNCEGIIHAGYLSDAQAIIAGNVSKAQQVRIADVVDII
SDDEEKMARDSEVVVYVNDLHALDYTERDQVKVIRPKLFAHMGGY
>QTS_1754
MDKFLTMNDLQEMTLKEIYNLAREYKISYYSQMNKKELSLAVLRAQAKKQSFVEMEGVLD
IIGNEGYGFLRPINYGSSQEDIYISASQITRFGLRNGDLVGGEARHPRPGERYYGLMRVT

SVNNKDPEEAKQRPHFPALTPIYPNQQLTLATTPDVLSTRLVDLFAPIGFGQRGLVVAPP
KAGKTTLLKAIANGISKNHPNAKLIVLLIDERPEEVTDLERSIDGEVVYSTFDQEPRNHT
RVSELVLQRAMRLVEDKQDVVILLDSITRLTRAYNLVTAPSGRTLSGGVDPASFYKPKKF
FGAARNIEEGGSLTIIGTALVDTGSRMDDVIYEEFKGTGNSELVLSRNLAERRVFPALDI
RQSGTRKEELMISRDVLEQLWNIRRSMRGDALEYTEQILQLMKNTKNNDEFIANLKNLNF
GKKS
>QTS_2490
LTEDKKNTEETQEKEEFEVFMPEANRVEMPATEFKEQPDYLKTFANFYISKFDESDLEIM
DVYDGNHDVIEINTYLTNNMAFSRQNLVKHVLNIHANRFLDMLNNIQKQTGVDPQNMKTY
EDWEKWYTDRRNEIKQTLS
>QTS_2524
MSHASQDNFLLLAKEAKKHNDLPQAKQYLLEALRLGHDSDIVCELCEIYLSQEKGDQAYS
LIKEEPDLFSNQRVYNTYLKILAFQHYAIEAAELEHLLQKKLPVKIEPVSQIKQLEIMRN
FKQLKYIQEKDYLLLYCLSTENFTNLAKSILIDPSPNFALRLSLCEDLIKLGYSEKVQVY
ILGELKDFIPKETDLLEKSLIYREVCVSLADYFRQDPSKLPIMIGEMNVCLGMLYPRLND
YIRDPDQFAHDFRNYLEQKKGGANQKLLNKIYEYLAYEKATNSDF
>QTS_2525
VKFPIGLRLNAKVNNITKLGIFVTLPHQHHGLIFHKDFGDKWESVKKKYSVGDEIRVVVI
NNHEGKISLSLSQVNNPDLVDPTNEFKDSKDFTPLAKLLEKSTDKIANLKNQLNLSDR
>QTS_3870
MLDSIFSRNTEADKMVVKQQPRYVFGVLNLKTDAGYEIHFLNIPDLSAKGVTYAETLYYA
YRVLSHFLEPFKEDAAQILQYTFRELPIFKKDKNSFLTLITVTHDLDPHKMEMTFLLPQT
RASELADEADQVGRLIRFLPNRSTSDQA
>QTS_4397
MLNFKEKDLRAAVETPQSIGDTRQALTDLYHQRLNYLSGKAQWTTNDQALFELNCSYSRL
LLDRIWEAYTDNDTIKDSELLDHTWLQVRGSTSNWVSLDVNYATEDHNTTLFSIQQPLTE
RAVLAAHNLPTLTKKGDEFMLPESDYEPLIQMIKLLYKADYRFTSARETILQPVNNLTFP
VVFNQPKNFTATEQVGTNVNKLIHLDTQIGRYDVRSFKVVDEDGNNVTKEGKPQISASGL
FTWKAENIAPLLDHELTLTVVGVETESLPSLDKLFISAANNSILMKTGDTMSSYRLELPN
KKTLGVSVDARSESLVLHYPDDETQVYELIKQYPFLGEWLNDVIIKK
>QTS_4707
MNRHNNNSNKNMTRESFRRKRKPFYKRKPFIISLILIIIILIIGLLIFWKSTSSKDNTHTT
QPSHKIEKVKPKKETKKKVTKKKHVKKAKKQKAADEITAKQQENDNKPKNDQQKKTTNQI
KNAGTYTDLTYDTDWYTFEISNDVKLVKDSNGDAALLVKYNYTNKTQSNEIPQRVQNTAI
MLKQDNQQLTATTASGEYSTIVNSSNNGLVQPNKSFDGALLVKVKDTDSEVTMYFKNIQT
NDWLDTTQPLKLK