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MICROBIOLOGY SOCIETY

International Committee on Systematics of Prokaryotes Subcommittee on the Taxonomy of *Bifidobacterium*, *Lactobacillus* and related organisms. Minutes of the closed meeting by videoconference, 3 September 2020

Paola Mattarelli[1,*], Giovanna E. Felis[2], B. Pot[3], Wilhelm H. Holzapfel[4] and Charles M. A. P. Franz[5]

MINUTE 1. CALL TO ORDER

The annual Subcommittee meeting by videoconference was called to order by Charles Franz at 14:30 (CET) on 3 September 2020.

MINUTE 2. RECORD OF ATTENDANCE

Present (12): B. Biavati, E. Brockman, L.M.T. Dicks, A. Endo, G.E. Felis, C.M.A.P. Franz, W.H. Holzapfel, P. Lawson, P. Mattarelli, B. Pot, E. Salvetti and K. Watanabe. Apologies for absence (2): J. Björkroth and C. Bonaparte.

MINUTE 3. APPROVAL OF THE AGENDA

The proposed agenda was approved.

MINUTE 4. SUBCOMMITTEE PUBLICATIONS

The minutes of our previous meeting (2019) have been published [1].

MINUTE 5. NEW MEMBERSHIPS

As pointed out in the last meeting, new memberships have been proposed. CVs have been already received from Monica Modesto proposed by Bruno Biavati, Paul O'Toole and Peter Vandamme proposed by Giovanna E. Felis. These researchers will be contacted in order to confirm their availability to become member of the Subcommittee. In case of positive answer, they will be invited to give a presentation about their taxonomical background at the next Subcommittee meeting. All members agreed.

MINUTE 6. FOLLOWING UP THE PROGRESS IN RESOLUTIONS OF *BIFIDOBACTERIUM INDICUM*/*BIFIDOBACTERIUM CORYNEFORME* SPECIES

C. Franz and P. Mattarelli are working on this matter in order to better clarify the taxonomic position of the two species *B. indicum* and *B. coryneforme*.

MINUTE 7. WEBSITE OF THE SUBCOMMITTEE

The website of the Subcommittee has been published at the following link: https://site.unibo.it/subcommittee-lactobacillus-bifidobacterium/en. E. Brockman underlines the importance of the web page for the Subcommittee visibility also for the stakeholder. Improvement should be done in communication possibly including some educational material to reach a broader audience like industry, regulatory bodies and in the end maybe also consumers. B. Biavati underlines the importance to find

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the right words to communicate taxonomic concepts also to inexperienced people. It has been suggested to put the index of agreed names of *Bifidobacterium*, *Lactobacillus* and lactic acid bacteria taxa in the website taking care to update it following the List of Prokaryotic names with Standing in Nomenclature website.

MINUTE 8. *LACTOBACILLUS* RECLASSIFICATION PUBLICATION

The paper on the genus *Lactobacillus* reclassification has been published in the *International Journal of Systematic and Evolutionary Microbiology* [2]. The new reclassification of the genus *Lactobacillus* is to be considered a big change in the taxonomical field. For this reason, both in academia and industry, some time will be required for stakeholders to adapt to the new nomenclature and associated labelling issues. C. Franz proposes to write a short communication to be published in the web site of the Subcommittee on *Lactobacillus* reclassification in order to communicate the topic to a broader audience.

MINUTE 9. QUESTIONS AND COMMENTS FROM THE AUDIENCE REGARDING THE UPCOMING PAPER ABOUT REVISED MINIMAL STANDARDS

The audience supports the need to update the minimal standard published in 2014 adding criteria for subspecies and genus delineation. At the moment there are no clear guidelines in this matter and genus and subspecies delineation is a challenging issue. E. Salvetti said that in *Lactobacillus* reclassification the criteria to delineate novel genera were several: average nucleotide identity, average amino acid identity (AAI), core-gene AAI (cAAI), core genome phylogeny, signature genes, and metabolic/ecological data. Percentage of conserved proteins (POCP) was abandoned as it accounts for the presence/absence of protein, while in this perspective AAI and cAAI are more powerful metrics for the datasets on hand. Concerning subspecies, A. Endo suggests that one of the criteria to be considered is the cut off of 70–80% of DNA–DNA hybridization to delineate subspecies, as proposed in Meier-Kolthoff *et al.* [3]. K. Watanabe agrees with A. Endo and adds that it is important to rely on some specific housekeeping genes for differentiation of subspecies, which can be extracted by pan-genome analysis. It is also important to consider the threshold for delineation of subspecies, on the basis of the integrated whole data for subspeciation for each case (species), and to use several strains for each genomic group. Phenotypic data should be taken in account as well.

MINUTE 10. NEW SPECIES SINCE THE LAST MEETING

The proposed names, attempting to best reflect the biology of the new taxa, have been accepted. The list of new species and genera comprised in the scope of the Subcommittee and described from 22 June 2019 to 3 September 2020 are listed in the Table 1.

MINUTE 11. SCOPE OF THE SUBCOMMITTEE

The *status quo* of families within the purview of the Subcommittee is as follows: *Aerococcaceae*, *Bifidobacteriaceae*, *Carnobacteriaceae*, *Enterococcaceae* and *Lactobacillaceae*.

MINUTE 11. PRESENT MEMBERSHIP

The following individuals are currently members of the Subcommittee on *Bifidobacterium*, *Lactobacillus* and related organisms: Bruno Biavati (Malta); Johanna Björkroth (Finland); Christine Bonaparte (Germany); Elke Brockmann (Denmark); Leon M.T. Dicks (South Africa); Akihido Endo (Japan); Giovanna E. Felis, Deputy Chairperson (Italy); Charles M.A.P. Franz, Chairman (Germany); Wilhelm H. Holzapfel (South Korea); Paul Lawson (USA); Paola Mattarelli, Secretary (Italy); Bruno Pot (Belgium); Elisa Salvetti (Italy); Koichi Watanabe (Taiwan).

MINUTE 12. DATE AND PLACE OF THE NEXT MEETING

The next meeting of the Subcommittee is scheduled to be held at the end of 2021 by videoconference.

MINUTE 13. ADJOURNMENT

The closed meeting was adjourned at 16.00 on 3 September 2020.

Table 1. List of species described from 21 June 2019 to 3 September 2020

Species	Origin	16S rRNA accession no.	References
Family *Lactobacillaceae*			
genus*Lactobacillus*			
Lactobacillus mulieris sp. nov. c10Ua161M^T (=CECT 9755^T=DSM 108704^T)	Human urine	SDGL00000000	[4]
genus*Acetilactobacillus*			
Acetilactobacillus gen. nov.			[2]
Acetilactobacillus jinshanensis sp. nov. HSLZ-75^T (=CICC 6269^T=JCM 33270^T)	Vinegar mash	KT783533	[2, 5]
genus*Agrilactobacillus*			
Agrilactobacillus gen. nov.			[2]
Agrilactobacillus composti comb. nov. [basonym: *Lactobacillus composti* Endo and Okada 2007] DSM 18527^T (=JCM 14202^T=NRIC 0689^T)	Pickle	AB268118	[2, 6]
Agrilactobacillus yilanensis comb. nov [basonym: *Lactobacillus yilanensis* Wei and Gu 2019] 54-2^T (=NCIMB 15154^T=CCM 8896^T=KCTC 21120^T=LMG 31058^T)	Traditional pickle in Heilongjiang province, PR China	MK110806	[2, 7]
genus*Amylolactobacillus*			
Amylolactobacillus gen. nov.			[2]
Amylolactobacillus amylophilus comb. nov. [basonym: *Lactobacillus amylophilus* Nakamura and Crowell 1981] ATCC 49845^T (=CCUG 30137^T=CIP 102988^T=DSM 20533^T=IFO (now NBRC) 15881^T)	Swine waste-corn fermentation	M58806	[2, 8]
Amylolactobacillus amylotrophicus comb. nov. [basonym: *Lactobacillus amylotrophicus* Naser *et al*. 2006] DSM 20534^T (=JCM 1124^T=LMG 11400=NRRL B-4436^T)	Swine waste-corn fermentation	AM236149	[2, 9]
genus*Apilactobacillus*			
Apilactobacillus gen. nov.			[2]
Apilactobacillus kunkeei comb. nov. [basonym: *Lactobacillus kunkeei* Edwards *et al.* 1998 emend. Endo *et al*. 2012] YH-15^T (=ATCC 700308^T=DSM 12361^T=JCM 16173^T)	Commercial grape wine	Y11374	[2, 10]
Apilactobacillus apinorum comb. nov. [basonym: *Lactobacillus apinorum* Olofsson *et al.* 2014] Fhon13N^T (=DSM 26257^T=CCUG 63287^T)	Honey stomach of the honeybee	JX099541	[2, 11]
Apilactobacillus bombintestini comb. nov. [basonym: *Lactobacillus bombintestini* Heo *et al* 2020] BHWM-4^T (=NBRC 113067^T=KACC 19317^T)	Intestine of an adult bumblebee	MH989598	[2, 12]
Apilactobacillus kosoi comb. nov. (heterotypic synonym of *Apilactobacillus Micheneri* [basonym: *Lactobacillus kosoi* Chiou *et al*. 2018; *Lactobacillus micheneri* McFrederick *et al*. 2018] Hlig3^T (=NRRL B-65473^T=DSM 104126^T=JCM 33323^T)	gut of a sweat bee (*Halictus ligatus*) caught at the Hornsby Bend Centre for Environmental Research, Austin, TX, USA.	KT833121	[13, 14]
Apilactobacillus ozensis (comb. nov. [basonym: *Lactobacillus ozensis* Kawasaki *et al*. 2011] Mizu2-1^T (=DSM 23829^T=JCM 17196^T)	Chrysanthemum, Oze National Park	AB572588	[2, 15]
Apilactobacillus quenuiae comb. nov. [basonym: *Lactobacillus quenuiae* McFrederick *et al.* 2018] HV_6^T (=DSM 104127^T=NRRL B-65474^T)	Wild bees and flowers	KX656667	[2, 14]
Apilactobacillus timberlakei comb. nov. [basonym: *Lactobacillus timberlakei* McFrederick *et al.* 2018] HV_12^T (=DSM 104128^T=NRRL B-65472^T)	Wild bees and flowers	KX656650	[2, 14]
genus*Bombilactobacillus*			
Bombilactobacillus gen. nov.			[2]
Bombilactobacillus mellifer comb. nov. [basonym: *Lactobacillus mellifer* Olofsson *et al*. 2014] Bin4N^T (=CCUG 6329^T=DSM 26254^T)	Honey stomach of the honeybee *Apis mellifera*	JX099543	[2, 11]

Continued

Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Bombilactobacillus bombi comb. nov. [basonym: *Lactobacillus bombi* Killer *et al.* 2014] BTLCH M1/2^T(=DSM 26517^T=CCM 8440^T)	Digestive tract of laboratory-reared bumblebee	KJ078643	[2, 16]
Bombilactobacillus mellis comb. nov. [basonym: *Lactobacillus mellis* Olofsson *et al.* 2014] Hon2N^T (=DSM 26255^T=CCUG 63289^T)	Honey stomach of the honeybee *Apis mellifera*	JX099543	[2, 11]
genus*Companilactobacillus*			
Companilactobacillus gen. nov.			[2]
Companilactobacillus alimentarius comb. nov. [basonym: *Lactobacillus alimentarius* (ex Reuter 1970) Reuter 1983] ATCC 29643^T (=CCUG 30672^T=CIP 102986^T=DSM 20249^T=JCM 1095^T=LMG 9187^T)	Marinated fish product	M58804	[2, 17]
Companilactobacillus allii comb. nov. [basonym: *Lactobacillus allii* Jung *et al.* 2017] WiKim39^T (=KCTC 21077^T=JCM 31938^T)	Scallion kimchi	NR_159082	[2, 18]
Companilactobacillus baiquanensis comb. nov. Basonym: *Lactobacillus baiquanensis* 184-8^T (=NCIMB 15152=CCM 8895^T=KCTC 21131^T=LMG 31050^T)	Traditional pickle in Heilongjiang province, PR China	MK110818	[2, 7]
Companilactobacillus bobalius comb. nov. [basonym: *Lactobacillus bobalius* Mañes-Lázaro *et al.* 2008] 203^T (=CECT 7310^T=DSM 19674^T=JCM 16180^T)	Grape variety Bobal	AY681134	[2, 19]
Companilactobacillus crustorum comb. nov. [basonym: *Lactobacillus crustorum* Scheirlinck *et al.* 2007] CCUG 53174^T (=JCM 15951^T=LMG 23699^T)	Wheat sourdough	AM285450	[2, 20]
Companilactobacillus farciminis comb. nov. [basonym: *Lactobacillus farciminis* (ex Reuter 1970) Reuter 1983] ATCC 29644^T (=DSM 20184^T=CCUG 30671^T=CIP 103136^T=JCM 1097^T)	Sausage	M58817	[2, 17]
Companilactobacillus formosensis comb. nov. [basonym: *Lactobacillus formosensis* Chang *et al.* 2015] S215^T (=NBRC 109509^T=BCRC 80582^T)	Fermented soybean meal	AB794060	[2, 21]
Companilactobacillus furfuricola comb. nov. [basonym: *Lactobacillus furfuricola* Irisawa *et al.* 2014] Nu 27^T (=JCM 18764^T=NRIC 0900^T=DSM 27174^T)	Ice bran paste	AB910349	[2, 22]
Companilactobacillus futsaii comb. nov. [basonym: *Lactobacillus futsaii* Chao *et al.* 2012] CQ16Z1^T (=CCTCC AB2017187^T=KCTC 21089^T	Swine waste-corn fermentation	AM236149	[2, 23]
Companilactobacillus ginsenosidimutans sp. nov. EMML 3041^T (=KACC 15420^T=DSM24154^T)	Kimchi	HQ389549	[2, 24]
Companilactobacillus halodurans sp. nov. TMW1.2172^T (=DSM109452^T=LMG31402^T)	Fermented sausages	MK968448	[2, 25]
Companilactobacillus heilongjiangensis comb. nov. [basonym: *Lactobacillus heilongjiangensis* Gu *et al.* 2013] S4-3^T (=LMG 26166^T=NCIMB 1470^T)	Chinese pickle	JF411966	[2, 26]
Companilactobacillus huachuanensis comb. nov. [basonym: *Lactobacillus huachuanensis* Fu and Gu 2019] 395-6.2^T (CCM8927^T=NCIMB 15188^T=LMG 31179^T)	Pickle	LC438522.1	[2, 27]
Companilactobacillus hulinensis comb. nov. basonym: *Lactobacillus hulinensis* Wei and Gu 2019] 8-1(1)^T (=NCIMB 15156^T=CCM 8898^T=KCTC 21115^T=LMG 31047^T)	Traditional pickle in Heilongjiang province, PR China	MK110822	[2, 7]
Companilactobacillus insicii comb. nov. [basonym: *Lactobacillus insicii* Ehrmann *et al.* 2016] TMW 1.2011^T (=CECT 8802^T=DSM 29801^T)	Pork salami	KP677494	[2, 28]
Companilactobacillus jidongensis comb. nov. [basonym: *Lactobacillus jidongensis* Wei and Gu 2019] 204-8^T (=NCIMB 15159^T=CCM 8900^T=KCTC 21133^T=LMG 31054^T)	Traditional pickle in Heilongjiang province, PR China	MK110821	[2, 7]
Companilactobacillus kedongensis comb. nov. [basonym*: Lactobacillus kedongensis* Wei and Gu 2019] 116-2^T (=NCIMB 15158^T=CCM 8899^T=KCTC 21124^T=LMG 31051^T)	Traditional pickle in Heilongjiang province, PR China	MK110821	[2, 7]

Continued

Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Companilactobacillus keshanensis comb. nov [basonym: *Lactobacillus keshanensis* Wei and Gu 2019] 33-7^T (=NCIMB 15153^T=CCM 8936^T=KCTC 21118^T=LMG 31166^T)	Traditional pickle in Heilongjiang province, PR China	MK110807	[2, 7]
Companilactobacillus kimchiensis comb. nov. [basonym: *Lactobacillus kimchiensis* Kim *et al*. 2013] L133^T (=DSM 2471^T=JCM 17702^T=KACC 15533^T)	Kimchi	HQ906500	[2, 29]
Companilactobacillus kimchii (comb. nov. [basonym: *Lactobacillus kimchii* Yoon *et al*. 2000] MT-1077^T (=ATCC BAA-131T=CCUG 45370^T=CIP 107019^T=DSM 13961^T=JCM 10707^T=KCTC 8903P^T)	Kimchi, a Korean fermented-vegetable food	AF183558	([2, 30]
Companilactobacillus metriopterae comb. nov. [basonym: *Lactobacillus metriopterae* Chiba *et al*. 2018 emend. Zhao and Gu 2019] Hime 5-1^T (=JCM 31635^T=DSM 103730^T)	gut of grasshopper *Metrioptera engelhardti*	LC190736	[2, 31]
Companilactobacillus mindensis (comb. nov. [basonym: *Lactobacillus mindensis* Ehrmann *et al*. 2003] TMW 1.80^T (=CCUG 48642^T=DSM 14500^T=JCM 12532^T=LMG 21508^T)	Sourdough	AJ313530	[32, 33]
Companilactobacillus mishanensis comb. nov. [basonym: *Lactobacillus mishanensis* Wei and Gu 2019]256-3^T (=NCIMB 15160^T=CCM 8901^T=LMG 31048^T)	Traditional pickle in Heilongjiang province, PR China	MK110825	([2, 7]
Companilactobacillus musae comb. nov. [basonym: *Lactobacillus musae* Chen *et al*. 2017] 313^T (=NBRC 112868 ^{T}=BCRC 81020^T)	Banana fruits	LC184607	[2, 26]
Companilactobacillus nantensis comb. nov. [basonym: *Lactobacillus nantensis* Valcheva *et al*. 2006] LP33^T (=TMW 1.1265^T=CIP 108546^T=DSM 16982^T=JCM 16171^T)	Wheat sourdough	AY690834	[2, 34]
Companilactobacillus nodensis comb. nov. [basonym: *Lactobacillus nodensis* Kashiwagi *et al*. 2009] iz4b-1^T (=DSM 19682^T=JCM 14932^T)	Japanese pickles	AB332024	[2, 35]
Companilactobacillus nuruki comb. nov. [basonym: *Lactobacillus nuruki* Heo *et al*. 2018] SYF10-1a^T (=KACC 18726^T=NBRC 112011^T)	nuruk (=cereals)	MG786754	[2, 36]
Companilactobacillus paralimentarius comb. nov. [basonym: *Lactobacillus paralimentarius* Cai *et al*. 1999] TB 1^T (=CCUG 43349^T=CIP 106794^T=DSM 13238^T=JCM 10415^T=LMG 19152^T)	Sourdough	AB018528	[2, 37]
Companilactobacillus salsicarnum sp. nov. TMW 1.2098^T (=DSM 109451^T=LMG 31401^T)	Fermented sausages	MK968446	[2, 25]
Companilactobacillus suantsaicola [Basonym: *Lactobacillus suantsaicola* Lin *et al*. 2020) R7^T (=BCRC 81127^T=NBRC 113530^T)	Suan-tsai, a traditional fermented mustard green product of Taiwan	MH810311	[38, 39]
Companilactobacillus tucceti comb. nov. [basonym: *Lactobacillus tucceti* Chenoll *et al*. 2009] R 19c^T (=CECT 5920^T=DSM 20183^T=JCM 18037^T)	Sausage	AJ576006	[2, 40]
Companilactobacillus versmoldensis comb. nov. [basonym: *Lactobacillus versmoldensis* Kröckel *et al*. 2003] KU-3^T (=ATCC BAA-478=DSM 14857=JCM 16174^T=NCCB 100034^T)	Poultry salami	AJ496791	[2, 41]
Companilactobacillus zhachilii comb. nov. [basonym: *Lactobacillus zhachilii* Zhang *et al*. 2019] HBUAS52074^T (=GDMCC1.1417^T=KCTC21106^T)	pickles mustard stem	MH392835	[2, 42]
Companilactobacillus zhongbaensis comb. nov. [basonym: *Lactobacillus zhongbaensis* Wei and Gu 2019] M1575^T (=NCIMB 15149^T=CCM 8892^T=LMG 31045^T)	Traditional yoghurt in Tibet Autonomous Region, PR China	MK110832	[2, 7]
genus*Dellaglioa*			
Dellaglioa gen. nov.			[2]
Dellaglioa algida comb. nov. [basonym: *Lactobacillus algidus* Kato *et al*. 2000] M6A9^T (=CIP 106688^T=JCM 10491^T)	Vacuum-packed beef	AB033209	[2, 43]
genus*Fructilactobacillus*			

Continued

Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Fructilactobacillus gen. nov.			[2]
Fructilactobacillus fructivorans comb. nov. [basonym: *Lactobacillus fructivorans* Charlton *et al.* 1934 (Approved Lists 1980) emend. Zhao and Gu 2019] ATCC 8288^T (=CCUG 32260^T=CIP 103042^T=DSM 20203^T=IFO (now NBRC) 13954^T=JCM 1117^T=LMG 9201^T=NRRL B-1841^T)	NA	NR_036789	[33, 44]
Fructilactobacillus florum comb. nov. [basonym: *Lactobacillus florum* Endo *et al.* 2010] F9-1^T (=DSM 22689^T=JCM 16035^T=NRIC 0771^T)	Peony (*Paeonia suffruticosa*)	AB498045	[2, 45]
Fructilactobacillus ixorae comb. nov. [basonym: *Lactobacillus ixorae* Techo *et al.* 2016] Ru20-1^T (=LMG 29008^T=NBRC 111239^T=PCU 346^T=TISTR 2381^T)	Flower (West-Indian jasmine)	LC094494	[2, 46]
Fructilactobacillus lindneri comb. nov. [basonym: *Lactobacillus lindneri* (ex Henneberg 1901) Back *et al.* 1997] KPA^T (=CIP 102983^T=DSM 20690^T=JCM 11027^T=LMG 14528^T)	Spoiled beer	X95421	[2, 47]
Fructilactobacillus sanfranciscensis (Weiss and Schillinger 1984) Zheng *et al.* 2020 comb. nov. [basonym: *Lactobacillus sanfranciscensis* corrig. (ex Kline and Sugihara 1971) Weiss and Schillinger 1984] L-12^T (=ATCC 27651^T=CCUG 30143^T=CIP 103252^T=DSM 20451^T=JCM 5668^T=LMG 16002^T=NRRL B-3934^T)	Sourdough	X76327	[2, 48]
Fructilactobacillus vespulae comb. nov. [basonym: *Lactobacillus vespulae* Hoang *et al.* 2015] DCY75^T (=KCTC 21023^T=JCM 19742^T)	Gut of a queen wasp	JX863367	[2, 49]
genus*Furfurilactobacillus*			
Furfurilactobacillus gen. nov.			[2]
Furfurilactobacillus rossiae comb. nov. [basonym: *Lactobacillus rossiae* corrig. Corsetti *et al.* 2005] CS1^T (=ATCC BAA-822^T=DSM 15814^T=JCM 16176^T)	Wheat sourdough	AJ564009	[2, 50]
Furfurilactobacillus curtus comb. nov. [basonym: *Lactobacillus curtus* Asakawa *et al.* 2017] VTT E-94560^T (=JCM 31185 ^{T})	Beer	LC093898	[2, 51]
Furfurilactobacillus siliginis comb. nov. [basonym: *Lactobacillus siliginis* Aslam *et al.* 2006] M1-212^T (=JCM 16155^T=KCTC 3985^T=NBRC 101315^T)	Wheat sourdough	AB370882	[2, 52]
g*Holzapfeliae*nus			
Holzapfelia gen. nov.			[2]
Holzapfelia floricola comb. nov. [basonym: *Lactobacillus floricola* Kawasaki *et al.* 2011] Ryu1-2^T (=DSM 23037^T=JCM 16512^T=NRIC 0774^T)	Flower of *Caltha palustris*	AB523780	[2, 53]
genus*Lacticaseibacillus*			
Lacticaseibacillus gen. nov.			[2]
Lacticaseibacillus casei comb. nov. [basonym: *Lactobacillus casei* (Orla-Jensen 1916) Hansen and Lessel 1971 (Approved Lists 1980)] Orla-Jensen 7^T ('*Streptobacterium casei*') (=Hucker03^T=OrlandL-323^T=ATCC 393^T=BCR (formerly CCRC) 10697^T=CECT 475^T=CIP 103137^T=DSM 20011^T)	Cheese	AF469172	[2, 54]
Lacticaseibacillus baoqingensis comb. nov. [basonym: *Lactobacillus baoqingensis* Long and Gu 2019] CCM 8903^T (=LMG 31064^T)	Chinese traditional pickle	MK110840	[2, 55]
Lacticaseibacillus brantae comb. nov. [basonym: *Lactobacillus brantae* Volokhov *et al.* 2012] SL1108^T (=ATCC BAA-2142^T=DSM 23927^T=LMG 26001^T)	Faeces of Canada goose	HQ022861	[2, 56]
Lacticaseibacillus camelliae comb. nov. [basonym: *Lactobacillus camelliae* Tanasupawat *et al.* 2007] MCH3-1^T (=BCC 21233^T=JCM 13995^T=NRIC 0672^T)	Fermented tea leaves (miang)	AB257864	[2, 57]
Lacticaseibacillus chiayiensis comb. nov. [basonym: *Lactobacillus chiayiensis* Huang *et al.* 2018] NCYUAS^T(=BCRC 81062^T=NBRC 112906^T)	Cow manure	MF446960	[2, 58]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Lacticaseibacillus daqingensis comb. nov. [basonym: *Lactobacillus daqingensis* Long *et al*. 2020] 143-4(a)^T (=NCIMB 15173^T=CCM 8948^T=JCM 33273^T=CCTCC 2018390^T)	Traditional pickle in Heilongjiang Province, PR China	MK110835,	[2, 59]
Lacticaseibacillus hegangensis comb. nov. [basonym: *Lactobacillus hegangensis* Long *et al*. 2020] 73-4^T(=NCIMB 15177^T=CCM 8912^T=CCTCC AB 2018407^T)	Traditional pickle in Heilongjiang Province, PR China.	MK110833	[2, 59]
Lacticaseibacillus hulanensis comb. nov. [basonym: *Lactobacillus hulanensis* Zhao and Gu 2019] ZW163^T (=NCIMB15193^T=CCM8926^T=CCTCCAB2019015^T)	Pickle	LC436604	[2, 60]
Lacticaseibacillus jixianensis comb. nov. [basonym: *Lactobacillus jixianensis* Long and Gu 2019] 159-4^T (=CCM 8911^T=NCIMB 15175^T)	Chinese traditional pickle	MK110836	[2, 55]
Lacticaseibacillus manihotivorans comb. nov. [basonym: *Lactobacillus manihotivorans* Morlon-Guyot *et al*. 1998] OND 32^T (=CCUG 42894^T=CIP 105851^T=DSM 13343^T=JCM 12514^T=LMG 18010^T)	Cassava sour starch fermentation	AF000162	[2, 61]
Lacticaseibacillus nasuensis comb. nov. [basonym: *Lactobacillus nasuensis* Cai *et al*. 2012] SU 18^T (=CGMCC 1.10801^T=JCM 17158^T)	Sudangrass silage sample	AB608051	[2, 62]
Lacticaseibacillus pantheris comb. nov. [basonym: *Lactobacillus pantheris* Liu and Dong 2002] A24-2-1^T(=AS 1.2826^T=JCM 12539^T=LMG 21017^T)	Jaguar faeces	NR025189.1	[2, 63]
Lacticaseibacillus paracasei comb. nov. [basonym: *Lactobacillus paracasei* Collins *et al*. 1989]			[2]
Lacticaseibacillus paracasei subsp. *paracasei* comb. nov. [basonym: *Lactobacillus paracasei* subsp. *paracasei* Collins *et al*. 1989] DSM 5622^T (=ATCC 25302^T=A24-2-1^T=AS 1.2826^T=JCM 8130^T=LMG 13087^T)	NA	D79212	[2, 64]
Lacticaseibacillus paracasei subsp. *tolerans* comb. nov. [basonym: *Lactobacillus paracasei* subsp. *tolerans* (Abo-Elnaga and Kandler 2020, 1965) Collins *et al*. 1989] ATCC 25599^T (=CCUG 34829^T=CIP 102994^T=CIP 103024^T=DSM 20258^T=IFO (now NBRC) 15906^T=JCM 1171^T=LMG 9191^T)	Pasteurized milk	AB181950	[2, 64]
Lacticaseibacillus porcinae comb. nov. [basonym: *Lactobacillus porcinae* Nguyen *et al*. 2013] R-42633^T (=CCUG 62266^T=LMG 26767^T)	Traditional Vietnamese nem chua	HE616585	[33, 65]
Lacticaseibacillus rhamnosus comb. nov. [basonym: *Lactobacillus rhamnosus* (Hansen 1968) Collins *et al*. 1989] ATCC 7469^T (=CCUG 21452^T=CIP A157^T=DSM 20021^T=IFO (now NBRC) 3425^T=JCM 1136^T=LMG 6400^T=NCAIM B.01147^T=NCCB 46033^T=NCIMB 6375^T (formerly NCDO 243)=NCTC 12953^T=NRRL B-442^T=VKM B-574^T)	NA	D16552	[2, 64]
Lacticaseibacillus saniviri comb. nov. [basonym: *Lactobacillus saniviri* Oki *et al*. 2012] YIT 12363^T (=DSM 24301^T=JCM 17471^T)	Faeces of a Japanese healthy adult male	AB602569	[2, 66]
Lacticaseibacillus sharpeae (comb. nov. [basonym: *Lactobacillus sharpeae* Weiss *et al*. 1982] ATCC 49974^T (=CCUG 39466^T=CIP 101266^T=DSM 20505^T=JCM 1186^T=LMG 9214 ^{T}=NRRL B-14855)	Municipal sewage	M58831	[2, 67]
Lacticaseibacillus songhuajiangensis comb. nov. [basonym: *Lactobacillus songhuajiangensis* Gu *et al*. 2013] 7-19^T (=LMG 27191^T=NCIMB 14832T=CCUG 62990^T)	Chinese traditional pickle and sourdough	HF679038	[2, 68]
Lacticaseibacillus thailandensis comb. nov. [basonym: *Lactobacillus thailandensis* Tanasupawat *et al*. 2007] MCH5-2^T (=BCC 21235^T=DSM 22698^T=JCM 13996^T=NRIC 0671^T)	Fermented tea leaves (miang)	AB257863	[2, 57]
Lacticaseibacillus suibinensis comb. nov. [basonym: *Lactobacillus suibinensis* Long *et al*. 2020] 247-3^T (=NCIMB 15176^T=JCM 33275^T)	Traditional pickle in Heilongjiang Province, PR China.	MK110834	[2, 59]
Lacticaseibacillus yichunensis comb. nov. [basonym: *Lactobacillus yichunensis* Long *et al*. 2020] 33-1^T (=NCIMB 15169^T=CCM 8947T=CM 33272^T=CCTCC 2018405^T)	Traditional pickle in Heilongjiang Province, PR China	MK110845	[33, 59]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Lacticaseibacillus zeae comb. nov. [basonym: *Lactobacillus zeae* Huang *et al* 2020] ATCC 15820^T (=DSM 20178^T=BCRC 17942^T)	Corn steep liquor	D86516	[2, 33, 69]
Lacticaseibacillus zhaodongensis comb. nov. [basonym: *Lacticaseibacillus zhaodongensis* Li *et al* 2020] 1206-1^T (=CCM 898^T=CCTCC AB 2019200^T=LMG 31620^T)	Traditional pickle in Heilongjiang province	LC508979	[2, 33]
genus*Lactiplantibacillus*			
Lactiplantibacillus gen. nov. Zheng *et al*. 2020			[2]
Lactiplantibacillus plantarum comb. nov. [basonym: *Lactobacillus plantarum* (Orla- Jensen 1919) Bergey *et al*. 1923 (Approved Lists 1980); *Lactobacillus plantarum* subsp. *argentoratennsis* (Bringel *et al* 2005)]			[2, 70]]
Lactiplantibacillus plantarum subsp. *plantarum* comb. nov. [basonym: *Lactobacillus plantarum* subsp. *plantarum* (Orla-Jensen 1919) Bringel *et al* 2005] ATCC 14917^T (=CCUG 30503^T=CIP 103151^T=DSM 20174^T=IFO (now NBRC) 15891^T=JCM 1149^T=LMG 6907^T=NCIMB 11974^T=NRRL B-4496^T)	Pickled cabbage	AJ965482	[2, 70]
Lactiplantibacillus argentoratensis comb. nov. [basonym: *Lactobacillus argentoratensis* Li *et al* 2020] DKO 22^T (=CIP 108320^T=DSM 16365^T=JCM 16169^T).	Sour cassava in Nigeria	AJ640078	[2, 13]
Lactiplantibacillus daoliensis comb. nov. [basonym: *Lactobacillus daoliensis* Liu and Gu 2019] 116-1A^T (=NCIMB 15181^T=CCM 8934^T=LMG 31171^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438516	[2, 71]
Lactiplantibacillus daowaiensis comb. nov. [basonym: *Lactobacillus daowaiensis* Liu and Gu 2019] 203-3^T (=NCIMB 15183^T=CCM 8933^T=LMG 31172^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438517	[2, 71]
Lactiplantibacillus dongliensis comb. nov. [basonym: *Lactobacillus dongliensis* Liu and Gu 2019] 218-3^T (=NCIMB 15184^T=CCM 8932^T=LMG 31173^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438518	[2, 71]
Lactiplantibacillus fabifermentans comb. nov. [basonym: *Lactobacillus fabifermentans* De Bruyne *et al*. 2009] R-34115^T (=DSM 21115^T=LMG 24284^T)	Cocoa bean heap fermentation	AM905388	[2, 72]
Lactiplantibacillus garii [basonym: *Lactobacillus garii* Diaz *et al* 2020] FI11369^T (=NCIMB 15148^T=DSM 108249^T)	Gari, a fermented cassava product	MN81791	[2, 73]
Lactiplantibacillus herbarum comb. nov. [basonym: *Lactobacillus herbarum* Mao *et al*. 2015] TCF032-E4^T (=CCTCC AB2015090^T=DSM 100358^T)	Chinese fermented radish	NR_145899	[2, 74]
Lactiplantibacillus modestisalitolerans comb. nov. [basonym: *Lactobacillus modestisalitolerans* Miyashita *et al*. 2015] NB446^T (=NBRC 107235^T=BCC 38191^T)	Traditional fermented foods	AB907192	[2, 75]
Lactiplantibacillus mudanjiangensis comb. nov. [basonym: *Lactobacillus mudanjiangensis* Gu *et al*. 2013] 11050^T (=LMG 27194^T=CCUG 62991^T)	Chinese traditional pickle and sourdough	HF679037	[2, 68]
Lactiplantibacillus nangangensis comb. nov. [basonym: *Lactobacillus nangangensis* Liu and Gu 2019] 381-7^T (=NCIMB 15186^T=CCM 8930^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438520	[2, 71]
Lactiplantibacillus paraplantarum comb. nov. [basonym: *Lactobacillus paraplantarum* Curk *et al*. 1996] CST 10961^T (=ATCC 700211^T=CCUG 35983^T=CIP 104668^T=CNRZ 1885^T=CST 10961^T=DSM 10667^T=JCM 12533^T=LMG 16673^T=NRRL B-23115^T)	Beer contaminant	AJ306297	[2, 76]
Lactiplantibacillus pentosus comb. nov. [basonym: *Lactobacillus pentosus* (ex Fred *et al*. 1921) Zanon *et al*. 1987] 124-2^T (=ATCC 8041^T=CCUG 33455^T=CIP 103156^T=DSM 20314^T=JCM 1558^T=LMG 10755^T=NCAIM B.01727^T=NCCB 32014^T=NCIMB 8026^T (formerly NCDO 363)=NRRL B-227^T=NRRL B-473^T)	NA	D79211	[2, 77]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Lactiplantibacillus pingfangensis comb. nov. [basonym: *Lactobacillus pingfangensis* Liu and Gu 2019] 382–1^T (=NCIMB 15187^T=CCM 8935^T=LMG 31176^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438521	[2, 71]
Lactiplantibacillus plajomi comb. nov. [basonym: *Lactobacillus plajomi* Miyashita *et al.* 2015] NB53^T (=NBRC 107333^T=BCC 38054^T)	Traditional fermented foods	AB907190	[2, 75]
Lactiplantibacillus songbeiensis comb. *nov*. [basonym: *Lactobacillus songbeiensis* Liu and Gu 2019] 398-2^T (=NCIMB 15189^T=CCM 8931^T=LMG 31174^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438523	[2, 71]
Lactiplantibacillus xiangfangensis comb. nov. [basonym: *Lactobacillus xiangfangensis* Gu *et al.* 2012] 3.1.1^T (=LMG 26013^T=NCIMB 14687^T)	Chinese pickle	HM443954	[2, 78]
genus*Lapidilactobacillus*			
Lapidilactobacillus gen. nov.			[2]
Lapidilactobacillus concavus comb. nov. [basonym: *Lactobacillus concavus* Tong and Dong 2005] C-5-1^T (=AS 1.5017^T=JCM 14153^T=LMG 22739^T)	Walls of a distilled spirit fermenting cellar	AY683322	[2, 79]
Lapidilactobacillus achengensis comb. nov. Basonym: *Lactobacillus achengensis* 247-4^T (=NCIMB 15155^T=CCM 8897^T=LMG 31059^T=CCTCC AB 2018410^T)	Traditional pickle in Heilongjiang Province, PR China	MK110810	[2, 59]
Lapidilactobacillus bayanensis comb. nov [basonym: *Lactobacillus bayanensis* Wei and Gu 2019] 54-5^T (=NCIMB 15151^T=CCM 8894^T)	Traditional pickle in Heilongjiang province, PR China	MK110807	[2, 7]
Lapidilactobacillus dextrinicus comb. nov. [basonym: *Lactobacillus dextrinicus* Haakensen *et al.* 2009] ATCC 33087^T (=CCUG 18834^T=CIP 103407^T=DSM 20335^T)	Silage	AF404726	[2, 80]
Lapidilactobacillus gannanensis comb. nov. Basonym: *Lactobacillus gannanensis* 143-1^T (=NCIMB 15157^T=CCM 8937^T=CCTCC AB 2018409^T)	Traditional pickle in Heilongjiang Province, PR China	MK110813	[2, 59]
Lapidilactobacillus mulanensis comb. nov. [basonym: *Lactobacillus mulanensis* Long *et al.* 2020] 143-6^T (=NCIMB 15162^T=CCM 8951^T=JCM 33274^T=CCTCC AB 2018411^T)	Traditional pickle in Heilongjiang Province, PR China	MK110808	[2, 59]
Lapidilactobacillus wuchangensis comb. nov. [Basonym: *Lactobacillus wuchangensis* Long *et al.* 2020] 17-4^T (=NCIMB 15161^T=CCM 8946^T=JCM 33271^T=CCTCC AB 2018406^T)	Traditional pickle in Heilongjiang Province, PR China	MK110811	[2, 59]
genus*Latilactobacillus*			
Latilactobacillus gen. nov.			[2]
Latilactobacillus sakei comb. nov. [Basonym: *Lactobacillus sakei* corrig. Katagiri, Kitahara and Fukami 1934, 157 (Approved Lists 1980); emend. Klein *et al.* 1996]			[2, 81]
Latilactobacillus sakei subsp. *carnosus* comb. nov. [basonym: *Lactobacillus sakei* subsp. *carnosus* corrig. Torriani *et al.* 1996] ATCC 4005^T(=CCUG 21532^T=CIP 103023^T=DSM 20057^T=JCM 1115^T=LMG 6892^T=NCAIM B.01145^T)	Tomato pulp	AB205055	([2, 82]
Latilactobacillus sakei subsp. *sakei* comb. nov. [basonym: *Lactobacillus sakei* subsp. *sakei* corrig. (Katagiri *et al.* 1934) Torriani *et al.* 1996] T.S [K. Kitahara 37]^T (=ATCC 15521^T=LMG 9468^T=DSM 20017^T=CCUG 30501^T=CIP 103139^T=IFO (now NBRC) 15893^T=JCM 1157^T)	'Moto' starter of sake	AM113784	[2, 82]
Latilactobacillus curvatus comb. nov. [basonym: *Lactobacillus curvatus* (Trioili-Peterson 1903) Abo-Elnaga and Kandler 1965 (Approved Lists 1980) emend. Klein *et al.* 1996] 1^T (=LMG 9198^T=DSM 20019^T=LMG 13553^T=ATCC 25601^T=CCUG 30669^T=CIP 102992^T=IFO (now NBRC) 15884^T=JCM 1096^T=NRRL B-4562^T)	Milk	AM113777	[2, 81]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Latilactobacillus fuchuensis comb. nov. [basonym: *Lactobacillus fuchuensis* Sakala *et al*. 2002] B5M10^{T} (=CCUG 47133^{T}=DSM 14340^{T}=JCM 11249^{T})	Vacuum-packaged beef	AB370875	[2, 83]
Latilactobacillus graminis comb. nov. [basonym: *Lactobacillus graminis* Beck *et al*. 1988] ATCC 4005^{T} (=CCUG 21532^{T}=CIP 103023^{T}=DSM 20057^{T}=JCM 1115^{T}=LMG 6892^{T}=NCAIM B.01145^{T}=NRRL B-1837^{T}=VKM B-1599^{T})	Grass silage	AM113778	[2, 84]
genus*Lentilactobacillus*			
Lentilactobacillus gen. nov.			[2]
Lentilactobacillus buchneri comb. nov.			[2]
Lentilactobacillus buchneri subsp. *buchneri* [basonym: *Lactobacillus buchneri* (Henneberg 1903; Liu and Gu 2020; Tanizawa *et al*. 2020)] ATCC 4005^{T}(=DSM 20057^{T}=CCM 1819^{T}=CCUG 21532^{T}=NCDO 110^{T}=NCIB 8007^{T}=CIP 103023^{T}=JCM 1115^{T}=LMG 6892^{T}=NCAIMB.01145^{T}=NRRL B-1837^{T}=VKM B-1599^{T})	Tomato pulp	AB205055	[33, 85]
Lentilactobacillus buchneri subsp. *silagei* [basonym: *Lactobacillus buchneri* (Henneberg 1903; Liu and Gu 2020; Tanizawa *et al*. 2020)] SG162^{T} (=JCM 32599^{T}=DSM 107969^{T}) (Approved Lists 1980)]	Rice grain silage	LC507191	[33, 85]
Lentilactobacillus curieae comb. nov. [basonym: *Lactobacillus curieae* Lei *et al*. 2013] CCTCC M 2011381^{T} (=S1 L19^{T}=JCM 18524^{T})	Stinky tofu brine	JQ086550	[2, 86]
Lentilactobacillus diolivorans comb. nov. [basonym: *Lactobacillus diolivorans* Krooneman *et al*. 2002] JKD6^{T} (=DSM 14421^{T}=JCM 12183^{T}=LMG 19667^{T})	Maize silage	AF264701	[2, 87]
Lentilactobacillus farraginis comb. nov. [basonym: *Lactobacillus farraginis* Endo and Okada 2007] DSM 18382^{T} (=JCM 14108^{T}=NRIC 0676^{T})	Composting material of distilled shochu residue	AB262731	[2, 88]
Lentilactobacillus hilgardii comb. nov. [basonym: *Lactobacillus hilgardii* Douglas and Cruess 1936 (Approved Lists 1980)] 9^{T} (=ATCC 8290^{T}=CIP 103007^{T}=DSM 20176^{T}=JCM 1155^{T}=LMG 6895^{T})	Wine	M58821	[2, 89]
Lentilactobacillus kefiri comb. nov. [basonym: *Lactobacillus kefiri* corrig. Kandler and Kunath 1983] A/K^{T} (=ATCC 35411^{T}=CIP 103006^{T}=DSM 20587^{T}=JCM 5818^{T}=LMG 9480^{T})	Kefir grains	AJ621553	[33, 90]
Lentilactobacillus kisonensis comb. nov. [basonym: *Lactobacillus kisonensis* Watanabe *et al*. 2009] YIT 11168^{T} (=DSM 19906^{T}=JCM 15041^{T}=NRIC 0741^{T})	Sunki, a Japanese traditional pickle	AB366388	[2, 91]
*Lentilactobacillus otakiensis*comb. nov. [basonym: *Lactobacillus otakiensis* Watanabe *et al*. 2009] YIT 11163^{T} (=DSM 19908^{T}=JCM 15040^{T}=NRIC 0742^{T})	Sunki, a Japanese traditional pickle	AB366386	[2, 91]
Lentilactobacillus parabuchneri comb. nov. [basonym: *Lactobacillus parabuchneri* Farrow *et al*. 1988] ATCC 49374^{T} (=CCUG 32261^{T}=CIP 103368^{T}=DSM 5707^{T}=JCM 12493^{T}=LMG 11457^{T}=NCIMB 8838^{T} (formerly NCDO 2748^{T})	Blair athol distillery	AB205056	[33, 92]
Lentilactobacillus parafarraginis comb. nov. [basonym: *Lactobacillus parafarraginis* Endo and Okada 2007] NRIC 0676^{T} (=DSM 18390^{T}=JCM 14109^{T}=NRIC 0677^{T})	Composting material of distilled shochun residue	AB262734	[2, 88]
Lentilactobacillus parakefiri comb. nov. [basonym: *Lactobacillus parakefiri* corrig. Takizawa *et al*. 1994] GCL 1731^{T} (=ATCC 51648^{T}=CCUG 39468^{T}=CIP 104242^{T}=DSM 10551^{T}=IFO (now NBRC) 15890^{T}=JCM 8573^{T}=LMG 15133^{T})	Kefir grain	AY026750	[2, 93]
Lentilactobacillus raoultii sp. nov. Strain Marseille P4006^{T} (=CSUR P4006^{T}=CCUG 71848^{T})	vaginal sample	LT854294	[2]
Lentilactobacillus rapi comb. nov. [basonym: *Lactobacillus rapi* Watanabe *et al*. 2009] YIT 11204^{T} (=DSM 19907^{T}=JCM 15042^{T}=NRIC 0743^{T})	Sunki, a Japanese traditional pickle	AB366389	[2, 91]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Lentilactobacillus senioris comb. nov. [basonym: *Lactobacillus senioris* Oki *et al.* 2012] YIT 12364^T (=DSM 24302^T=JCM 17472^T)	Faeces of a healthy 100-year-old Japanese female	AB602570	[2, 66]
Lentilactobacillus sunkii comb. nov. [basonym: *Lactobacillus sunkii* Watanabe *et al.* 2009] YIT 11161^T (=DSM 19904^T=JCM 15039^T=NRIC 0744^T)	Sunki, a Japanese traditional pickle	AB366385	[2, 91]
genus*Leuconostoc*			
Leuconostoc litchi sp. nov. MB7^T (=BCRC 81077^T=NBRC 113542^T)	Lychee fruits collected from Taoyuan City, Taiwan, in 2015	LC259518	[94]
genus*Levilactobacillus*			
Levilactobacillus gen. nov.			[2]
Levilactobacillus brevis comb. nov. [basonym: *Lactobacillus brevis* (Orla-Jensen 1919) Bergey *et al.* 1934 (Approved Lists 1980)] Bb14^T (=DSM 20054^T=ATCC 14869^T=JCM 1059^T=LMG 6906^T=LMG 7944^T=NRRL B-4527^T)	Faeces	M58810	[2, 95]
Levilactobacillus acidifarinae comb. nov. [basonym: *Lactobacillus acidifarinae* Vancanneyt *et al.* 2005] R-19065^T (=CCM 7240^T=CCUG 50162^T=JCM 15949^T=LMG 2220^T)	Artisanal wheat sourdough	AJ632158	[2, 96]
Levilactobacillus angrenensis comb. nov. [basonym: *Lactobacillus angrenensis* Long *et al.* 2020] M1530-1^T (=NCIMB 15150^T=CCM 8893^T=LMG 31046^T=CCTCC AB 2018402^T)	Traditional yoghurt in Tibet Autonomous Region, PR China	MK110858	[2, 59]
Levilactobacillus bambusae comb. nov. [basonym: *Lactobacillus bambusae* Guu *et al.* 2018] BS-W1^T (=BCRC 80970^T=NBRC 112377^T)	Traditional fermented bamboo shoorts	KX400838	[2, 97]
Levilactobacillus cerevisiae comb. nov. [basonym: *Lactobacillus cerevisiae* Koob *et al.* 2017] 2301^T (=DSM 100836^T=LMG 29073^T)	Spoiled beer	KT445896	[2, 98]
Levilactobacillus enshiensis comb. nov. [basonym: *Lactobacillus enshiensis* Zhang *et al.* 2020] HBUAS57009^T (=GDMCC 1.1664^T=KACC 21424^T)	Zha-Chili in Enshi Autonomous Prefecture, in Hubei Province, PR China in 2019	SULH00000000	[2, 99]
Levilactobacillus fujinensis comb. nov. [basonym: *Lactobacillus fujinensis* Long and Gu 2019] 218-6^T (=CCM 8908^T=KCTC 21134^T=LMG 31067^T)	Chinese traditional pickle	MK110865	[2, 55]
Levilactobacillus fuyuanensis comb. nov. [basonym: *Lactobacillus fuyuanensis* Long and Gu 2019] 244-4^T (=CCM 8906^T=KCTC 21137^T=LMG 31052^T)	Chinese traditional pickle	MK110862	[2, 55]
Levilactobacillus hammesii comb. nov. [basonym: *Lactobacillus hammesii* Valcheva *et al.* 2005] LP38^T (=TMW 1.1236^T=CCUG 51325^T=CIP 108387^T=DSM 16381^T=JCM 16170^T)	Wheat sourdough	AJ632219	[2, 100]
Levilactobacillus huananensis comb. nov. [basonym: *Lactobacillus huananensis* Long and Gu 2019] 151-2B^T (=CCM 8913^T=KCTC 21129^T=LMG 31063^T)	Chinese traditional pickle	MK110857	[2, 55]
Levilactobacillus koreensis comb. nov. [basonym: *Lactobacillus koreensis* Bui *et al.* 2011] DCY50^T (=JCM 16448^T=KCTC 13530^T)	Cabbage kimchi	FJ904277	[2, 101]
Levilactobacillus lindianensis comb. nov. [basonym: *Lactobacillus lindianensis* Long and Gu 2019] 220-4^T (=NCIMB 15163^T=CCM 8902^T=KCTC 21136^T)	Chinese traditional pickle	MK110856	[2, 55]
Levilactobacillus mulengensis comb. nov. [basonym: *Lactobacillus mulengensis* Long and Gu 2019] 112-3^T (=CCM 8909^T=KCTC 21123^T=LMG 31049^T)	Chinese traditional pickle	MK110866	[2, 99]
Levilactobacillus namurensis comb. nov. [basonym: *Lactobacillus namurensis* Scheirlinck *et al.* 2007] DSM 19117^T (=CCUG 52843^T=JCM 15612^T=LMG 23583^T)	Sourdough	AM259119	[2, 102]
Levilactobacillus parabrevis comb. nov. [basonym: *Lactobacillus parabrevis* Vancanneyt *et al.* 2006] RODS-DW^T (=SLB MAS^T=ATCC 53295^T=LMG 11984^T)	Cheese	AM158249	[2, 103]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Levilactobacillus paucivorans comb. nov. [basonym: *Lactobacillus paucivorans* Ehrmann *et al*. 2010] TMW 1.1424^T (=DSM 22467^T=JCM 18045^T=LMG 25291^T)	Yeast storage tank containing lager beer	FN185731	[2, 104]
Levilactobacillus senmaizukei comb. nov. [basonym: *Lactobacillus senmaizukei* Hiraga *et al*. 2008] L13^T (=DSM 21775^T=NBRC 103853^T=TISTR 1847^T)	Senmaizuke, a Japanese pickle	AB297927	[2, 105]
Levilactobacillus spicheri comb. nov. [basonym: *Lactobacillus spicheri* Meroth *et al*. 2004] LTH 5753^T (=DSM 15429^T=JCM 15956^T=LMG 21871^T)	Rice sourdough	AJ534844	[2, 106]
Levilactobacillus suantsaii comb. nov. [basonym: *Lactobacillus suantsaii* Liou *et al*. 2019] L88^T (=BCRC 12945^T=NBRC 113535^T)	suan-tsai, a traditional Taiwanese fermented mustard green	MH730159	[2, 107]
Levilactobacillus suantsaiihabitans [basonym: *Lactobacillus suantsaiihabitans* Li *et al* 2020] R19^T (=BCRC 81129^T=NBRC 113532^T)	Fermented mustard green product	NH810313	[2, 39]
Levilactobacillus tangyuanensis comb. nov. [basonym: *Lactobacillus tangyuanensis* Long and Gu 2019] 137-3^T (=CCM 8907^T=KCTC 21125^T=LMG 31053^T)	Chinese traditional pickle	MK110859	[2, 55]
Levilactobacillus tongjiangensis comb. nov. [basonym: *Lactobacillus tongjiangensis* Long and Gu 2019] 218-10^T (=CCM 8905^T=KCTC 21135^T=LMG 31055^T)	Chinese traditional pickle	MK110863	[2, 55]
Levilactobacillus yonginensis comb. nov. [basonym: *Lactobacillus yonginensis* Yi *et al*. 2013] THK-V8^T (=KACC 16236^T=JCM 18023^T=ATCC 16236^T)	Kimchi	JN128640	[33, 55]
Levilactobacillus zymae comb. nov. [basonym: *Lactobacillus zymae* Vancanneyt *et al*. 2005] R-18615^T (=CCM 7241^T=CCUG 50163^T=JCM 15957^T=LMG 22198^T)	Artisanal wheat sourdough	AJ632157	[2, 96]
genus*Ligilactobacillus*			
Ligilactobacillus gen. nov.			[2]
Ligilactobacillus salivarius comb. nov. [basonym: *Lactobacillus salivarius* Rogosa *et al*. 1953 (Approved Lists 1980) emend. Li *et al*. 2006] H066^T (=ATCC 11741^T=CCUG 31453^T=CIP 103140^T=DSM 20555^T=JCM 1231^T=LMG 9477^T=NRRL B-1949^T)	Saliva	AF089108	[2, 108]
Ligilactobacillus acidipiscis comb. nov. [basonym: *Lactobacillus acidipiscis* Tanasupawat *et al*. 2000] FS60-1^T (=CCUG 46556^T=CIP 106750^T=HSCC 1411^T=JCM 10692^T=NBRC 102163^T=NRIC 0300^T=PCU 207^T=TISTR 1386^T)	Fermented fish	AB023836	[2, 109]
Ligilactobacillus agilis comb. nov. [basonym: *Lactobacillus agilis* Weiss *et al*. 1982] CIP 101264^T (=CCUG 31450^T=DSM 20509^T=JCM 1187^T=LMG 9186^T=NRRL B-14856^T)	Municipal sewage	M58803	[2, 67]
Ligilactobacillus animalis comb. nov. [basonym: *Lactobacillus animalis* Dent and Williams 1983] 1535^T=ATCC 35046^T=CCUG 33906^T=CIP 103152^T=DSM 20602^T=IFO (now NBRC) 15882^T=JCM 5670^T=LMG 9843^T=NCIMB 13278^T (formerly NCDO 2425^T)=NRRL B-14176^T	Dental plaque of baboon	AB326350	[2, 110]
Ligilactobacillus apodemi comb. nov. [basonym: *Lactobacillus apodemi* Osawa *et al*. 2006] ASB1^T (=CIP 108913^T=DSM 16634^T=JCM 16172^T)	Faeces of wild Japanese wood mouse	AJ871178	[2, 111]
Ligilactobacillus araffinosus sp. nov. [elevation in rank from *Lactobacillus aviarius* subsp. *araffinosus* Fujisawa *et al*. 1986] ML2^T (=ATCC 43235^T=DSM 20653^T=CCUG 32231^T=CIP 103145^T=JCM 5667^T)	Intestine of chicken	AB289043	[2, 112]
Ligilactobacillus aviarius comb. nov. [basonym: *Lactobacillus aviarius* Fujisawa *et al*. 1985] 75^T (=ATCC 43234^T=DSM 20655^T=CCUG 32230^T=CIP 103144^T=JCM 5666^T=LMG 10753^T=NBRC 102162^T)	Faeces of chicken	M58808	[2, 112]
Ligilactobacillus ceti comb. nov. [basonym: *Lactobacillus ceti* Vela *et al*. 2008] 142-2^T (=CCUG 53626^T=CECT 7185^T=JCM 15609^T)	Lungs of a beaked whale	AM292799	[2, 113]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Ligilactobacillus equi comb. nov. [basonym: *Lactobacillus equi* Morotomi *et al.* 2002] YIT 0455^T (=ATCC BAA-261^T=CCUG 47129^T=JCM 10991^T)	Faeces of horses	AB048833	[2, 114]
Ligilactobacillus faecis (comb. nov. [basonym: *Lactobacillus faecis* Endo *et al.* 2013] AFL13-2^T (=JCM 17300^T=DSM 23956^T)	Animal faeces	AB812750	[2, 115]
Ligilactobacillus hayakitensis comb. nov. [basonym: *Lactobacillus hayakitensis* Morita *et al.* 2007] KBL13^T (=DSM 18933^T=JCM 14209^T)	Faeces of thoroughbred horse	AB267406	[2, 116]
Ligilactobacillus murinus comb. nov. [basonym: *Lactobacillus murinus* Hemme *et al.* 1982] 313^T (=ATCC 35020^T=CCUG 33904^T=CIP 104818^T=CNRZ 220^T=DSM 20452^T=IFO (now NBRC) 14221^T=JCM 1717^T=LMG 14189^T)	Intestine of rat	AJ621554	[2, 117]
Ligilactobacillus pobuzihii comb. nov. [basonym: *Lactobacillus pobuzihii* Chen *et al.* 2010] E100301^T (=RIFY 6501^T=JCM 18084^T=KCTC 13174^T=NBRC 103219^T)	Pobuzih (fermented cummingcordia), *Cordia dichotoma*	AB326358	[2, 118]
Ligilactobacillus ruminis comb. nov. [basonym: *Lactobacillus ruminis* Sharpe *et al.* 1973 (Approved Lists 1980)] RFI^T (=ATCC 27780^T=CCUG 39465^T=CIP 103153^T=DSM 20403^T=JCM 1152^T=LMG 10756^T=NBRC 102161^T=NRRL B-14853^T)	Bovine rumen	AB326354	[2, 119]
Ligilactobacillus saerimneri comb. nov. [basonym: *Lactobacillus saerimneri* Pedersen and Roos 2004] GDA154^T (=CCUG 48462^T=DSM 16049^T=JCM 15955^T=LMG 22087^T)	Pig faeces	AY255802	[2, 120]
Ligilactobacillus salitolerans comb. nov. [basonym: *Lactobacillus salitolerans* Tohno *et al.* 2019] YK43^T (=JCM 31331^T=DSM 103433^T)	mushrooms	LC127508	[2, 121]
genus*Limosilactobacillus*			
Limosilactobacillus gen. nov.			[2]
Limosilactobacillus fermentum comb. nov. [basonym: *Lactobacillus fermentum* Beijerinck 1901 (Approved Lists 1980) emend. Dellaglio *et al.* 2004] ATCC 14931^T (=CCUG 30138^T=CIP 102980^T=DSM 20052^T=IFO (now NBRC) 15885^T=JCM 1173^T=LMG 6902^T=NCCB 46038^T=NCIMB 11840^T (formerly NCDO 1750^T)=NRRL B-4524^T)	Human saliva	JN175331	[2, 122]
Limosilactobacillus alvi sp. nov. R54^T (=KCCM 90099^T=JCM 17644^T)	Gizzards of hens	NR_118032.1	[2, 123]
Limosilactobacillus antri comb. nov. [basonym: *Lactobacillus antri* Roos *et al.* 2005] Kx146A4^T (=CCUG 48456^T=DSM 16041^T=JCM 15950^T=LMG 22111^T)	Gastric biopsies, Human stomach mucosa	AY253659	[2, 124]
Limosilactobacillus caviae comb. nov. [basonym: *Lactobacillus caviae* Killer *et al.* 2017] MOZM2^T (=CCM 8609^T=DSM 100239^T=LMG 28780^T)	Oral cavity of a home-bred guinea pig	KT343143	[2, 125]
Limosilactobacillus coleohominis [basonym: *Lactobacillus coleohominis* Nikolaitchouk *et al.* 2001] DSM 14060^T (=CCUG 44007^T=CIP 106820^T)	Vaginal urogenital tract	AM113776	[2, 126]
Limosilactobacillus equigenerosi comb. nov. [basonym: *Lactobacillus equigenerosi* Endo *et al.* 2008] NRIC 0697^T (=JCM 14505^T=DSM 18793^T)	Faeces of thoroughbred horse	AB288050	[2, 127]
Limosilactobacillus frumenti comb. nov. [basonym: *Lactobacillus frumenti* Müller *et al.* 2000] TMW 1.666^T (=CIP 106922^T=DSM 13145^T=JCM 11122^T=LMG 19473^T)	Rye-bran sourdough	AJ250074	[2, 128]
Limosilactobacillus gastricus comb. nov. [basonym: *Lactobacillus gastricus* Roos *et al.* 2005 emend. Endo *et al.* 2008] Kx156A7^T (=CCUG 48454^T=DSM 16045^T=JCM 15952^T=LMG 22113^T)	Gastric biopsies, Human stomach mucosa	AY253658	[2, 124]
Limosilactobacillus gorillae [basonym: *Lactobacillus gorillae* Tsuchida *et al.* 2014] KZ01^T (=JCM 19575^T=DSM 28356^T)	Faeces of captive and wild western lowland gorillas (*Gorilla gorilla gorilla*)	AB904716	[2, 129]
Limosilactobacillus ingluviei comb. nov. [basonym: *Lactobacillus ingluviei* Baele *et al.* 2003] KR3^T (=CCUG 45722^T=JCM 12531^T=LMG 20380^T)	Pigeon, crop	AF333975	[2, 130]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Limosilactobacillus mucosae comb. nov. [basonym: *Lactobacillus mucosae* Roos *et al*. 2000] S32^T (=CCUG 43179^T=CIP 106485^T=DSM 13345^T=JCM 12515^T)	Pig small intestine	AF126738	[2, 131] muingluviei
Limosilactobacillus oris comb. nov. [basonym: *Lactobacillus oris* Farrow and Collins 1988] 5A1^T of Hayward (=ATCC 49062^T=CCUG 37396^T=CIP 103255^T=CIP 105162^T=DSM 4864^T=JCM 7507^T=JCM 11028^T=LMG 9848^T=NCIMB 8831^T (formerly NCIB 8831^T; formerly NCDO 2160^T)	Human saliva	X94229	[2, 132]
Limosilactobacillus panis comb. nov. [basonym: *Lactobacillus panis* Wiese *et al*. 1996] CCUG 37482^T=DSM 6035^T=JCM 11053^T	Sourdough	X94230	[2, 133]
Limosilactobacillus pontis comb. nov. [basonym: *Lactobacillus pontis* Vogel *et al*. 1994] LTH 2587^T (=ATCC 51518^T=CCUG 33456^T=CIP 104232^T=DSM 8475^T=JCM 11051^T=LMG 14187^T)	Rye sourdough	X76329	[2, 134]
Limosilactobacillus reuteri comb. nov. [basonym: *Lactobacillus reuteri* Kandler *et al*. 1982] F 275^T (=ATCC 23272^T=DSM 20016^T=JCM 1112^T=LMG 9213^T=LMG 13557^T)	Intestine of adult	AP007281	[33, 135]
Limosilactobacillus secaliphilus comb. nov. [basonym: *Lactobacillus secaliphilus* Ehrmann *et al*. 2007] TMW 1.1309^T (=CCUG 53218^T=DSM 17896^T=JCM 15613^T)	Sourdough	AM279150	[2, 136]
Limosilactobacillus vaginalis (Embley *et al*. 1989) Zheng *et al*. 2020 comb. nov. [basonym: *Lactobacillus vaginalis* Embley *et al*. 1989] Lac 19^T (=ATCC 49540^T=CCUG 31452^T=CIP 105932^T=DSM 5837^T=JCM 9505^T=LMG 12891^T)	Vaginal swab	AF243177	[2, 137]
genus*Liquorilactobacillus*			
Liquorilactobacillus gen. nov.			[2]
Liquorilactobacillus mali comb. nov. [basonym: *Lactobacillus mali* Carr and Davies 1970 (Approved Lists 1980)] ATCC 27053^T (=CCUG 30141^T=CCUG 32228^T=CIP 103142^T=DSM 20444^T=JCM 1116^T=LMG 6899^T=NBRC 102159^T=NCIB (now NCIMB) 10560^T=NRRL B-4563^T=VKM B-1600^T)	Apple juice from cider press	NR_044709.2	[2, 138]
Liquorilactobacillus aquaticus comb. nov. [basonym: *Lactobacillus aquaticus* Mañes-Lázaro *et al*. 2009] IMCC1736^T (=CECT 7355^T=DSM 21051^T=JCM 16869^T)	Surface of a eutrophic freshwater pond	DQ664203	[2, 139]
Liquorilactobacillus cacaonum comb. nov. [basonym: *Lactobacillus cacaonum* De Bruyne *et al*. 2009] R-34119^T (=DSM 21116^T=LMG 24285^T)	Cocoa bean heap fermentation	AM905389	[2, 72]
Liquorilactobacillus capillatus comb. nov. [basonym: *Lactobacillus capillatus* Chao *et al*. 2008] YIT 11306^T (=BCRC 17811^T=DSM 19910^T=JCM 15044^T)	Fermented brine used for stinky tofu production	AB365976	[2, 140]
Liquorilactobacillus ghanensis comb. nov. [basonym: *Lactobacillus ghanensis* Nielsen *et al*. 2007] L489^T (=CCUG 53453^T=DSM 18630^T=JCM 15611^T)	Cocoa fermentation	DQ523489	[2, 141]
Liquorilactobacillus hordei comb. nov. [basonym: *Lactobacillus hordei* Rouse *et al*. 2008] UCC128^T (=DSM 19519^T=JCM 16179^T=LMG 24241^T)	Malted barley	EU074850	[2, 142]
Liquorilactobacillus nagelii comb. nov. [basonym: *Lactobacillus nagelii* Edwards *et al*. 2000] LuE10^T (=ATCC 700692^T=CCUG 43575^T=DSM 13675^T=JCM 12492^T)	Partially fermented wine	Y17500	[2, 143]
Liquorilactobacillus oeni comb. nov. [basonym: *Lactobacillus oeni* Mañes-Lázaro *et al*. 2009] 59b^T (=CECT 7334^T=DSM 19972^T=JCM 18036^T)	Bobal wine	AY681127	[2, 144]
Liquorilactobacillus satsumensis (comb. nov. [basonym: *Lactobacillus satsumensis* Endo and Okada 2005] DSM 16230^T (=JCM 12392^T=NRIC 0604^T)	Shochu mash	AB154519	[2, 145]
Liquorilactobacillus sicerae comb. nov. [basonym: *Lactobacillus sicerae* Puertas *et al*. 2014] CUPV261^T (=CECT 8227^T=KCTC 21012^T)	Spanish natural cider	HG794492	[2, 146]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Liquorilactobacillus sucicola comb. nov. [basonym: *Lactobacillus sucicola* Irisawa and Okada 2009] DSM 21376^T (=JCM 15457^T=NRIC 0736^T)	Sap of an Oak tree	AB433982	[2, 147]
Liquorilactobacillus uvarum (comb. nov. [basonym: *Lactobacillus uvarum* Mañes-Lázaro *et al*. 2008] 8^T (=Lb8^T=CECT 7335^T=DSM 19971^T=JCM 16870^T)	Must of Bobal grape variety	AY681126	[2, 148]
Liquorilactobacillus vini comb. nov. [basonym: *Lactobacillus vini* Rodas *et al*. 2006] Mont 4^T (=CECT 5924^T=DSM 20605^T=JCM 14280^T)	Must of grape	AJ576009	[2, 149]
genus*Loigolactobacillus*			
Loigolactobacillus gen. nov.			[2]
Loigolactobacillus coryniformis subsp. *coryniformis* comb. nov. [basonym: *Lactobacillus coryniformis* subsp. *coryniformis* Abo-Elnaga and Kandler 1965 (Approved Lists 1980)] ATCC 25602^T(=CIP 103133^T=DSM 20001^T=CCUG 30666^T=JCM 1164^T=LMG 9196^T=NRRL B-4391^T)	Silage	M58813	[2, 150]
Loigolactobacillus binensis comb. nov. [basonym: *Lactobacillus binensis* Long *et al*. 2020] 735-2^T (=NCIMB 15190^T=CCM 8925^T=LMG 31186^T)	Traditional pickle in Heilongjiang province, PR China	LC438524	[2, 59]
Loigolactobacillus coryniformis comb. nov. [basonym: *Lactobacillus coryniformis* Abo-Elnaga and Kandler 1965 (Approved Lists 1980)]			[2]
Loigolactobacillus coryniformis subsp. *torquens* comb. nov. [basonym: *Lactobacillus coryniformis* subsp. torquens Abo-Elnaga and Kandler al. 1965 (Approved Lists 1980)] CECT 4129^T (=ATCC 25600^T=CCUG 30667^T=CIP 103134^T=DSM 20004^T=JCM 1166^T=LMG 9197^T=NRRL B-4390^T)	Air of cow shed	AJ575741	[2, 150]
Loigolactobacillus backii comb. nov. [basonym: *Lactobacillus backii* Tohno *et al*. 2013] L-1062^T (=JCM 18665^T=LMG 23555^T=DSM 18080^T=L1062^T)	Spoiled lager beer	AB779648	[2, 151]
Loigolactobacillus bifermentans comb. nov. [basonym: *Lactobacillus bifermentans* (ex Pette and van Beynum 1943) Kandler *et al*. 1983] N2^T (=ATCC 35409^T=CCUG 32234^T=CIP 102811^T=DSM 20003^T=JCM 1094^T=LMG 9845^T)	Blown cheese	JN175330	[2, 152]
Loigolactobacillus iwatensis comb. nov. [basonym: *Lactobacillus iwatensis* Tohno *et al*. 2013] IWT246^T (=JCM 18838^T=DSM 26942^T)	Orchardgrass (*Dactylis glomerata* L.) silage	AB773428	[2, 151]
Loigolactobacillus jiayinensis comb. nov. [basonym: *Lactobacillus jiayinensis* Long and Gu 2019] 257-1^T (=NCIMB 15166^T=CCM 8904^T=LMG 31065^T)	Chinese traditional pickle	MK110846	[2, 55]
Loigolactobacillus rennini comb. nov. [basonym: *Lactobacillus rennini* Chenoll *et al*. 2006] CECT 5922^T (=DSM 20253^T=JCM 14279^T)	Rennin	LC258150	[2, 153]
Loigolactobacillus zhaoyuanensis comb. nov. [basonym: *Lactobacillus zhaoyuanensis* Long and Gu 2019] 187-3^T (=NCIMB 15172^T=CCM 8910^T)	Chinese traditional pickle	MK110851	[2, 55]
genus*Paucilactobacillus*			
Paucilactobacillus gen. nov.			[2]
Paucilactobacillus vaccinostercus comb. nov. [basonym: *Lactobacillus vaccinostercus* Okada *et al*. 1979 emend. Dellaglio *et al*. 2006] X-94^T (=TUA 055B^T=ATCC 33310^T=CCUG 30723^T=CIP 102807^T=DSM 20634^T=JCM 1716^T=LMG 9215^T=NCIMB 11808^T=NRIC 1075^T)	Cow dung	AJ621556	[2, 154]
Paucilactobacillus hokkaidonensis comb. nov. [basonym: *Lactobacillus hokkaidonensis* Tohno *et al*. 2013] LOOC260^T (=JCM 18461^T=DSM 26202^T)	timothy grass (Phleum pratense L.) silage	AB721549	[2, 155]
Paucilactobacillus kaifaensis comb. nov. [basonym: *Lactobacillus kaifaensis* Liu and Gu 2019] 778-3^T (=NCIMB 15191^T=CCM 8929^T=LMG 31177^T)	Traditional pickle in Harbin, Heilongjiang Province, PR China	LC438525	[2, 71]
Paucilactobacillus nenjiangensis comb. nov. [basonym: *Lactobacillus nenjiangensis* Gu *et al*. 2013] 11102^T (=LMG 27192^T=NCIMB 14833^T)	Chinese traditional pickle and sourdough	HF679039	[2, 68]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Paucilactobacillus oligofermentans comb. nov. [basonym: *Lactobacillus oligofermentans* Koort *et al*. 2005] AMKR18^T (=CCUG 52263^T=DSM 15707^T=JCM 16175^T=LMG 22743^T)	Broiler leg	AY733084	[2, 156]
Paucilactobacillus suebicus comb. nov. [basonym: *Lactobacillus suebicus* Kleynmans *et al*. 1989] I, WC-t4-15^T (=ATCC 49375^T=DSM 5007^T=JCM 9504^T=KCTC 3549^T=LMG 11408^T)	Apple mash	AJ575744	[2, 157]
Paucilactobacillus wasatchensis comb. nov. [basonym: *Lactobacillus wasatchensis* Oberg *et al*. 2016] WDC04^T (=DSM 29958^T=LMG 28678^T)	Aged Cheddar cheese	NR_147709	[2, 158]
genus*Schleiferilactobacillus*			
Schleiferilactobacillus gen. nov.			[2]
Schleiferilactobacillus perolens comb. nov. [basonym: *Lactobacillus perolens* Back *et al*. 2000] L 532^T (=DSM 12744^T=JCM 12534^T=LMG 18936^T)	Orange lemonade	Y19167	([2, 159]
Loigolactobacillus binensis comb. nov. [basonym: *Lactobacillus binensis* Long *et al* 2020] 735-2^T (=NCIMB 15190^T=CCM 8925^T)	Traditional pickle in Heilongjiang province, PR China	LC438524	[2, 59]
Schleiferilactobacillus harbinensis comb. nov. [basonym: *Lactobacillus harbinensis* Miyamoto *et al*. 2006] AHU 1762^T (=DSM 16991^T=JCM 16178^T=NBRC 100982^T=SBT 10908^T)	Chinese traditional fermented vegetable Suan cai	AB196123	[2, 160]
Schleiferilactobacillus shenzhenensis comb. nov. [basonym: *Lactobacillus shenzhenensis* Zou *et al*. 2013] LY-73^T (=CCTCC M 2011481^T=KACC 16878^T)	Fermented dairy beverage	JX523627	[2, 161]
genus*Secundilactobacillus*			
Secundilactobacillus gen. nov.			[2]
Secundilactobacillus malefermentans comb. nov. [basonym: *Lactobacillus malefermentans* (ex Russel and Walker 1953) Farrow *et al*. 1988] D2 MF1^T (=ATCC 49373^T=CCUG 32206^T=CIP 103367^T=DSM 5705^T=IFO (now NBRC) 15905^T=JCM 12497^T=LMG 11455^T=NCIMB 701410^T (formerly NCDO 1410^T)	Sour beer	AM113783	[2, 92]
Secundilactobacillus collinoides comb. nov. [basonym: *Lactobacillus collinoides* Carr and Davies 1972 (Approved Lists 1980)] ATCC 27612^T (=CCUG 32259^T=CIP 103008^T=DSM 20515^T=JCM 1123^T=LMG 9194^T)	Fermenting apple juice	NR_024645	[2, 162]
Secundilactobacillus kimchicus comb. nov. [basonym: *Lactobacillus kimchicus* Liang *et al*. 2011] DCY51^T (=JCM 15530^T=KCTC 12976^T)	Kimchi	EU678893	[2, 163]
Secundilactobacillus mixtipabuli comb. nov. [basonym: *Lactobacillus mixtipabuli* Tohno *et al*. 2015] IWT30^T (=JCM 19805^T=DSM 28580^T)	Silage	AB894863	[2, 164]
Secundilactobacillus odoratitofui comb. nov. [basonym: *Lactobacillus odoratitofui* Chao *et al*. 2010] YIT 11304^T (=BCRC 17810^T=DSM 19909^T=JCM 15043^T)	Fermented brine used for stinky tofu production	AB365975	[2, 165]
Secundilactobacillus oryzae comb. nov. [basonym: *Lactobacillus oryzae* Tohno *et al*. 2013] SG293^T (=JCM 18671^T=DSM 26518^T)	Fermented rice grain (*Oryza sativa* L. subsp. *japonica*)	AB731660	[2, 166]
Secundilactobacillus paracollinoides. nov. [basonym: *Lactobacillus paracollinoides* Suzuki *et al*. 2004] LA2^T (=DSM 15502^T=JCM 11969^T)	Brewery environment	AJ786665	[2, 167]
Secundilactobacillus pentosiphilus comb. nov. [basonym: *Lactobacillus pentosiphilus* Tohno *et al*. 2017] IWT25^T (=JCM 31145^T=DSM 102974^T)	Silage	LC085284	[2, 168]
Secundilactobacillus silagei comb. nov. [basonym: *Lactobacillus silagei* Tohno *et al*. 2013] IWT126^T (=JCM 19001^T=DSM 27022^T)	Silage	AB786910	[2, 169]
Secundilactobacillus silagincola comb. nov. [basonym: *Lactobacillus silagincola* Tohno *et al*. 2017] IWT5^T (=JCM 31144^T=DSM 102973^T)	Silage	LC085283	[2, 168]

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Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Secundilactobacillus similis comb. nov. [basonym: *Lactobacillus similis* Kitahara et al. 2010] JCM 2765^T (=LMG 23904^T)	Fermented cane molasses at alcohol plants	AB282889	[2, 170]
genus*Vagococcus*			
Vagococcus xieshaowenii sp. nov. cf-49^T (=CGMCC 1.16436^T=GDMCC 1.1588 ^{T}=JCM 33477^T)	Snow finch (*Montifringilla taczanowskii*) cloacal content	MF967438	[171]
genus*Weissella*			
Weissella sagaensis sp. nov. X0750^T (=NCIMB 15192^T=CCM 8924^T=LMG 31184^T=CCTCC AB 2018403^T)	Traditional yoghurt in Tibet Autonomous Region, PR China	LC438526	[172]
Weissella muntiaci sp. nov. 8 H-2^T (=BCRC 81133^T=NBRC 113537^T)	Faeces of Formosan barking deer which were collected in Fushan Botanical Garden, Yilan County, Taiwan, ROC in 2017	MK774696	[173]
Weissella cryptocerci sp. nov. 26KH-42^T (=KACC 18423^T=NBRC 113066^T)	gut of an insect, *Cryptocercus kyebangensis*, collected in the mountainous area of Seoraksan, Yangyang-gun, Republic of Korea	MK395366	[174]
Family *Enterococcaceae*			
genus*Enterococcus*			
Enterococcus florum sp. nov. Gos25-1^T (=CIP 110956^T=LMG 29007^T=NBRC 111461^T=TISTR 2382^T)	Cotton flower (*Gossypium hirsutum* L.) collected form Khao Wong district, Kalasin province, Thailand.	LC428281	[175]
Enterococcus pingfangensis sp. nov. 241-2-2^T (=NCIMB 15185^T=CCM 8921^T)	Traditional pickle juice in Hilongjiang province, PR China	LC438519	[176]
Enterococcus dongliensis sp. nov. 63-4^T (=NCIMB 15178^T=CCM 8922^T)	Traditional pickle juice in Heilongjiang province, PR China	LC438513	[176]
Enterococcus hulanensis sp. nov. 190-7^T (=NCIMB 15200^T=CCM 8949^T)	Traditional pickle juice in Heilongjiang province, PR China	LC473138	[176]
Enterococcus nangangensis sp. nov. 94-2^T (=NCIMB 15180^T=CCM 8920^T)	Traditional pickle juice in Heilongjiang province, PR China	LC438515	[176]
Enterococcus songbeiensis sp. nov. 85-4^T (=NCIMB 15179^T=CCM 8923^T)	Traditional pickle juice in Heilongjiang province, PR China	LC438514	[176]
Family *Bifidobacteriaceae*			
genus*Alloscardovia*			
Alloscardovia theropitheci sp. nov. GLDI4/2^T (=DSM 106019^T=JCM 32430^T)	faeces of an adult gelada baboon (*Theropithecus gelada*)	XLP00000000	[177]
genus*Bifidobacterium*			
Bifidobacterium tibiigranuli sp. nov. TMW 2.2057^T (=DSM 108414^T=LMG 31086^T)	Water kefir fermentations carried out in Freising, Germany	MK988442	[178]
Bifidobacterium canis sp. nov. GSD1FS^T (=DSM 105923^T=LMG 30345^T=CCM 8806^T)	Faecal sample of a 3 weeks old German Shepherd dog (*Canis lupus* f. familiaris)	MG028631	[179]
Bifidobacterium xylocopae sp. nov. XV2 (=DSM 104955^T=LMG 30142^T)	Gut samples of carpenter bees (*X. violacea*)	MG597278	[180]
Bifidobacterium aemilianum sp. nov. XV10 (=DSM 104956^T=LMG 30143^T)	Gut samples of carpenter bees (*X. violacea*).	MG597282	[180]

Continued

Table 1. Continued

Species	Origin	16S rRNA accession no.	References
Bifidobacterium leontopitheci sp. nov. 2177B^T (=LMG 31471^T=CCUG 73786^T)	Stool sample of a golden-headed lion tamarin (*Leontopithecus chrysomelas*)	MN443772	[181]
Bifidobacterium cebidarum sp. nov. 2176B^T (=LMG 31469^T=CCUG 73785^T)	Stool sample of a Goeldi's monkey (*Callimico goeldii*)	MN443771	[181]
Bifidobacterium primatium sp. nov. TRE 1^T (=DSM 100687^T=JCM 30945^T)	Faeces of an adult subject of the cotton top tamarin (*Saguinus oedipus*)	KU291307	[182]
Bifidobacterium scaligerum sp. nov. TRE D^T (=DSM 103140^T=JCM 31792^T)	Faeces of an adult subject of the cotton top tamarin (*Saguinus oedipus*).	KU291312	[182]
Bifidobacterium felsineum sp. nov. TRE H^T (=DSM 103139^T=JCM 31789^T)	Faeces of an adult subject of the cotton top tamarin (*Saguinus oedipus*).	KU291314	[182]
Bifidobacterium simiarum sp. nov. TRI 7^T (=DSM 103153^T=JCM 31793^T)	Faeces of an adult subject of the emperor tamarin (*Saguinus imperator*)	KU298956	[182]
Bifidobacterium choloepi sp. nov. BRDM 6^T (=NBRC 114053^T=BCRC 81222^T)	Faeces of an adult subject of the two toed sloth, *Choloepus didactylus*	MN482706	[183]

References

1. Mattarelli P, Felis GE, Pot B, Holzapfel WH, Franz CMAP. International Committee on Systematics of Prokaryotes Subcommittee on the taxonomy of *Bifidobacterium*, *Lactobacillus* and related organisms Minutes of the closed meeting, 20 June 2019, Prague, Czech Republic. *Int J Syst Evol Microbiol* 2020;70:2949–2951.
2. Zheng J, Wittouck S, Salvetti E, Franz CMAP, Harris HMB, *et al*. A taxonomic note on the genus *Lactobacillus*: description of 23 novel genera, emended description of the genus *Lactobacillus* Beijerinck 1901, and union of Lactobacillaceae and Leuconostocaceae. *Int J Syst Evol Microbiol* 2020;70:2782–2858.
3. Meier-Kolthoff JP, Auch AF, Klenk H-P, Göker M. Genome sequence-based species delimitation with confidence intervals and improved distance functions. *BMC Bioinformatics* 2013;14:60.
4. Rocha J, Botelho J, Ksiezarek M, Perovic SU, Machado M, *et al*. *Lactobacillus mulieris* sp. nov., a new species of *Lactobacillus delbrueckii* group. *Int J Syst Evol Microbiol* 2020;70:1522–1527.
5. Yu Y, Li X, Zhang J, Chai L-J, Lu Z-M, *et al*. *Lactobacillus jinshani* sp. nov., isolated from solid-state vinegar culture of Zhenjiang aromatic vinegar. *Antonie van Leeuwenhoek* 2020;113:43–54.
6. Endo A, Okada S. *Lactobacillus composti* sp. nov., a lactic acid bacterium isolated from a compost of distilled shochu residue. *Int J Syst Evol Microbiol* 2007;57:870–872.
7. Wei YX, Gu CT. *Lactobacillus yilanensis* sp. nov., *Lactobacillus bayanensis* sp. nov., *Lactobacillus keshanensis* sp. nov., *Lactobacillus kedongensis* sp. nov., *Lactobacillus baiquanensis* sp. nov., *Lactobacillus jidongensis* sp. nov., *Lactobacillus hulinensis* sp. nov., *Lactobacillus mishanensis* sp. nov. and *Lactobacillus zhongbaensis* sp. nov., isolated from Chinese traditional pickle and yogurt. *Int J Syst Evol Microbiol* 2019;69:3178–3190.
8. Nakamura LK. *Lactobacillus amylovorus*, a new starch-hydrolyzing species from cattle waste-corn fermentations. *Int J Syst Bacteriol* 1981;31:56–63.
9. Naser SM, Vancanneyt M, Snauwaert C, Vrancken G, Hoste B, *et al*. Reclassification of *Lactobacillus amylophilus* LMG 11400 and NRRL B-4435 as *Lactobacillus amylotrophicus* sp. nov. *Int J Syst Evol Microbiol* 2006;56:2523–2527.
10. Endo A, Irisawa T, Futagawa-Endo Y, Takano K, du Toit M, *et al*. Characterization and emended description of *Lactobacillus kunkeei* as a fructophilic lactic acid bacterium. *Int J Syst Evol Microbiol* 2012;62:500–504.
11. Olofsson TC, Alsterfjord M, Nilson B, Butler È, Vásquez A. *Lactobacillus apinorum* sp. nov., *Lactobacillus mellifer* sp. nov., *Lactobacillus mellis* sp. nov., *Lactobacillus melliventris* sp. nov., *Lactobacillus kimbladii* sp. nov., *Lactobacillus helsingborgensis* sp. nov. and *Lactobacillus kullabergensis* sp. nov., isolated from the honey stomach of the honeybee *Apis mellifera*. *Int J Syst Evol Microbiol* 2014;64:3109–3119.
12. Heo J, Kim S-J, Kim J-S, Hong S-B, Kwon S-W. Comparative genomics of Lactobacillus species as bee symbionts and description of *Lactobacillus bombintestini* sp. nov., isolated from the gut of *Bombus ignitus*. *J Microbiol* 2020;58:445–455.
13. Li TT, Liu DD, Fu ML, Gu CT. Proposal of *Lactobacillus kosoi* Chiou et al. 2018 as a later heterotypic synonym of *Lactobacillus micheneri* McFrederick et al. 2018, elevation of *Lactobacillus plantarum* subsprgentoratensis to the species level as *Lactobacillus argentoratensis* sp. nov. *Int J Syst Evol Microbiol* 2020;70.
14. McFrederick QS, Vuong HQ, Rothman JA. *Lactobacillus micheneri* sp. nov., *Lactobacillus timberlakei* sp. nov. and *Lactobacillus quenuiae* sp. nov., lactic acid bacteria isolated from wild bees and flowers. *Int J Syst Evol Microbiol* 2018;68:1879–1884.
15. Kawasaki S, Kurosawa K, Miyazaki M, Sakamoto M, Ohkuma M, *et al*. *Lactobacillus ozensis* sp. nov., isolated from mountain flowers. *Int J Syst Evol Microbiol* 2011;61:2435–2438.
16. Killer J, Votavová A, Valterová I, Vlková E, Rada V, *et al*. *Lactobacillus bombi* sp. nov., from the digestive tract of laboratory-reared bumblebee queens (*Bombus terrestris*). *Int J Syst Evol Microbiol* 2014;64:2611–2617.
17. Reuter G. *Lactobacillus alimentarius* sp. nov., nom rev. and *Lactobacillus farciminis* sp. nov., nom. rev. *Syst Appl Microbiol* 1983;4:277–279.
18. Jung MY, Lee SH, Lee M, Song JH, Chang JY. *Lactobacillus allii* sp. nov. isolated from scallion kimchi. *Int J Syst Evol Microbiol* 2017;67:4936–4942.

19. Mañes-Lázaro R, Ferrer S, Rodas AM, Urdiain M, Pardo I. *Lactobacillus bobalius* sp. nov., a lactic acid bacterium isolated from Spanish Bobal grape must. *Int J Syst Evol Microbiol* 2008;58:2699–2703.
20. Scheirlinck I, Van der Meulen R, Van Schoor A, Huys G, Vandamme P, *et al*. *Lactobacillus crustorum* sp. nov., isolated from two traditional Belgian wheat sourdoughs. *Int J Syst Evol Microbiol* 2007;57:1461–1467.
21. Chang C-H, Chen Y-S, Lee T-T, Chang Y-C, Yu B. *Lactobacillus formosensis* sp. nov., a lactic acid bacterium isolated from fermented soybean meal. *Int J Syst Evol Microbiol* 2015;65:101–106.
22. Irisawa T, Tanaka N, Kitahara M, Sakamoto M, Ohkuma M, *et al*. *Lactobacillus furfuricola* sp. nov., isolated from Nukadoko, rice bran paste for Japanese pickles. *Int J Syst Evol Microbiol* 2014;64:2902–2906.
23. Chao S-H, Kudo Y, Tsai Y-C, Watanabe K. *Lactobacillus futsaii* sp. nov., isolated from fu-tsai and suan-tsai, traditional Taiwanese fermented mustard products. *Int J Syst Evol Microbiol* 2012;62:489–494.
24. Jung H-M, Liu Q-M, Kim J-K, Lee S-T, Kim S-C, *et al*. *Lactobacillus ginsenosidimutans* sp. nov., isolated from kimchi with the ability to transform ginsenosides. *Antonie van Leeuwenhoek* 2013;103:867–876.
25. Schuster JA, Klingl A, Vogel RF, Ehrmann MA. Polyphasic characterization of two novel *Lactobacillus* spp. isolated from blown salami packages: description of *Lactobacillus halodurans* sp. nov. and *Lactobacillus salsicarnum* sp. nov. *Syst Appl Microbiol* 2019;42:126023.
26. Chen Y-S, Wang L-T, Liao Y-J, Lan Y-S, Chang C-H, *et al*. *Lactobacillus musae* sp. nov., a novel lactic acid bacterium isolated from banana fruits. *Int J Syst Evol Microbiol* 2017;67:5144–5149.
27. Fu ML, Gu CT. *Lactobacillus huachuanensis* sp. nov., isolated from Chinese traditional pickle. *Int J Syst Evol Microbiol* 2019;69:2807–2814.
28. Ehrmann MA, Kröckel L, Lick S, Radmann P, Bantleon A, *et al*. *Lactobacillus insicii* sp. nov., isolated from fermented raw meat. *Int J Syst Evol Microbiol* 2016;66:236–242.
29. Kim J, Kim JY, Kim M-S, Roh SW, Bae J-W. *Lactobacillus kimchiensis* sp. nov., isolated from a fermented food. *Int J Syst Evol Microbiol* 2013;63:1355–1359.
30. Yoon JH, Kang SS, Mheen TI, Ahn JS, Lee HJ, *et al*. *Lactobacillus kimchii* sp. nov., a new species from kimchi. *Int J Syst Evol Microbiol* 2000;50 Pt 5:1789–1795.
31. Chiba M, Itabashi T, Hirai K, Sakamoto M, Ohkuma M, *et al*. *Lactobacillus metriopterae* sp. nov., a novel lactic acid bacterium isolated from the gut of grasshopper *Metrioptera engelhardti*. *Int J Syst Evol Microbiol* 2018;68:1484–1489.
32. Ehrmann MA, Müller MRA, Vogel RF. Molecular analysis of sourdough reveals *Lactobacillus mindensis* sp. nov. *Int J Syst Evol Microbiol* 2003;53:7–13.
33. Liu DD, Gu CT. Proposal to reclassify *Lactobacillus zhaodongensis*, *Lactobacillus zeae*, *Lactobacillus argentoratensis* and *Lactobacillus buchneri* subsp. *silagei* as *Lacticaseibacillus zhaodongensis* comb. nov., *Lacticaseibacillus zeae* comb. nov., *Lactiplantibacillus argentoratensis* comb. nov. and *Lentilactobacillus buchneri* subsp. *silagei* comb. nov., respectively and *Apilactobacillus kosoi* as a later heterotypic synonym of *Apilactobacillus micheneri*. *Int J Syst Evol Microbiol* 2020;70:6414–6417.
34. Valcheva R, Ferchichi MF, Korakli M, Ivanova I, Gänzle MG, *et al*. *Lactobacillus nantensis* sp. nov., isolated from French wheat sourdough. *Int J Syst Evol Microbiol* 2006;56:587–591.
35. Kashiwagi T, Suzuki T, Kamakura T. *Lactobacillus nodensis* sp. nov., isolated from rice bran. *Int J Syst Evol Microbiol* 2009;59:83–86.
36. Heo J, Saitou S, Tamura T, Cho H, Kim J-S, *et al*. *Lactobacilus nuruki* sp. nov., isolated from Nuruk, a Korean fermentation starter. *Int J Syst Evol Microbiol* 2018;68:3273–3278.
37. Cai Y, Okada H, Mori H, Benno Y, Nakase T. *Lactobacillus paralimentarius* sp. nov., isolated from sourdough. *Int J Syst Bacteriol* 1999;49 Pt 4:1451–1455.
38. Mattarelli P, Felis G, Franz C, Gänzle MG. Proposal to reclassify four *Lactobacillus* species as *Apilactobacillus bombintestini*, *Companilactobacillus suantsaicola*, *Lactiplantibacillus garii* and *Levilactobacillus suantsaiihabitans*. *Int J Syst Evol Microbiol* 2019;71.
39. Lin S-T, Wang L-T, Wang H-M, Tamura T, Mori K, *et al*. *Lactobacillus suantsaicola* sp. nov. and *Lactobacillus suantsaiihabitans* sp. nov., isolated from suan-tsai, a traditional fermented mustard green product of Taiwan. *Int J Syst Evol Microbiol* 2020;70:2972–2980.
40. Chenoll E, Carmen Macián M, Aznar R. *Lactobacillus tucceti* sp. nov., a new lactic acid bacterium isolated from sausage. *Syst Appl Microbiol* 2006;29:389–395.
41. Kröckel L, Schillinger U, Franz C, Bantleon A, Ludwig W. *Lactobacillus versmoldensis* sp. nov., isolated from raw fermented sausage. *Int J Syst Evol Microbiol* 2003;53:513–517.
42. Zhang Z, Hou Q, Wang Y, Li W, Zhao H, *et al*. *Lactobacillus zhachilii* sp. nov., a lactic acid bacterium isolated from Zha-Chili. *Int J Syst Evol Microbiol* 2019;69:2196–2201.
43. Kato Y, Sakala RM, Hayashidani H, Kiuchi A, Kaneuchi C, *et al*. *Lactobacillus algidus* sp. nov., a psychrophilic lactic acid bacterium isolated from vacuum-packaged refrigerated beef. *Int J Syst Evol Microbiol* 2000;50 Pt 3:1143–1149.
44. Charlton D, Nelson M, Werkman C. Physiology of *Lactobacillus fructivorans* sp. nov. isolated from spoiled salad dressing. *Iowa State Col J Sci* 1934;9:1–11.
45. Endo A, Futagawa-Endo Y, Sakamoto M, Kitahara M, Dicks LMT. *Lactobacillus florum* sp. nov., a fructophilic species isolated from flowers. *Int J Syst Evol Microbiol* 2010;60:2478–2482.
46. Techo S, Miyashita M, Shibata C, Tanaka N, Wisetkhan P, *et al*. *Lactobacillus ixorae* sp. nov., isolated from a flower (West-Indian jasmine). *Int J Syst Evol Microbiol* 2016;66:5500–5505.
47. Back W, Bohak I, Ehrmann M, Ludwig W, Schleifer KH. Revival of the species *Lactobacillus lindneri* and the design of a species specific oligonucleotide probe. *Syst Appl Microbiol* 1996;19:322–325.
48. Weiss N, Schillinger U. *Lactobacillus sanfrancisco* sp. nov., nom. rev. *Syst Appl Microbiol* 1984;5:230–232.
49. Hoang V-A, Kim Y-J, Nguyen N-L, Kim S-K, Yang D-C. *Lactobacillus vespulae* sp. nov., isolated from gut of a queen wasp (*Vespula vulgaris*). *Int J Syst Evol Microbiol* 2015;65:3326–3332.
50. Corsetti A, Settanni L, van Sinderen D, Felis GE, Dellaglio F, *et al*. *Lactobacillus rossii* sp. nov., isolated from wheat sourdough. *Int J Syst Evol Microbiol* 2005;55:35–40.
51. Asakawa Y, Takesue N, Asano S, Shimotsu S, Iijima K, *et al*. *Lactobacillus curtus* sp. nov., isolated from beer in Finland. *Int J Syst Evol Microbiol* 2017;67:3899–3906.
52. Aslam Z, Im W-T, Ten LN, Lee M-J, Kim K-H, *et al*. *Lactobacillus siliginis* sp. nov., isolated from wheat sourdough in South Korea. *Int J Syst Evol Microbiol* 2006;56:2209–2213.
53. Kawasaki S, Kurosawa K, Miyazaki M, Yagi C, Kitajima Y, *et al*. *Lactobacillus floricola* sp. nov., lactic acid bacteria isolated from mountain flowers. *Int J Syst Evol Microbiol* 2011;61:1356–1359.
54. Hansen PA, Lessel EF. *Lactobacillus casei* (Orla-Jensen) comb. nov. *Int J Syst Bacteriol* 1971;21:69–71.
55. Long GY, Gu CT. *Lactobacillus jixianensis* sp. nov., *Lactobacillus baoqingensis* sp. nov., *Lactobacillus jiayinensis* sp. nov., *Lactobacillus zhaoyuanensis* sp. nov., *Lactobacillus lindianensis* sp. nov., *Lactobacillus huananensis* sp. nov., *Lactobacillus tangyuanensis* sp. nov., *Lactobacillus fuyuanensis* sp. nov., *Lactobacillus tongjiangensis* sp. nov., *Lactobacillus fujinensis* sp. nov. and *Lactobacillus mulengensis* sp. nov., isolated from Chinese traditional pickle. *Int J Syst Evol Microbiol* 2019;69:2340–2353.
56. Volokhov DV, Amselle M, Beck BJ, Popham DL, Whittaker P, *et al*. *Lactobacillus brantae* sp. nov., isolated from faeces of Canada geese (*Branta canadensis*). *Int J Syst Evol Microbiol* 2012;62:2068–2076.

57. Tanasupawat S, Pakdeeto A, Thawai C, Yukphan P, Okada S. Identification of lactic acid bacteria from fermented tea leaves (miang) in Thailand and proposals of *Lactobacillus thailandensis* sp. nov., *Lactobacillus camelliae* sp. nov., and *Pediococcus siamensis* sp. nov. *J Gen Appl Microbiol* 2007;53:7–15.
58. Huang C-H, Liou J-S, Lee A-Y, Tseng M, Miyashita M, *et al*. Polyphasic characterization of a novel species in the *Lactobacillus casei* group from cow manure of Taiwan: description of *L. chiayiensis* sp. nov. *Syst Appl Microbiol* 2018;41:270–278.
59. Long GY, Wei YX, Tu W, Gu CT. *Lactobacillus hegangensis* sp. nov., *Lactobacillus suibinensis* sp. nov., *Lactobacillus daqingensis* sp. nov., *Lactobacillus yichunensis* sp. nov., *Lactobacillus mulanensis* sp. nov., *Lactobacillus achengensis* sp. nov., *Lactobacillus wuchangensis* sp. nov., *Lactobacillus gannanensis* sp. nov., *Lactobacillus binensis* sp. nov. and *Lactobacillus angrenensis* sp. nov., isolated from Chinese traditional pickle and yogurt. *Int J Syst Evol Microbiol* 2020;70:2467–2484.
60. Zhao W, Gu CT. *Lactobacillus hulanensis* sp. nov., isolated from suancai, a traditional Chinese pickle. *Int J Syst Evol Microbiol* 2019;69:2147–2152.
61. Morlon-Guyot J, Guyot JP, Pot B, Jacobe de Haut I, Raimbault M. *Lactobacillus manihotivorans* sp. nov., a new starch-hydrolysing lactic acid bacterium isolated during cassava sour starch fermentation. *Int J Syst Bacteriol* 1998;48 Pt 4:1101–1109.
62. Cai Y, Pang H, Kitahara M, Ohkuma M. *Lactobacillus nasuensis* sp. nov., a lactic acid bacterium isolated from silage, and emended description of the genus *Lactobacillus*. *Int J Syst Evol Microbiol* 2012;62:1140–1144.
63. Liu B, Dong X. *Lactobacillus pantheris* sp. nov., isolated from faeces of a jaguar. *Int J Syst Evol Microbiol* 2002;52:1745–1748.
64. Collins MD, Phillips BA, Zanoni P. Deoxyribonucleic acid homology studies of *Lactobacillus casei*, *Lactobacillus paracasei* sp. nov., subsp. *paracasei* and subsp. *tolerans*, and *Lactobacillus rhamnosus* sp. nov., comb. nov. *Int J Syst Bacteriol* 1989;39:105–108.
65. Nguyen DTL, Cnockaert M, Van Hoorde K, De Brandt E, Snauwaert I, *et al*. *Lactobacillus porcinae* sp. nov., isolated from traditional Vietnamese nem chua. *Int J Syst Evol Microbiol* 2013;63:1754–1759.
66. Oki K, Kudo Y, Watanabe K. *Lactobacillus saniviri* sp. nov. and *Lactobacillus senioris* sp. nov., isolated from human faeces. *Int J Syst Evol Microbiol* 2012;62:601–607.
67. Weiss N, Schillinger U, Laternser M, Kandler O. *Lactobacillus sharpeae* sp.nov. and *Lactobacillus agilis* sp.nov., two new species of homofermentative, meso-diaminopimelic acid-containing lactobacilli isolated from sewage. *Zentralblatt für Bakteriologie Mikrobiologie und Hygiene: I Abt Originale C: Allgemeine, angewandte und ökologische Mikrobiologie* 1981;2:242–253.
68. Gu CT, Li CY, Yang LJ, Huo GC. *Lactobacillus mudanjiangensis* sp. nov., *Lactobacillus songhuajiangensis* sp. nov. and *Lactobacillus nenjiangensis* sp. nov., isolated from Chinese traditional pickle and sourdough. *Int J Syst Evol Microbiol* 2013;63:4698–4706.
69. Huang C-H, Chen C-C, Liou J-S, Lee A-Y, Blom J, *et al*. Genome-based reclassification of *Lactobacillus casei*: emended classification and description of the species *Lactobacillus zeae*. *Int J Syst Evol Microbiol* 2020;70:3755–3762.
70. Bringel F, Castioni A, Olukoya DK, Felis GE, Torriani S, *et al*. *Lactobacillus plantarum* subsp. argentoratensis subsp. nov., isolated from vegetable matrices. *Int J Syst Evol Microbiol* 2005;55:1629–1634.
71. Liu DD, Gu CT. *Lactobacillus pingfangensis* sp. nov., *Lactobacillus daoliensis* sp. nov., *Lactobacillus nangangensis* sp. nov., *Lactobacillus daowaiensis* sp. nov., *Lactobacillus dongliensis* sp. nov., *Lactobacillus songbeiensis* sp. nov. and *Lactobacillus kaifaensis* sp. nov., isolated from traditional Chinese pickle. *Int J Syst Evol Microbiol* 2019;69:3237–3247.
72. De Bruyne K, Camu N, De Vuyst L, Vandamme P. *Lactobacillus fabifermentans* sp. nov. and *Lactobacillus cacaonum* sp. nov., isolated from Ghanaian cocoa fermentations. *Int J Syst Evol Microbiol* 2009;59:7–12.
73. Diaz M, Sayavedra L, Atter A, Mayer MJ, Saha S, *et al*. *Lactobacillus garii* sp. nov., isolated from a fermented cassava product. *Int J Syst Evol Microbiol* 2020;70:3012–3017.
74. Mao Y, Chen M, Horvath P. *Lactobacillus herbarum* sp. nov., a species related to *Lactobacillus plantarum*. *Int J Syst Evol Microbiol* 2015;65:4682–4688.
75. Miyashita M, Yukphan P, Chaipitakchonlatarn W, Malimas T, Sugimoto M, *et al*. *Lactobacillus plajomi* sp. nov. and *Lactobacillus modestisalitolerans* sp. nov., isolated from traditional fermented foods. *Int J Syst Evol Microbiol* 2015;65:2485–2490.
76. Curk M-C, Hubert J-C, Bringel F. *Lactobacillus paraplantarum* sp. now., a new species related to *Lactobacillus plantarum*. *Int J Syst Bacteriol* 1996;46:595–598.
77. Zanon P, Farrow JAE, Phillips BA, Collins MD. *Lactobacillus pentosus* sp nov. nom. rev. *Int J Syst Bacteriol* 1987:339–341.
78. Gu CT, Wang F, Li CY, Liu F, Huo GC. *Lactobacillus xiangfangensis* sp. nov., isolated from Chinese pickle. *Int J Syst Evol Microbiol* 2012;62:860–863.
79. Tong H, Dong X. *Lactobacillus concavus* sp. nov., isolated from the walls of a distilled spirit fermenting cellar in China. *Int J Syst Evol Microbiol* 2005;55:2199–2202.
80. Haakensen M, Dobson CM, Hill JE, Ziola B. Reclassification of *Pediococcus dextrinicus* (Coster and White 1964) back 1978 (Approved Lists 1980) as *Lactobacillus dextrinicus* comb. nov., and emended description of the genus *Lactobacillus*. *Int J Syst Evol Microbiol* 2009;59:615–621.
81. Klein G, Dicks LMT, Pack A, Hack B, Zimmermann K, *et al*. Emended descriptions of *Lactobacillus sake* (Katagiri, Kitahara, and Fukami) and *Lactobacillus curvatus* (Abo-Elnaga and Kandler): numerical classification revealed by protein figerprinting and identification based on biochemical patterns and DNA-DNA hybridizations. *Int J Syst Bacteriol* 1996;46:367–376.
82. Torriani S, Van Reenen GA, Klein G, Reuter G, Dellaglio F, *et al*. *Lactobacillus curvatus* subsp. *curvatus* subsp. nov. and *Lactobacillus curvatus* subsp. *melibiosus* subsp nov. and *Lactobacillus sake* subsp. *sake* subsp. nov. and *Lactobacillus sake* subsp. *carnosus* subsp. nov., new subspecies of *Lactobacillus curvatus* abo-el. *Int J Syst Bacteriol* 1996;46.
83. Sakala RM, Kato Y, Hayashidani H, Murakami M, Kaneuchi C, *et al*. *Lactobacillus fuchuensis* sp. nov., isolated from vacuum-packaged refrigerated beef. *Int J Syst Evol Microbiol* 2002;52:1151–1154.
84. Beck R, Weiss N, Winter J. *Lactobacillus graminis* sp. nov., a new species of facultatively heterofermentative *Lactobacilli* surviving at low pH in grass silage. *Syst Appl Microbiol* 1988;10:279–283.
85. Tanizawa Y, Kobayashi H, Nomura M, Sakamoto M, Arita M, *et al*. *Lactobacillus buchneri* subsp. *silagei* subsp. nov., isolated from rice grain silage. *Int J Syst Evol Microbiol* 2020;70:3111–3116.
86. Lei X, Sun G, Xie J, Wei D. *Lactobacillus curieae* sp. nov., isolated from stinky tofu brine. *Int J Syst Evol Microbiol* 2013;63:2501–2505.
87. Krooneman J, Faber F, Alderkamp AC, Elferink SJHWO, Driehuis F, *et al*. *Lactobacillus diolivorans* sp. nov., a 1,2-propanediol-degrading bacterium isolated from aerobically stable maize silage. *Int J Syst Evol Microbiol* 2002;52:639–646.
88. Endo A, Okada S. *Lactobacillus farraginis* sp. nov. and *Lactobacillus parafarraginis* sp. nov., heterofermentative *Lactobacilli* isolated from a compost of distilled shochu residue. *Int J Syst Evol Microbiol* 2007;57:708–712.
89. Douglas HC, Cruess WV. A *Lactobacillus* from California wine: *Lactobacillus hilgardii*. *J Food Science* 1936;1:113–119.
90. Kandler O, Kunath P. *Lactobacillus kefir* sp.nov., a component of the microflora of Kefir. *Syst Appl Microbiol* 1983;4:286–294.
91. Watanabe K, Fujimoto J, Tomii Y, Sasamoto M, Makino H, *et al*. *Lactobacillus kisonensis* sp. nov., *Lactobacillus otakiensis* sp. nov., *Lactobacillus rapi* sp. nov. and *Lactobacillus sunkii* sp. nov., heterofermentative species isolated from sunki, a traditional Japanese pickle. *Int J Syst Evol Microbiol* 2009;59:754–760.

92. Farrow JAE, Phillips BA, Collins MD. Nucleic acid studies on some heterofermentative *Lactobacilli*: description of *Lactobacillus malefermentans* sp.nov. and *Lactobacillus parabuchneri* sp. nov. . *FEMS Microbiol Lett* 1988;55:163–168.
93. Takizawa S, Kojima S, Tamura S, Fujinaga S, Benno Y, *et al*. *Lactobacillus kefirgranum* sp. nov. and *Lactobacillus parakefir* sp. nov., two new species from Kefir grains. *Int J Syst Bacteriol* 1994;44:435–439.
94. Chen Y-S, Wang L-T, Wu Y-C, Mori K, Tamura T, *et al*. *Leuconostoc litchii* sp. nov., a novel lactic acid bacterium isolated from lychee. *Int J Syst Evol Microbiol* 2020;70:1585–1590.
95. Orla-Jensen S. *The Lactic Acid Bacteria*. Host and Son, Copenhagen; 1919.
96. Vancanneyt M, Neysens P, De Wachter M, Engelbeen K, Snauwaert C, *et al*. *Lactobacillus acidifarinae* sp. nov. and *Lactobacillus zymae* sp. nov., from wheat sourdoughs. *Int J Syst Evol Microbiol* 2005;55:615–620.
97. Guu J-R, Wang L-T, Hamada M, Wang C, Lin R-W, *et al*. *Lactobacillus bambusae* sp. nov., isolated from traditional fermented ma bamboo shoots in Taiwan. *Int J Syst Evol Microbiol* 2018;68:2424–2430.
98. Koob J, Jacob F, Wenning M, Hutzler M. *Lactobacillus cerevisiae* sp. nov., isolated from a spoiled brewery sample. *Int J Syst Evol Microbiol* 2017;67:3452–3457.
99. Zhang Z, Wang Y, Hou Q, Zhao H, Li W, *et al*. *Lactobacillus enshiensis* sp. nov., a novel arsenic-resistant bacterium. *Int J Syst Evol Microbiol* 2020;70:2580–2587.
100. Valcheva R, Korakli M, Onno B, Prévost H, Ivanova I, *et al*. *Lactobacillus hammesii* sp. nov., isolated from French sourdough. *Int J Syst Evol Microbiol* 2005;55:763–767.
101. Bui TPN, Kim Y-J, In J-G, Yang D-C. *Lactobacillus koreensis* sp. nov., isolated from the traditional Korean food kimchi. *Int J Syst Evol Microbiol* 2011;61:772–776.
102. Scheirlinck I, Van der Meulen R, Van Schoor A, Cleenwerck I, Huys G, *et al*. *Lactobacillus namurensis* sp. nov., isolated from a traditional Belgian sourdough. *Int J Syst Evol Microbiol* 2007;57:223–227.
103. Vancanneyt M, Naser SM, Engelbeen K, De Wachter M, Van der Meulen R, *et al*. Reclassification of *Lactobacillus brevis* strains LMG 11494 and LMG 11984 as *Lactobacillus parabrevis* sp. nov. *Int J Syst Evol Microbiol* 2006;56:1553–1557.
104. Ehrmann MA, Preissler P, Danne M, Vogel RF. *Lactobacillus paucivorans* sp. nov., isolated from a brewery environment. *Int J Syst Evol Microbiol* 2010;60:2353–2357.
105. Hiraga K, Ueno Y, Sukontasing S, Tanasupawat S, Oda K. *Lactobacillus senmaizukei* sp. nov., isolated from Japanese pickle. *Int J Syst Evol Microbiol* 2008;58:1625–1629.
106. Meroth CB, Hammes WP, Hertel C. Characterisation of the microbiota of rice sourdoughs and description of *Lactobacillus spicheri* sp. nov. *Syst Appl Microbiol* 2004;27:151–159.
107. Liou J-S, Huang C-H, Wang C-L, Lee A-Y, Mori K, *et al*. *Lactobacillus suantsaii* sp. nov., isolated from suan-tsai, a traditional Taiwanese fermented mustard green. *Int J Syst Evol Microbiol* 2019;69:1484–1489.
108. Rogosa M, Wiseman RF, Mitchell JA, Disraely MN, Beaman AJ. Species differentiation of oral *Lactobacilli* from man including description of *Lactobacillus salivarius* nov spec and *Lactobacillus cellobiosus* nov spec. *J Bacteriol* 1953;65:681–699.
109. Tanasupawat S, Shida O, Okada S, Komagata K. *Lactobacillus acidipiscis* sp. nov. and *Weissella thailandensis* sp. nov., isolated from fermented fish in Thailand. *Int J Syst Evol Microbiol* 2000;50 Pt 4:1479–1485.
110. Dent VE, Williams RAD. *Lactobacillus animalis* sp. nov., a new species of *Lactobacillus* from the alimentary canal of animals. *Zentralblatt für Bakteriologie Mikrobiologie und Hygiene: I Abt Originale C: Allgemeine, angewandte und ökologische Mikrobiologie* 1982;3:377–386.
111. Osawa R, Fujisawa T, Pukall R. *Lactobacillus apodemi* sp. nov., a tannase-producing species isolated from wild mouse faeces. *Int J Syst Evol Microbiol* 2006;56:1693–1696.
112. Fujisawa T, Shirasaka S, Watabe J, Mitsuoka T. *Lactobacillus aviarius* sp. nov.: a new species isolated from the intestine of chickens. *Syst Appl Microbiol* 1984;5:414–420.
113. Vela AI, Fernandez A, Espinosa de los Monteros A, Goyache J, Herraez P, *et al*. *Lactobacillus ceti* sp. nov., isolated from beaked whales (*Ziphius cavirostris*). *Int J Syst Evol Microbiol* 2008;58:891–894.
114. Morotomi M, Yuki N, Kado Y, Kushiro A, Shimazaki T, *et al*. *Lactobacillus equi* sp. nov., a predominant intestinal *Lactobacillus* species of the horse isolated from faeces of healthy horses. *Int J Syst Evol Microbiol* 2002;52:211–214.
115. Endo A, Irisawa T, Futagawa-Endo Y, Salminen S, Ohkuma M, *et al*. *Lactobacillus faecis* sp. nov., isolated from animal faeces. *Int J Syst Evol Microbiol* 2013;63:4502–4507.
116. Morita H, Shiratori C, Murakami M, Takami H, Kato Y, *et al*. *Lactobacillus hayakitensis* sp. nov., isolated from intestines of healthy thoroughbreds. *Int J Syst Evol Microbiol* 2007;57:2836–2839.
117. Hemme D, Raibaud P, Ducluzeau R, Galpin JV, Sicard P, *et al*. "*Lactobacillus murinus*" n. sp., a new species of the autochtoneous dominant flora of the digestive tract of rat and mouse (author's transl). *Ann Microbiol* 1980;131:297–308.
118. Chen Y-S, Miyashita M, Suzuki K-I, Sato H, Hsu J-S, *et al*. *Lactobacillus pobuzihii* sp. nov., isolated from pobuzihi (fermented cummingcordia). *Int J Syst Evol Microbiol* 2010;60:1914–1917.
119. Sharpe ME, Latham MJ, Garvie EI, Zirngibl J, Kandler O. Two new species of *Lactobacillus* isolated from the bovine rumen, *Lactobacillus ruminis* sp.nov. and *Lactobacillus vitulinus* sp.nov. *J Gen Microbiol* 1973;77:37–49.
120. Pedersen C, Roos S. *Lactobacillus saerimneri* sp. nov., isolated from pig faeces. *Int J Syst Evol Microbiol* 2004;54:1365–1368.
121. Tohno M, Tanizawa Y, Kojima Y, Sakamoto M, Nakamura Y, *et al*. *Lactobacillus salitolerans* sp. nov., a novel lactic acid bacterium isolated from spent mushroom substrates. *Int J Syst Evol Microbiol* 2019;69:964–969.
122. Beijerink MW. Sur les ferments lactiques de l'industrie. arch ne´erl sci exactes nat se´rie. *Arch Ne´erl Sci Exactes Nat 1901;Se´rie II* 1901;II 7:212–243.
123. Kim H-J, Eom S-J, Park S-J, Cha C-J, Kim G-B. *Lactobacillus alvi* sp. nov., isolated from the intestinal tract of chicken. *FEMS Microbiol Lett* 2011;323:83–87.
124. Roos S, Engstrand L, Jonsson H. *Lactobacillus gastricus* sp. nov., *Lactobacillus antri* sp. nov., *Lactobacillus kalixensis* sp. nov. and *Lactobacillus ultunensis* sp. nov., isolated from human stomach mucosa. *Int J Syst Evol Microbiol* 2005;55:77–82.
125. Killer J, Pechar R, Švec P, Salmonová H, Švejstil R, *et al*. *Lactobacillus caviae* sp. nov., an obligately heterofermentative bacterium isolated from the oral cavity of a guinea pig (*Cavia aperea* f. porcellus). *Int J Syst Evol Microbiol* 2017;67:2903–2909.
126. Nikolaitchouk N, Wacher C, Falsen E, Andersch B, Collins MD, *et al*. *Lactobacillus coleohominis* sp. nov., isolated from human sources. *Int J Syst Evol Microbiol* 2001;51:2081–2085.
127. Endo A, Roos S, Satoh E, Morita H, Okada S. *Lactobacillus equigenerosi* sp. nov., a coccoid species isolated from faeces of thoroughbred racehorses. *Int J Syst Evol Microbiol* 2008;58:914–918.
128. Müller MR, Ehrmann MA, Vogel RF. *Lactobacillus frumenti* sp. nov., a new lactic acid bacterium isolated from rye-bran fermentations with a long fermentation period. *Int J Syst Evol Microbiol* 2000;50 Pt 6:2127–2133.
129. Tsuchida S, Kitahara M, Nguema PPM, Norimitsu S, Fujita S, *et al*. *Lactobacillus gorillae* sp. nov., isolated from the faeces of captive and wild western lowland gorillas (*Gorilla gorilla gorilla*). *Int J Syst Evol Microbiol* 2014;64:4001–4006.

130. Baele M, Vancanneyt M, Devriese LA, Lefebvre K, Swings J, *et al*. *Lactobacillus ingluviei* sp. nov., isolated from the intestinal tract of pigeons. *Int J Syst Evol Microbiol* 2003;53:133–136.
131. Roos S, Karner F, Axelsson L, Jonsson H. *Lactobacillus mucosae* sp. nov., a new species with in vitro mucus-binding activity isolated from pig intestine. *Int J Syst Evol Microbiol* 2000;50 Pt 1:251–258.
132. Farrow JAE, Collins MD. Notes: *Lactobacillus oris* sp. nov. from the human oral cavity. *Int J Syst Bacteriol* 1988;38:116–118.
133. Wiese BG, Strohmar W, Rainey FA, Diekmann H. *Lactobacillus panis* sp. nov., from sourdough with a long fermentation period. *Int J Syst Bacteriol* 1996;46:449–453.
134. Vogel RF, Böcker G, Stolz P, Ehrmann M, Fanta D, *et al*. Identification of *Lactobacilli* from sourdough and description of *Lactobacillus pontis* sp. nov. *Int J Syst Bacteriol* 1994;44:223–229.
135. Kandler O, Stetter K-O, Köhl R. *Lactobacillus reuteri* sp. nov., a new species of heterofermentative *Lactobacilli*. *Zentralblatt für Bakteriologie: I Abt Originale C: Allgemeine, angewandte und ökologische Mikrobiologie* 1980;1:264–269.
136. Ehrmann MA, Brandt M, Stolz P, Vogel RF, Korakli M. *Lactobacillus secaliphilus* sp. nov., isolated from type II sourdough fermentation. *Int J Syst Evol Microbiol* 2007;57:745–750.
137. Embley TM, Faquir N, Bossart W, Collins MD. *Lactobacillus vaginalis* sp. nov. from the human vagina. *Int J Syst Bacteriol* 1989;39:368–370.
138. Carr JG, Davies PA. Homofermentative *Lactobacilli* of ciders including *Lactobacillus mali* nov. spec. *J Appl Bacteriol* 1970;33:768–774.
139. Mañes-Lázaro R, Song J, Pardo I, Cho J-C, Ferrer S. *Lactobacillus aquaticus* sp. nov., isolated from a Korean freshwater pond. *Int J Syst Evol Microbiol* 2009;59:2215–2218.
140. Chao S-H, Tomii Y, Sasamoto M, Fujimoto J, Tsai Y-C, *et al*. *Lactobacillus capillatus* sp. nov., a motile bacterium isolated from stinky tofu brine. *Int J Syst Evol Microbiol* 2008;58:2555–2559.
141. Nielsen DS, Schillinger U, Franz CMAP, Bresciani J, Amoa-Awua W, *et al*. *Lactobacillus ghanensis* sp. nov., a motile lactic acid bacterium isolated from Ghanaian cocoa fermentations. *Int J Syst Evol Microbiol* 2007;57:1468–1472.
142. Rouse S, Canchaya C, van Sinderen D. *Lactobacillus hordei* sp. nov., a bacteriocinogenic strain isolated from malted barley. *Int J Syst Evol Microbiol* 2008;58:2013–2017.
143. Edwards CG, Collins MD, Lawson PA, Rodriguez AV. *Lactobacillus nagelii* sp. nov., an organism isolated from a partially fermented wine. *Int J Syst Evol Microbiol* 2000;50 Pt 2:699–702.
144. Mañes-Lázaro R, Ferrer S, Rosselló-Mora R, Pardo I. *Lactobacillus oeni* sp. nov., from wine. *Int J Syst Evol Microbiol* 2009;59:2010–2014.
145. Endo A, Okada S. *Lactobacillus satsumensis* sp. nov., isolated from mashes of shochu, a traditional Japanese distilled spirit made from fermented rice and other starchy materials. *Int J Syst Evol Microbiol* 2005;55:83–85.
146. Puertas AI, Arahal DR, Ibarburu I, Elizaquível P, Aznar R, *et al*. *Lactobacillus sicerae* sp. nov., a lactic acid bacterium isolated from Spanish natural cider. *Int J Syst Evol Microbiol* 2014;64:2949–2955.
147. Irisawa T, Okada S. *Lactobacillus sucicola* sp. nov., a motile lactic acid bacterium isolated from oak tree (*Quercus* sp.) sap. *Int J Syst Evol Microbiol* 2009;59:2662–2665.
148. Mañes-Lázaro R, Ferrer S, Rosselló-Mora R, Pardo I. *Lactobacillus uvarum* sp. nov.--a new lactic acid bacterium isolated from Spanish Bobal grape must. *Syst Appl Microbiol* 2008;31:425–433.
149. Rodas AM, Chenoll E, Macián MC, Ferrer S, Pardo I, *et al*. *Lactobacillus vini* sp. nov., a wine lactic acid bacterium homofermentative for pentoses. *Int J Syst Evol Microbiol* 2006;56:513–517.
150. Abo-Elnaga IG, Kandler O. On the taxonomy of genus *Lactobacillus* Beijerinck. I. subgenus *Streptobacterium* Orla Jensen. *Zentralblatt fur Bakteriol Parasitenkunde, Infekt und Hyg Zweite naturwissenschaftliche Abt Allg Landwirtsch und Tech Mikrobiol* 1965;119:1–36.
151. Tohno M, Kitahara M, Irisawa T, Masuda T, Uegaki R, *et al*. Description of *Lactobacillus iwatensis* sp. nov., isolated from orchardgrass (*Dactylis glomerata* L.) silage, and *Lactobacillus backii* sp. nov. *Int J Syst Evol Microbiol* 2013;63:3854–3860.
152. Kandler O, Schillinger U, Weiss N. *Lactobacillus bifermentans* sp. nov., nom. rev., an organism forming CO(2) and H(2) from lactic acid. *Syst Appl Microbiol* 1983;4:408–412.
153. Chenoll E, Macián MC, Aznar R. *Lactobacillus rennini* sp. nov., isolated from rennin and associated with cheese spoilage. *Int J Syst Evol Microbiol* 2006;56:449–452.
154. Okada S, Suzuki Y, Kozaki M. A new heterofermentative *Lactobacillus* species with meso-diaminopimelic acid in peptidoglycan, *Lactobacillus vaccinostercus* Kozaki and Okada sp. nov.. *J Gen Appl Microbiol* 1979;25:215–221.
155. Tohno M, Kitahara M, Uegaki R, Irisawa T, Ohkuma M, *et al*. *Lactobacillus hokkaidonensis* sp. nov., isolated from subarctic timothy grass (*Phleum pratense* L.) silage. *Int J Syst Evol Microbiol* 2013;63:2526–2531.
156. Koort J, Murros A, Coenye T, Eerola S, Vandamme P, *et al*. *Lactobacillus oligofermentans* sp. nov., associated with spoilage of modified-atmosphere-packaged poultry products. *Appl Environ Microbiol* 2005;71:4400–4406.
157. Kleynmans U, Heinzl H, Hammes WP. *Lactobacillus suebicus* sp. nov., an obligately heterofermentative *Lactobacillus* species isolated from fruit mashes. *Syst Appl Microbiol* 1989;11:267–271.
158. Oberg CJ, Oberg TS, Culumber MD, Ortakci F, Broadbent JR, *et al*. *Lactobacillus wasatchensis* sp. nov., a non-starter lactic acid bacteria isolated from aged Cheddar cheese. *Int J Syst Evol Microbiol* 2016;66:158–164.
159. Back W, Bohak I, Ehrmann M, Ludwig W, Pot B, *et al*. *Lactobacillus perolens* sp. nov., a soft drink spoilage bacterium. *Syst Appl Microbiol* 1999;22:354–359.
160. Miyamoto M, Seto Y, Hao DH, Teshima T, Sun YB, *et al*. *Lactobacillus harbinensis* sp. nov., consisted of strains isolated from traditional fermented vegetables "Suan cai" in Harbin, Northeastern China and *Lactobacillus perolens* DSM 12745. *Syst Appl Microbiol* 2005;28:688–694.
161. Zou Y, Liu F, Fang C, Wan D, Yang R, *et al*. *Lactobacillus shenzhenensis* sp. nov., isolated from a fermented dairy beverage. *Int J Syst Evol Microbiol* 2013;63:1817–1823.
162. Carr JG, Davies PA. The ecology and classification of strains of *Lactobacillus collinoides* nov. spec.: a bacterium commonly found in fermenting apple juice. *J Appl Bacteriol* 1972;35:463–471.
163. Liang Z-Q, Srinivasan S, Kim Y-J, Kim H-B, Wang H-T, *et al*. *Lactobacillus kimchicus* sp. nov., a β-glucosidase-producing bacterium isolated from kimchi. *Int J Syst Evol Microbiol* 2011;61:894–897.
164. Tohno M, Kitahara M, Irisawa T, Ohmori H, Masuda T, *et al*. *Lactobacillus mixtipabuli* sp. nov. isolated from total mixed ration silage. *Int J Syst Evol Microbiol* 2015;65:1981–1985.
165. Chao S-H, Sasamoto M, Kudo Y, Fujimoto J, Tsai Y-C, *et al*. *Lactobacillus odoratitofui* sp. nov., isolated from stinky tofu brine. *Int J Syst Evol Microbiol* 2010;60:2903–2907.
166. Tohno M, Kitahara M, Irisawa T, Inoue H, Uegaki R, *et al*. *Lactobacillus oryzae* sp. nov., isolated from fermented rice grain (*Oryza sativa* L. subsp. *japonica*). *Int J Syst Evol Microbiol* 2013;63:2957–2962.
167. Suzuki K, Funahashi W, Koyanagi M, Yamashita H. *Lactobacillus paracollinoides* sp. nov., isolated from brewery environments. *Int J Syst Evol Microbiol* 2004;54:115–117.
168. Tohno M, Tanizawa Y, Irisawa T, Masuda T, Sakamoto M, *et al*. *Lactobacillus silagincola* sp. nov. and *Lactobacillus pentosiphilus* sp. nov., isolated from silage. *Int J Syst Evol Microbiol* 2017;67:3639–3644.
169. Tohno M, Kitahara M, Irisawa T, Masuda T, Uegaki R, *et al*. *Lactobacillus silagei* sp. nov., isolated from orchardgrass silage. *Int J Syst Evol Microbiol* 2013;63:4613–4618.

170. Kitahara M, Sakamoto M, Benno Y. *Lactobacillus similis* sp. nov., isolated from fermented cane molasses. *Int J Syst Evol Microbiol* 2010;60:187–190.

171. Ge Y, Yang J, Lai X-H, Zhang G, Jin D, *et al*. *Vagococcus xieshaowenii* sp. nov., isolated from snow finch (*Montifringilla taczanowskii*) cloacal content. *Int J Syst Evol Microbiol* 2020;70:2493–2498.

172. Li YQ, Tian WL, Gu CT. *Weissella sagaensis* sp. nov., isolated from traditional Chinese yogurt. *Int J Syst Evol Microbiol* 2020;70:2485–2492.

173. Lin S-T, Wang L-T, Wu Y-C, Guu J-RJ, Tamura T, *et al*. *Weissella muntiaci* sp. nov., isolated from faeces of Formosan barking deer (*Muntiacus reevesi*). *Int J Syst Evol Microbiol* 2020;70:1578–1584.

174. Heo J, Hamada M, Cho H, Weon H-Y, Kim J-S, *et al*. *Weissella cryptocerci* sp. nov., isolated from gut of the insect *Cryptocercus kyebangensis*. *Int J Syst Evol Microbiol* 2019;69:2801–2806.

175. Techo S, Shiwa Y, Tanaka N, Fujita N, Miyashita M, *et al*. *Enterococcus florum* sp. nov., isolated from a cotton flower (*Gossypium hirsutum* L.). *Int J Syst Evol Microbiol* 2019;69:2506–2513.

176. Li YQ, Gu CT. *Enterococcus pingfangensis* sp. nov., *Enterococcus dongliensis* sp. nov., *Enterococcus hulanensis* sp. nov., *Enterococcus nangangensis* sp. nov. and *Enterococcus songbeiensis* sp. nov., isolated from Chinese traditional pickle juice. *Int J Syst Evol Microbiol* 2019;69:3191–3201.

177. Modesto M, Satti M, Watanabe K, Sciavilla P, Felis GE, *et al*. *Alloscardovia theropitheci* sp. nov., isolated from the faeces of gelada baboon, the "bleeding heart" monkey (*Theropithecus gelada*). *Int J Syst Evol Microbiol* 2019;69:3041–3048.

178. Eckel VPL, Ziegler L-M, Vogel RF, Ehrmann M. *Bifidobacterium tibiigranuli* sp. nov. isolated from homemade water kefir. *Int J Syst Evol Microbiol* 2020;70:1562–1570.

179. Neuzil-Bunesova V, Lugli GA, Modrackova N, Makovska M, Mrazek J, *et al*. *Bifidobacterium canis* sp. nov., a novel member of the *Bifidobacterium pseudolongum* phylogenetic group isolated from faeces of a dog (*Canis lupus* f. familiaris). *Int J Syst Evol Microbiol* 2020;70:5040–5047.

180. Alberoni D, Gaggìa F, Baffoni L, Modesto MM, Biavati B, *et al*. *Bifidobacterium xylocopae* sp. nov. and *Bifidobacterium aemilianum* sp. nov., from the carpenter bee (*Xylocopa violacea*) digestive tract. *Syst Appl Microbiol* 2019;42:205–216.

181. Duranti S, Lugli GA, Viappiani A, Mancabelli L, Alessandri G, *et al*. Characterization of the phylogenetic diversity of two novel species belonging to the genus *Bifidobacterium*: *Bifidobacterium cebidarum* sp. nov. and *Bifidobacterium leontopitheci* sp. nov. *Int J Syst Evol Microbiol* 2020;70:2288–2297.

182. Modesto M, Puglisi E, Bonetti A, Michelini S, Spiezio C, *et al*. *Bifidobacterium primatium* sp. nov., *Bifidobacterium scaligerum* sp. nov., *Bifidobacterium felsineum* sp. nov. and *Bifidobacterium simiarum* sp. nov.: four novel taxa isolated from the faeces of the cotton top tamarin (*Saguinus oedipus*) and the emperor tamarin (*Saguinus imperator*). *Syst Appl Microbiol* 2018;41:593–603.

183. Modesto M, Satti M, Watanabe K, Huang C-H, Liou J-S, *et al*. *Bifidobacteria* in two-toed sloths (*Choloepus didactylus*): phylogenetic characterization of the novel taxon *Bifidobacterium choloepi* sp. nov. *Int J Syst Evol Microbiol* 2020;70:6115–6125.