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Safety Demonstration of Microbial Food Cultures (MFC) in Fermented Food Products

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Safety Demonstration of Microbial Food Cultures (MFC) in Fermented Food Products

Foreword

During the IDF World Dairy Summit in Berlin in September 2009, the last meeting of the former Joint IDF Action Team on Safety and Functionality of Beneficial Micro-Organisms used in Dairy foods paved the way for the follow-up of current and upcoming activities related to probiotics and dairy starter cultures in IDF.

With the adoption of new IDF work titled *Update of Inventory of Microorganisms with a Documented History of Use in Food* (update on the IDF inventory of micro-organisms published in IDF Bulletin 377/2002) a new IDF Task Force was established, comprising the following experts:

E. Bech Hansen (DK) – Chair, F. Bourdichon (FR) – Deputy Chair, B. Berger (CH), C. Farrokh (FR), M.L. Gerds (US), J. Håkansson (SE), W.P. Hammes (DE), J. Harnett (NZ), G. Huys (BE), S Kim (KR), M. Kleerebezem (NL), S. Laulund (DK) – EFFCA, V. Ninane (BE), A.Ouwehand (FI), I.B. Powell (AU), J.B. Prajapati (IN), Y. Seto (JP), E. Ter Schure (NL), A. Van Boven (NL), V. Vankerckhoven (BE), S-S Yoon (KR), A. Zgoda (FR), S. Casaregola (FR), J.C. Frisvad (DK) contributed to the group with expertise on the metabolism and taxonomy of yeast and filamentous fungi.

P. Boyaval (FR), J. Dupont (FR), J.L. Jany (FR), S. Casaregola (FR) helped with the completion of the inventory of microbial species.

S. Tuijtelaars (IDF) assisted the process in her capacity of IDF staff officer in charge of the Task Force.

All these persons are acknowledged for their participation in this extensive work which was completed in due time.

The scientific rationale proposed for building and updating the inventory of microbial species with technological benefit in food fermentation was published on 15 March 2012:

Food Fermentations: Microorganisms with technological beneficial use

Bourdichon, F., Casaregola, S., Farrokh, C., Frisvad, J.C., Gerds, M.L., Hammes, W.P., Harnett, J., Huys, G., Laulund, S., Ouwehand, A., Powell, I.B., Prajapati, J.B., Seto, Y., Ter Schure, E., Van Boven, A., Vankerckhoven, V., Zgoda, A., Tuijtelaars, S., Bech Hansen, E.

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The present IDF Bulletin is composed of four parts:

- Outline of the safety assessment of Microbial Food Cultures (MFC)
- Update of the previously published Inventory in IDF Bulletin 377-2002
- 2012 Inventory of Microbial Species with technological beneficial use
- Conclusion: Continuous Update Process within IDF to maintain the inventory

Nico van Belzen, PhD

Director General of IDF

Brussels, September 2012

Safety Demonstration of Microbial Food Cultures (MFC) in Fermented Food Products

1. A Safety Assessment of Microbial Food Cultures with History of Use in Fermented Dairy Products

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Fermentation, as a process for manufacturing foods, has traditionally been used to preserve perishable products and enhance their nutritional value. Fermented foods are typically associated with local and traditional food consumption. They result from the action of microorganisms causing significant and desirable modifications to the food matrix, through biochemical changes. The growing body of evidence with regard to microorganisms and their ecological role in the food matrix has led to industrial applications of processes of fermentation starting in the early twentieth century through the use of specific dedicated microbiota with various levels of characterization.

Until recently, the safety of fermentation processes and the microorganisms employed has neither been questioned nor regulated. In recent decades, the fermentation processes have directly or indirectly come under various regulatory frameworks in many countries. Several of these regulatory frameworks put emphasis on "the history of use", "traditional food", or "general recognition of safety" without clear guidelines for the expected level of evidence. The evaluation of "positive" microorganisms ought to be conducted through a "classical" microbiological risk assessment (MRA) as used for the "negative" microorganisms – i.e. pathogenic species.

The scope of the current approach of microbial assessment has been widened to microbial species with a known implication in fermentation in all types of food matrices (dairy, meat, fish,

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vegetables, cereals, pulses, fruits, beverages, and vinegar), both in traditional and industrial food products worldwide. The characterization of microbial species is based on the latest changes in microbial taxonomy.

Advances in genetics and physiology have greatly increased our understanding of microbial phylogeny and have led to substantial changes in microbial taxonomy. These advances have generally facilitated the safe use of microorganisms, but have also led to some problems from a regulatory point of view, e.g. some newly described species with a long history of use may possibly be considered as novel. The most difficult problem to solve is to find a way to base a regulatory framework on evolving taxonomy when leading taxonomists cannot find a consensus position for the definition of the taxonomic unit or species. The proposed assessment can be conducted on currently used species of commercial food starter cultures, as well as on the microorganisms documented to constitute the safe and beneficial components of the complex communities associated with food fermentation processes.

Characterization of the species considered is key to performing a relevant assessment. The taxonomy is therefore based on species names with most recent standing in nomenclature. The implication of the proposed species in fermentation process is also documented with published available level of evidence.

Under European regulations, uncertainty may arise when a decision is required as to whether or not a food associated microorganism has to be deemed as novel. Changes in taxonomy may complicate the decision as well as progress of isolation techniques with regard to the use of more sensitive methods or intensified research interests. Based on our approach, it is reasonable to assume that newly described or identified microorganisms involved in the fermentation processes of traditional food should not necessarily be considered as novel (Vogel et al., 2011).

1.1. Introduction: Desired properties of Microbial Food Cultures (MFC) in fermented foods

Preservation of food including the use of fermentation of otherwise perishable raw materials has been used by man since the Neolithic period (around 10 000 years BC). The scientific rationale behind fermentation started with the identification of microorganisms in 1665 by Van Leeuwenhoek and Hooke (Gest, 2004). Pasteur revoked the "spontaneous generation theory" around 1859 (Wyman, 1862, Farley and Geison, 1974). The role of a sole bacterium, "*Bacterium*" *lactis* (*Lactococcus lactis*), in fermented milk was shown around 1877 by Sir John Lister (Santer, 2010). Fermentation, from the Latin word *fervere*, was defined as a chemical process by Louis Pasteur as "La vie sans l'air" (Life without air). From a biochemical point of view, fermentation is a metabolic process of deriving energy from organic compounds without the involvement of an exogenous oxidizing agent. Fermentation plays different roles in food processing. Major roles considered are:

(1) Preservation of food through formation of inhibitory metabolites such as organic acids (lactic acid, acetic acid, formic acid, propionic acid), ethanol, bacteriocins, etc, often in combination with decrease of water activity (by drying or use of salt) (Caplice and Fitzgerald, 1999).

(2) Improving hygiene through inhibition and even elimination of food pathogens (Adams and Mitchell, 2002, Adams and Nicolaides, 2008).

(3) Detoxification of food (e. g. removal of cyanogens, goiterogens, etc) (Hammes and Tichaczek, 1994).

(4) Improving wholesomeness through improved digestibility of polymers after removal of flatulence-causing compounds (van Boekel et al., 2010).

(5) Enrichment of food substrates with essential nutrients (vitamins, proteins and essential amino acid, fatty acids, etc) and enhanced bioavailability of food components through catabolism of the food matrix (Steinkraus, 2004).

(6) Organoleptic properties through effects on flavor, texture and color: flavor compounds are produced by microorganisms during the initial fermentation step or during subsequent ripening. Examples include ripening by lactic acid bacteria in cheese products (Marilley and Casey, 2004, Smit et al., 2005, Lacroix et al., 2010) or yeasts in beverages and vegetable fermentation (Arroyo-Lopez et al., 2008, Sicard and Legras, 2011).

In the following proposed approach, we shall consider one or more documented metabolic activities of a microbial species contributing to the above roles as recognition of its role in a food fermentation process.

In the specific case of microorganisms, the history of use of the species, including information on the past and present use in different parts of the world, constitute the essential pieces of information.

1.2. Overview of Regulatory systems

The need for documenting MFC is tightly linked to the international regulatory environment. It is thus pertinent to give a brief overview of the various regulatory systems in place for such cultures. It is, however, remarkable that MFC have not been defined legally. To alleviate this, EFFCA (European Food and Feed Cultures Association) has proposed the following **definition**: "*Microbial food cultures are live bacteria, yeasts or molds used in food production*". MFC preparations are formulations, consisting of one or more microbial species and/or strains, including media components carried over from the fermentation and components which are necessary for their survival, storage, standardization, and to facilitate their application in the food production process.

United States

In the United States food and substances used in food are regulated according to the Food Drug and Cosmetic Act (1958), in which the status of Generally Recognized As Safe (GRAS) was introduced (FDA, 2010). Accordingly, a GRAS substance is generally recognized, among qualified experts, as having been adequately shown to be safe under the conditions of its intended use. A substance recognized for such use prior to 1958, is by default GRAS (like food used in the EU prior to May 15, 1997 not being Novel Food (Anon, 1997, ILSI Europe Novel Food Task Force, 2003). MFC are an integral part of traditional fermented foods. As a significant number of people have consumed these foods for many centuries before 1958, the fermenting microorganisms of these products can be said to be GRAS. If a substance (microorganism) is GRAS for one food use, it is not necessarily GRAS for all food uses. It is the use of a substance rather than the substance itself that is GRAS, as the safety determination is always limited to its intended conditions of use. When microorganisms with a safe history in food are employed for a different use or at a significantly higher dosage, a GRAS determination for these new uses is needed. There are 3 ways to obtain GRAS status for a MFC in the US:

- A GRAS notification where a person/company informs FDA of a determination that the use of a substance is GRAS and receipt of a no-objection letter from FDA.
- A GRAS determination made by qualified experts outside of the US government and the result is kept by the person/company behind the determination.
- GRAS due to a general recognition of safety based on experience from common use in food by a significant number of people before 1958.

Lists of microorganisms and microbial-derived ingredients used in foods can be found at the FDA web site (FDA, 2001). As a result of the different ways to obtain GRAS, the FDA lists of GRAS substances are not expected to include all substances, nor all pre-1958 natural, nutritional substances. For a more comprehensive US regulatory update on MFC, we refer to a recent review by Stevens and O'Brien Nabors (2009).

European Union

In the European Union, the MFC are considered to be ingredients and must satisfy the legal requirements of regulation (EC) n° 178/2002. Consequently, the responsibility for the safe use of microorganisms in food should be ensured by food manufacturers.

The European Food Safety Authority (EFSA) introduced in 2007 "Qualified Presumption of Safety" (QPS), for a premarket safety assessment of microorganisms used in food and feed production referred to EFSA for a formal assessment of safety (Anon, 2005, Leuschner et al., 2010). This is applicable to food and feed additives, food enzymes and plant protection products (Anon, 2005). The QPS system was proposed to harmonize approaches to the safety assessment of microorganisms across the various EFSA scientific panels. The QPS approach is meant to be a fast track for species for which there is a sufficient body of knowledge, that all strains within a species are assumed to be safe. This presumption may be qualified by some restrictions such as the absence of specific characteristics (e.g. the absence of transmissible antibiotic resistance, absence of food poisoning toxins, absence of surfactant activity, and absence of enterotoxic activity). The QPS list therefore covers only selected groups of microorganisms which have been evaluated by the EFSA. The list is updated annually and published on EFSA's web site (http://www.efsa.europa.eu/en/topics/topic/qps.htm). The absence of a particular organism from the QPS list does not necessarily imply a risk associated with its use. Individual strains may be safe but this cannot be judged from the existing knowledge of the taxonomic unit to which it belongs. Another reason that a species is not on the list could be that EFSA has not been asked to assess the safety of any strains of the species. A review by Herody et al. (2010) gives a thorough description of the European regulatory environment for microbial food cultures.

Denmark

Denmark is the nation with the first national legislation (since 1974) that specifically requires safety approval of MFC. More than 80 species used in 14 different food categories have been approved and are published at the Danish Veterinary and Food Administration web site (Anon, 2009). In 2010 the regulation was changed. Approval is no longer needed, but a notification of a new species or a new application is still required before marketing in Denmark.

1.3. Microbial Taxonomy

The regulatory frameworks of MFC are based on the characterization of the considered species, using the most accurate updated information of systematics and taxonomy. It is therefore somewhat unfortunate that the definition of microbial species as a taxonomic unit still lacks a theoretical basis (Stackebrandt, 2007). Molecular methods have broadened the view we have of bacterial and fungal biodiversity. As a consequence it has been necessary to adopt a pragmatic approach to defining species, and microbial taxonomy has changed considerably in recent decades. There is no reason to believe that microbial taxonomy has found its final form, switching from phenotypic-based classification to a genetic-based one.

Kingdom Monera: the prokaryotes

As proposed by Stackebrandt in the third edition of The Prokaryotes (Stackebrandt, 2006), a prokaryotic species has a phylogenetic component given as "the smallest diagnosable cluster of individual organisms within which there is a parental pattern of ancestry and descendents" (Cracraft, 1983) and a taxonomic component given as "a group of related organisms that is distinguished from similar groups by a constellation of significant genotypic, phenotypic, and ecological characteristics." (Colwell, 1970). In general a polyphasic approach to taxonomy is recommended in bacteriology (Vandamme et al., 1996).

In practice this means that a bacterial species is represented by a type strain with strains showing a high degree of phenotypic and/or genotypic similarity to that type strain regarded as belonging to the same species. Whilst objective measures of relatedness have been proposed (such as

% genome hybridization or sequence similarity) there is no simple consensual definition of the species as a taxonomical unit.

Kingdom Fungi: yeasts and molds

Different concepts to define microbial species are used in fungal taxonomy (Guarro et al., 1999) without reaching a final consensus between the numerous relationships observed between phenotypic and molecular methods (Hawksworth, 2006). Several definitions have been used to describe the yeast domain. Yeasts may be defined as being ascomycetous or basidiomycetous fungi that reproduce vegetatively by budding or fission, with or without pseudohyphae and hyphae, and forming sexual states that are not enclosed in fruiting bodies (Boekhout and Robert, 2003). Phylogenetic studies have now clearly shown the clustering of the hemiascomycetous yeasts forming a single clade within the ascomycota, the other yeasts belonging to the basidiomycetes (Hibbett et al., 2007).

Yeasts used to be commonly identified phenotypically but they are now identified from diagnostic sequences. Techniques using molecular biology are seen as an alternative to traditional methods since they analyze the genome independently of the physiological characteristics which may vary within the species (Boekhout and Robert, 2003, Fernández-Espinar et al., 2006). The nucleotide sequences of the domains D1 and D2 (located at the 5' end of the 26S ribosomal RNA gene), of the 5.8S ribosomal RNA gene and the adjacent intergenic regions ITS1 and ITS2 and of various protein coding sequences such as the actin gene are used to delimit species in multigenic analysis (Daniel and Meyer, 2003). PCR amplification followed by restriction of the ITS ribosomal DNA regions or the non-transcribed DNA region NTS2 and NTS (also called IGS) are also used for the identification of yeasts, although this is considered not as accurate and as universal as D1, D2 or ITS sequencing (Nguyen et al., 2000, Fernández-Espinar et al., 2006). In addition, molecular techniques are more reproducible and faster than the conventional methods based on physiological and morphological characteristics. Furthermore, these techniques prevent misclassification of species on the basis of their sexuality. In some cases, ribosomal D1/D2 sequence comparison is not able to discriminate between species and more discriminating sequences have to be used in parallel (Jacques and Casaregola, 2008). Overall, a combination of proven loci such as *ACT1, RPB1* and *RPB2*, and Elongation Factor genes are suitable if they are included in a multi locus analysis. Genomic studies have greatly helped the search for yeast identification markers (Casaregola et al., 2011; Aguileta et al., 2008).

The variability in the fungal kingdom is even wider considering molds: estimations are currently rated around 100 000 species. It is thought that there are between 700 000 and 1.5 million species that have been yet to be identified and classified (McLaughlin et al., 2009). It has been shown that ITS sequencing has a poor resolution at the species level (Skouboe et al., 1999) for *Penicillium*, and also in bar-coding projects it was found that CO1 or ITS sequences indeed have a poor resolution for many fungal genera (Seifert et al., 2007). It has therefore been proposed, as in zymology, to use several house-keeping genes such as β-tubulin and calmodulin for the phylogenetic component, and morphology, physiology, exoproteins and exometabolites for the phenotypic component of determinative taxonomy, so a polyphasic taxonomic approach is also recommended in mycology.

Recently, a comprehensive monograph on all the genera of anamorphic fungi (hyphomycetes, fungi imperfecti, deuteromycetes, asexual fungi) has been written (Seifert et al., 2011). This book, together with the Dictionary of the Fungi (Kirk et al., 2008), gives an overview of the taxonomic status of all genera of filamentous fungi and how to find recent revisions of the different genera at the species level.

1.4. History of use

Fermented foods generally have a very good safety record (Caplice and Fitzgerald, 1999, Ross et al., 2002, Adams and Nicolaides, 2008). While fermented foods are in themselves generally safe, the fermentation process does not by itself solve the problems of contaminated drinking water, environments contaminated with human waste, improper personal hygiene, flies carrying disease organisms, etc. Improperly fermented foods can be unsafe (Adams and Mitchell, 2002). However, application of the principles that lead to the safety of fermented foods and good manufacturing principles could improve the overall quality and the nutritional value of the food supply (Ross et al., 2002; Prajapati and Nair, 2003).

The concept of 'history of safe use' has appeared recently in regulations and in safety assessment guidance. One definition of 'history of safe use' proposes ''significant human consumption of food over several generations and in a large, genetically diverse population for which there exist adequate toxicological and allergenicity data to provide reasonable certainty that no harm will result from consumption of the food'' (Health Canada, 2003). This definition was also discussed while building the QPS assessment of microorganisms proposed to EFSA (Anon, 2005). A long history of apparently safe use of given microorganisms for the making of a given food suggests a very high safety level for the consumption of such products. Even so, the application in food of a microbial strain belonging to a species with an accepted history of safe use remains subject to consideration of the potential presence of undesirable traits that are of a safety concern (Leuschner et al., 2010).

1.5. Undesired properties for MFCs

Although they have been used since ancient times in fermentation processes without any identified major concern, recent discoveries of rare events of adverse effects caused by microorganisms in fermented foods have been described and raise uncertainty about the level of risk, depending either on the food matrix or the susceptibility of the host (Gasser, 1994, Miceli et al., 2011).

Opportunistic infections

Opportunistic infections caused by commensal bacteria have been described in patients with underlying disease since the late 1970s (Berg and Garlington, 1979, Berg, 1985, Berg, 1995). Owing to its natural presence in different sites of the human body and in fermented food products, the genus *Lactobacillus* has gained particular attention. *Lactobacillus* infections occur at a very low rate in the generally healthy population – estimated 0.5 / 1 million per year (Borriello et al., 2003, Bernardeau et al., 2006). As stated in two reviews of *Lactobacillus* infections: "Underlying disease or immunosuppression are common features in these cases, whereas infection in previously healthy humans is extremely rare"(Aguirre and Collins, 1993). "*Lactobacillus* bacteraemia is rarely fatal per se but serves as an important marker of serious underlying disease" (Husni et al., 1997). Sporadic infections have been reported in immuno-compromised patients. The underlying problems have mainly been central venous catheter (CVC) in place, metabolic disorders, organ failure, or invasive procedures as dental work (Axelrod et al., 1973, Liong, 2008). Infections by other bacterial species used as MFC are also extremely rare (Horowitz et al., 1987, Barton et al., 2001, Mofredj et al., 2007, Leuschner et al., 2010).

Infections with the commonly used yeast and mold species are rare events as well (Enache-Angoulvant and Hennequin, 2005). Most of the infections are due to opportunistic pathogens not recognized as MFC and affect immuno-compromised patients and hospitalized patients (Winer-Muram, 1988, Jacques and Casaregola, 2008).

Toxic metabolites and virulence factors

Biogenic amine formation in fermented foods by lactic acid bacteria (LAB) has been reviewed by Spano et al. (2010) and EFSA (2011). Following food poisoning outbreaks (Sumner et al., 1985), metabolic pathways of histidine and tyrosine decarboxylation have been elucidated (Straub et al., 1995). Screening procedures have been proposed to limit the level of production (Bover-Cid and Holzapfel, 1999, Bover-Cid et al., 2000).

The presence of mycotoxin genes in filamentous fungal species also raises safety concerns, although the level of expression within fermented food is very unlikely to cause any health hazard (Food Standards Australia New Zealand, 2006). Within fungi, the potential for antibiotic production is also an undesired property.

Virulence traits should not be present in microorganisms used in a food-fermentation. A specific risk assessment should be conducted on strains presenting these undesirable properties, even if they belong to a species with a long history of use (Semedo et al., 2003a, Semedo et al., 2003b).

Antibiotic resistance

The emergence and spread of antibiotic resistance is a major global health issue. The on-going Codex ad hoc intergovernmental task force on antimicrobial resistance is focused on the non-human use of antimicrobials. Microorganisms intentionally added to food and feed for technological purposes have not been shown to aggravate the problem of spreading antibiotic resistant pathogens.

Intrinsic resistance or resistance that is caused by mutation in an indigenous gene not associated with mobile elements would represent a very low risk of dissemination. Acquired antibiotic resistance genes, especially when associated with mobile genetic elements (plasmids, transposons), can be transferred to pathogens or other commensals along the food chain, from within the product until consumption.

The role of MFC in the spread of antibiotic resistance has been assessed in fermented foods (Nawaz et al., 2011) as well as more specifically for probiotic food products (Saarela et al., 2007, Mater et al., 2008; Vankerckhoven et al., 2008). Results of such studies confirm the role of a reservoir of antibiotic resistance genes from the food microbiota, without identifying any major health concerns to date.

It is considered that strains carrying acquired antibiotic resistance genes might act as a reservoir of transmissible antimicrobial resistance determinants (FEEDAP, 2005, FEEDAP, 2008). Gene transfer of antibiotic resistance between microorganisms in the food and feed chain is thus considered to be a topic of surveillance for the safety demonstration of microorganisms (FAO and WHO, 2001, FAO and WHO, 2002, Borriello et al., 2003, Gueimonde et al., 2005).

1.6. Conclusion

Either in traditional fermented foods or as new opportunities, the rationalized use of microorganisms in our diet opens new perspectives. In recent years, microorganisms have been used in fields other than the traditional food industry. *Lactococcus* spp. is experimentally used for its potential role in vaccination and microorganisms are also used for the specific production of biogenic compounds. As we did not consider fermentation in liquid tailor-made media, species used in an industrial microbiology process were not considered if no reference to food fermentation could be provided (e.g. *Streptomyces natalensis* for natamycin production).

Microbiological research mostly focuses on the pathogenicity of certain microorganisms while the positive role of some microorganism for improving technological and/or nutritional properties of food has largely been neglected. While there has been a recent focus on the emerging science of the preponderant role of our own microbiota, our "other genome", from the skin, gut, and other mucosa, research activities remain to be carried on characterizing traditional fermented foods consumed for centuries.

1.7. References

1. Adams, M., Mitchell, R., 2002. Fermentation and pathogen control: a risk assessment approach. Int. J. Food Microbiol. 79, 75-83.
2. Adams, M.R., Nicolaides, L., 2008. Review of the sensitivity of different foodborne pathogens to fermentation. Food Control 8, 227-239.

3. Aguileta, G., Marthey, S., Chiapello, H., Lebrun, M.H., Rodolphe, F., Fournier, E., Gendrault-Jacquemard, A., Giraud, T., 2008. Assessing the performance of single-copy genes for recovering robust phylogenies. Syst. Biol. 57, 613-627.
4. Aguirre, M., Collins, M.D., 1993. Lactic acid bacteria and human clinical infection. J. Appl. Bacteriol. 75, 95-107.
5. Anon, 1997. Regulation (EC) No 258/97 of the European Parliament and of the Council of 27 January 1997 concerning novel foods and novel food ingredients N° 258/97, Official Journal L 043, 14/02/1997, 1-6.
6. Anon, 2005. EFSA Scientific Colloquium - Microorganisms in Food and Feed: Qualified Presumption of Safety - 13-14 December 2004, Brussels, Belgium. ISSN 1830-4737. http://www.efsa.europa.eu/en/supporting/pub/109e.htm.
7. Anon, 2009. [Liste over anmeldte mikrobielle kulturer] (List of notified microbial cultures). Denmark. http://www.foedevarestyrelsen.dk/Foedevarer/Tilsaetningsstoffer_og_teknologi/mikrobielle_kulturer/Anmeldelsesordning/Sider/Anmeldelsesordning.aspx
8. Arroyo-Lopez, F.N., Querol, A., Bautista-Gallego, J., Garrido-Fernandez, A., 2008. Role of yeasts in table olive production. Int. J. Food Microbiol. 128, 189-196.
9. Axelrod, J., Keusch, G.T., Bottone, E., Cohen, S.M., Hirschman, S.Z., 1973. Endocarditis caused by *Lactobacillus plantarum*. Ann. Intern. Med. 78, 33-37.
10. Barton, L.L., Rider, E.D., Coen, R.W., 2001. Bacteremic infection with Pediococcus: vancomycin-resistant opportunist. Pediatrics 107, 775-776.
11. Berg, R.D., 1985. Bacterial translocation from the intestines. Jikken Dobutsu 34, 1-16.
12. Berg, R.D., 1995. Bacterial translocation from the gastrointestinal tract. Trends Microbiol. 3, 149-154.
13. Berg, R.D., Garlington, A.W., 1979. Translocation of certain indigenous bacteria from the gastrointestinal tract to the mesenteric lymph nodes and other organs in a gnotobiotic mouse model. Infect. Immun. 23, 403-411.
14. Bernardeau, M., Guguen, M., Vernoux, J., 2006. Beneficial lactobacilli in food and feed: long-term use, biodiversity and proposals for specific and realistic safety assessments. FEMS Microbiology Reviews 30, 487-513.
15. Boekhout, T., Robert, V., 2003. Yeasts in food: Beneficial and detrimental aspects. Woodhead Publishing Series in Food Science, Technology and Nutrition No. 81.
16. Borriello, S.P., Hammes, W.P., Holzapfel, W., Marteau, P., Schrezenmeir, J., Vaara, M., Valtonen, V., 2003. Safety of probiotics that contain lactobacilli or bifidobacteria. Clin. Infect. Dis. 36, 775-780.
17. Bover-Cid, S., Holzapfel, W.F., 1999. Improved screening procedure for biogenic amine production by lactic acid bacteria. Int. J. Food Microbiol. 53, 33-41.
18. Bover-Cid, S., Izquierdo-Pulido, M., Vidal-Carou, M.C., 2000. Mixed starter cultures to control biogenic amine production in dry fermented sausages. J. Food Prot. 63, 1556-1562.
19. Brennan, N.M., Brown, R., Goodfellow, M., Ward, A.C., Beresford, T.P., Vancanneyt, M., Casaregola, S., Weis, S., Morel, G., 2011. New perspectives in hemiascomycetous yeast taxonomy. Comptes Rendus Biologies 334, 590–598.
20. Caplice, E., Fitzgerald, G.F., 1999. Food fermentations: role of microorganisms in food production and preservation. Int J Food Microbiol 50(1-2) 131-49.
21. Colwell, R.R., 1970. Polyphasic taxonomy of the genus *Vibrio*: numerical taxonomy of *Vibrio cholerae*, *Vibrio parahaemolyticus*, and related Vibrio species. J. Bacteriol. 104, 410-433.
22. Cracraft, J., 1983. Species concept and speciation analysis. In: Plenum Press (ed.), Current Ornithology. New York, p. 159-187.
23. Daniel, H.M., Meyer, W., 2003. Evaluation of ribosomal RNA and actin gene sequences for the identification of ascomycetous yeasts. Int. J. Food Microbiol. 86, 61-78.
24. EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Scientific Opinion on risk based control of biogenic amine formation in fermented foods. EFSA Journal 2011;9(10):2393.

25. Enache-Angoulvant, A., Hennequin, C., 2005. Invasive *Saccharomyces* infection: a comprehensive review. Clin. Infect. Dis. 41, 1559-1568.

26. FAO and WHO, 2001. Report on Joint FAO/WHO expert consultation on evaluation of health and nutritional properties of probiotics in food including powder milk with live lactic acid bacteria.

27. FAO and WHO, 2002. Guidelines for the evaluation of probiotics in Food. Joint FAO/WHO Workgroup on Drafting Guidelines for the Evaluation of Probiotics in Food. London, Ontario, Canada, April 30 and May 1, 2002.

28. Farley, J., Geison, G.L., 1974. Science, politics and spontaneous generation in nineteenth-century France: the Pasteur-Pouchet debate. Bull. Hist. Med. 48, 161-198.

29. FDA, 2001. Partial list of microorganisms and microbial-derived ingredients that are used in foods. FDA. http://www.fda.gov/Food/FoodIngredientsPackaging/ucm078956.htm

30. FDA, 2010. Generally Recognized as Safe (GRAS) Notifications. FDA. http://www.fda.gov/AnimalVeterinary/Products/AnimalFoodFeeds/GenerallyRecognizedasSafeGRASNotifications/default.htm

31. FEEDAP, 2005. Opinion of the Scientific Panel on additives and products or substances used in animal feed (FEEDAP) on the updating of the criteria used in the assessment of bacteria for resistance to antibiotics of human or veterinary importance. The EFSA Journal 223, 1-12.

32. FEEDAP, 2008. Technical guidance - Update of the criteria used in the assessment of bacterial resistance to antibiotics of human or veterinary importance. The EFSA Journal 732, 1-15.

33. Fernández-Espinar, M.T., Martorell, P., De Llanos, R., Querol, A., 2006. Molecular methods to identify and characterise yeast in foods and beverages. In: A. Querol and G. H. Fleet (eds.), The yeast handbook. Springer, Berlin.

34. Food Standards Australia New Zealand, 2006. A Risk Profile of Dairy Products in Australia. http://www.foodstandards.gov.au. http://www.foodstandards.gov.au/_srcfiles/P296%20Dairy%20PPPS%20FAR%20Attach%202%20FINAL%20-%20mr.pdf

35. Gasser, F., 1994. Safety of lactic-acid bacteria and their occurence in human clinical infections. Bulletin de l'Institut Pasteur 94, 45-67.

36. Gest, H., 2004. The discovery of microorganisms by Robert Hooke and Antoni van Leeuwenhoek, Fellows of The Royal Society. Notes Rec. R. Soc. Lond. 58, 187-201.

37. Guarro, J., Gene, J.,Stchigel, A.M., 1999. Developments in fungal taxonomy. Clin. Microbiol. Rev. 12, 454-500.

38. Gueimonde, M., Ouwehand, A.C., Salminen, S., 2005. Safety of Probiotics. Scand. J. Nutr. 48, 42-48.

39. Hammes, W.P., Tichaczek, P.S., 1994. The potential of lactic acid bacteria for the production of safe and wholesome food. Z. Lebensm. Unters. Forsch. 198, 193-201.

40. Hawksworth, D.L., 2006. Pandora's mycological box: molecular sequences vs. morphology in understanding fungal relationships and biodiversity. Rev. Iberoam. Micol. 23, 127-133.

41. Health Canada, 2003. Amendment (Schedule No. 948) to Division 28 of the Food and Drug Regulations, Sections B.28.001–003. Food and Drugs Regulations.

42. Herody, C., Soyeux, Y., Bech Hansen, E., Gillies, K., 2010. The Legal Status of Microbial Food Cultures in the European Union: An Overview. European Food and Feed Law Review 5/2010, 258-269.

43. Hibbett, D.S., Binder, M., Bischoff, J.F., Blackwell, M., Cannon, P.F., Eriksson, O.E., Huhndorf, S., James, T., Kirk, P.M., Lucking, R., Thorsten, L.H., Lutzoni, F., Matheny, P.B., McLaughlin, D.J., Powell, M.J., Redhead, S., Schoch, C.L., Spatafora, J.W., Stalpers, J.A., Vilgalys, R., Aime, M.C., Aptroot, A., Bauer, R., Begerow, D., Benny, G.L., Castlebury, L.A., Crous, P.W., Dai, Y.C., Gams, W., Geiser, D.M., Griffith, G.W., Gueidan, C., Hawksworth, D.L., Hestmark, G., Hosaka, K., Humber, R.A., Hyde, K.D., Ironside, J.E., Koljalg, U., Kurtzman, C.P., Larsson, K.H., Lichtwardt, R., Longcore, J., Miadlikowska, J., Miller, A., Moncalvo, J.M., Mozley-Standridge, S., Oberwinkler, F., Parmasto, E., Reeb, V., Rogers, J.D., Roux, C., Ryvarden, L., Sampaio,

J.P., Schussler, A., Sugiyama, J., Thorn, R.G., Tibell, L., Untereiner, W.A., Walker, C., Wang, Z., Weir, A., Weiss, M., White, M.M., Winka, K., Yao, Y.J., Zhang, N., 2007. A higher-level phylogenetic classification of the Fungi. Mycol. Res. 111, 509-547.

44. Horowitz, H.W., Handwerger, S., van Horn, K.G., Wormser, G.P., 1987. Leuconostoc, an emerging vancomycin-resistant pathogen. Lancet 2, 1329-1330.
45. Husni, R.N., Gordon, S.M., Washington, J.A., Longworth, D.L., 1997. *Lactobacillus* bacteremia and endocarditis: review of 45 cases. Clin. Infect. Dis. 25, 1048-1055.
46. ILSI Europe Novel Food Task Force, 2003. The safety assessment of novel foods and concepts to determine their safety in use. Int. J. Food Sci. Nutr. 54 Suppl, S1-32.
47. Jacques, N., Casaregola, S., 2008. Safety assessment of dairy microorganisms: the hemiascomycetous yeasts. Int. J. Food Microbiol. 126, 321-326.
48. Kirk, P.M., Cannon, P.F., Minter, D.W., Staalpers, J.A., 2008. Ainsworth & Bisby's Dictionary of the Fungi. 10th ed. CAB International, Wallingford.
49. Lacroix, N., St Gelais, D., Champagne, C.P., Fortin, J., Vuillemard, J.C., 2010. Characterization of aromatic properties of old-style cheese starters. J. Dairy Sci. 93, 3427-3441.
50. Leuschner, R.-G.K., Robinson, T., Hugas, M., Cocconcelli, P.S., Richard-Forget, F., Klein, G., Licht, T.R., Nguyen-The, C., Querol, A., Richardson, M., Suarez, J.E., Vlak, J.M., von Wright, A., 2010. Qualified presumption of safety (QPS): a generic risk assessment approach for biological agents notified to the European Food Safety Authority (EFSA). Trends Food Sci. Technol. 21, 425-435.
51. Liong, M.T., 2008. Safety of probiotics: translocation and infection. Nutrition Reviews 66, 192-202.
52. Marilley, L., Casey, M.G., 2004. Flavors of cheese products: metabolic pathways, analytical tools and identification of producing strains. Int. J. Food Microbiol. 90, 139-159.
53. Mater, D.D., Langella, P., Corthier, G., Flores, M.J., 2008. A probiotic *Lactobacillus* strain can acquire vancomycin resistance during digestive transit in mice. J. Mol. Microbiol. Biotechnol. 14, 123-127.
54. McLaughlin, D.J., Hibbett, D.S., Lutzoni, F., Spatafora, J.W., Vilgalys, R., 2009. The search for the fungal tree of life. Trends Microbiol. 17, 488-497.
55. Miceli, M.H., Diaz, J.A., Lee, S.A., 2011. Emerging opportunistic yeast infections. Lancet Infect. Dis. 11, 142-151.
56. Mofredj, A., Bahloul, H., Chanut, C., 2007. *Lactococcus lactis*: an opportunistic bacterium? Médecine et Maladies Infectieuses, 37, 200-207.
57. Nawaz, M., Wang, J., Zhou, A., Ma, C., Wu, X., Moore, J.E., Cherie, M.B., Xu, J., 2011. Characterization and transfer of antibiotic resistance in lactic acid bacteria from fermented food products. Curr. Microbiol. 62, 1081-1089.
58. Nguyen, H.V., Lepingle, A., Gaillardin, C.A., 2000. Molecular typing demonstrates homogeneity of *Saccharomyces uvarum* strains and reveals the existence of hybrids between *S. uvarum* and *S. cerevisiae*, including the *S. bayanus* type strain CBS 380. Syst. Appl. Microbiol. 23, 71-85.
59. Prajapati, J.B., Nair, B.M., 2003. The history of fermented foods. In: Farnworth, E.R., (Ed.), Fermented Functional foods. CRC Press, Boca Raton, New York, London, Washington DC, pp. 1-25.
60. Ross, R.P., Morgan, S., Hill, C., 2002. Preservation and fermentation: past, present and future. Int. J. Food Microbiol. 79, 3-16.
61. Saarela, M., Maukonen, J., von Wright, A., Vilpponen-Salmela, T., Patterson, A.J., Scott, K.P., Hamynen, H., Matto, J., 2007. Tetracycline susceptibility of the ingested *Lactobacillus acidophilus* LaCH-5 and *Bifidobacterium animalis* subsp. lactis Bb-12 strains during antibiotic/probiotic intervention. Int. J Antimicrob. Agents 29, 271-280.
62. Santer, M., 2010. Joseph Lister: first use of a bacterium as a 'model organism' to illustrate the cause of infectious disease of humans. Notes Rec. R. Soc. Lond. 64, 59-65.

63. Seifert K.A., Morgan-Jones, G., Gams, W., Kendrick, B., 2011. The genera of hyphomycetes. CBS-KNAW Fungal Biodiversity Centre, Utrecht.

64. Seifert, K.A., Samson, R.A., de Waard, J.R., Houbraken, J., Lévesque, C.A., Moncalvo, J.-M., Louis-Seize, G., Hebert, P.D.N., 2007. Prospect for fungus identification using CO1 DNA barcodes, with *Penicillium* as a test case. Proc. Nat. Acad. Sci. USA, 104, 3901-3906.

65. Semedo, T., Almeida, S.M., Martins, P., Silva Lopes, M.F., Figueiredo Marques, J.J., Tenreiro, R., Barreto Crespo, M.T., 2003a. Comparative study using type strains and clinical and food isolates to examine hemolytic activity and occurrence of the cyl operon in enterococci. J. Clin. Microbiol. 41, 2569-2576.

66. Semedo, T., Santos, M.A., Lopes, M.F., Figueiredo Marques, J.J., Barreto Crespo, M.T., Tenreiro, R., 2003b. Virulence factors in food, clinical and reference enterococci: A common trait in the genus? Syst. Appl. Microbiol. 26, 13-22.

67. Sicard, D, Legras, J.L., 2011. Bread, beer and wine: yeast domestication in the *Saccharomyces sensu stricto* complex. C.R. Biol. 334 (3), 229-36.

68. Skouboe, P., Frisvad, J.C., Lauritsen, D., Boysen, M., Taylor, J.W., Rossen, L., 1999. Nucleotide sequences from the ITS region of Penicillium species. Mycological Research 103, 873-881.

69. Smit, G., Smit, B.A., Engels, W.J., 2005. Flavor formation by lactic acid bacteria and biochemical flavor profiling of cheese products. FEMS Microbiol. Rev. 29, 591-610.

70. Spano, G., Russo, P., Lonvaud-Funel, A., Lucas, P., Alexandre, H., Grandvalet, C., Coton, E., Coton, M., Barnavon, L., Bach, B., Rattray, F., Bunte, A., Magni, C., Ladero, V., Alvarez, M., Fernandez, M., Lopez, P., de Palencia, P.F., Corbi, A., Trip, H., Lolkema, J.S., 2010. Biogenic amines in fermented foods. Eur. J. Clin. Nutr. 64 Suppl 3, S95-100.

71. Stackebrandt, E., 2006. Defining taxonomic ranks. In: Springer (ed.), Prokaryotes. p. 29-57.

72. Stackebrandt, E., 2007. Forces shaping bacterial systematics. Microbe, 2, 283-288.

73. Steinkraus, K.H., 2004. Origin and History of Food Fermentations. In: Hui, Y.H., Meunier-Goddik, L., Hansen, A.S., Josephsen, J., Nip, W.-K., Stanfield, P.S., Toldra, F. (Eds.), Handbook of Food and Beverage Fermentation Technology. CRC Press. pp. 1-9.

74. Stevens, H.C., O'Brien Nabors, L., 2009. Microbial food cultures: a regulatory update. Food Technology 63, 36-41.

75. Straub, B.W., Kicherer, M, Schilcher, S.M., Hammes, W.P., 1995. The formation of biogenic amines by fermentation organisms. Z. Lebensm. Unters. Forsch. 201, 79-82.

76. Sumner, S.S., Speckhard, M.W., Somers, E.B., Taylor, S.L., 1985. Isolation of histamine-producing *Lactobacillus buchneri* from Swiss cheese implicated in a food poisoning outbreak. Appl. Environ. Microbiol. 50, 1094-1096.

77. van Boekel, M., Fogliano, V., Pellegrini, N., Stanton, C., Scholz, G., Lalljie, S., Somoza, V., Knorr, D., Jasti, P.R., Eisenbrand, G., 2010 . A review on the beneficial aspects of food processing. Mol. Nutr. Food Res. 54, 1215-1247.

78. Vandamme, P., Bot, P., Gillis, M., de Vos, P., Kersters, K., Swings, J., 1996. Polyphasic taxonomy, a consensus approach to bacterial systematics. Microbiol.Rev., 60, 407-438.

79. Vankerckhoven, V., Huys, G., Vancanneyt, M., Vael, C., Klare, I., Romond, M.-B., Entenza, J.M., Moreillon, P., Wind, R.D., Knol, J., Wiertz, E., Pot, B., Vaughan, E.E., Kahlmeter, G., Goossens, H., 2008. Biosafety assessment of probiotics used for human consumption: Recommendations from the EU-PROSAFE project. Trends in Food Science and Technology 19, 102-114.

80. Vogel, R.F., Hammes, W.P., Habermeyer, M., Engel, K.H., Knorr, D., Eisenbrand, D., 2011. Microbial food cultures - opinion of the Senate Commission on Food Safety (SKLM) of the German Research Foundation (DFG). Mol. Nutr. Food Res. in press.

81. Winer-Muram, H.T., 1988. Geotrichosis: who is susceptible? Chest 94, 1315-1316.

82. Wyman, J., 1862. Spontaneous Generation. Br. Med. J. 2, 311-312.

2. Building an Inventory of Microbial Food Cultures with a Technological Role in Fermented Food Products

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Authoritative lists of microorganisms with a documented use in food have come into high demand recently with regulatory emphasis on "the history of use", "traditional food", or "general recognition of safety". As a result of a joint project between the International Dairy Federation (IDF) and the European Food and Feed Cultures Association (EFFCA), an authoritative list of microorganisms with a documented use in food was published in 2002 (Mogensen et al., 2002b). The "2002 IDF/EFFCA inventory" has become a de facto reference for food cultures in practical use. The need for an update of the list was expressed following the major evolution in taxonomy and available evidence of a positive role of microbial species beyond commercially available dairy cultures. Cultures used in other food matrices and some species of complex microbiota of traditional fermented food products needed also to be considered. The inventory has been revised and its scope widened to microorganisms with a role in fermentation by including recognized microorganisms from a wide range of food matrices (dairy, meat, fish, vegetables, cereals, beverages, and vinegar). Commensal microbiota with an undetermined role however are not considered.

A pragmatic approach for updating the inventory was chosen. We started from the initial 2002 IDF/EFFCA inventory (Mogensen et al., 2002b). We then asked members and National Committees of IDF and members of EFFCA about identified omissions from this list. In parallel we searched the literature for documentation of food fermentations with emphasis on microbial associations and food matrices not initially covered (Mogensen et al., 2002a). From this greatly expanded list we then critically reviewed the literature for each species in order to retain only microbial species making desirable contributions to the food fermentation. This final step is not without ambiguity as taste and flavor preferences can be quite different, and what some people

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would consider spoilage can be regarded as desirable by others. We have tended to be conservative, and we will therefore expect that the current list is less than exhaustive. As such, the list cannot be considered as definitive, and will be part of a continuous updating process.

The criteria chosen for including species in the list are:

Inclusion

- Microbial species with a documented presence in fermented foods

Exclusion

- Lack of documentation for any desirable function in the fermentation process
- The species is a contaminant and / or does not harbor any relevant metabolic activity
- The species is undesirable in food for scientifically documented reasons

Microorganisms conferring a health benefit to the host (FAO and WHO, 2002) are thus included if they are part of a culture used in a food fermentation process, while we have decided not to include microbial species of probiotic strains only used in supplements or over the counter (OTC) products.

2.1. Example of evaluation of incorporating microbial species

In order to evaluate the history of safe use of a microorganism, it is necessary to document not just the occurrence of a microorganism in a fermented food, but also to provide evidence whether the presence of the microorganism is beneficial, fortuitous, or undesired. As an example, Paludan-Muller and colleagues considered the demonstration for two types of fermented seafood: plaa-som from Thailand (Paludan-Muller et al., 1999, Paludan-Muller et al., 2002), and jeotgal from Korea (Guan et al., 2011).

For the Thai fermented seafood, the role of microorganisms in the fermentation process was demonstrated beyond isolation from the food (Kopermsub and Yunchalard, 2010, Saithong et al., 2010), and therefore the identified microbial species were incorporated in the inventory. This was not the case, at least according to the criteria defined for incorporation, for most of the species isolated within the Korean seafood jeotgal. Until further evidence is provided, it is not possible to explain the role of the 19 novel species identified in this fermented food and decide which ones are to be included in the inventory and which ones are to be considered as commensals.

2.2. Kingdom Monera – Bacterial Species

Actinobacteriaceae

Bifidobacterium is represented with eight species as in the 2002 IDF/EFFCA inventory. *B. infantis* disappeared, as this taxon is now transferred to *B. longum* as *B. longum* subsp. *infantis. B. thermophilum* has been included in the list as this species has also been reported to have food applications (Xiao et al., 2010).

Brachybacterium has entered the list with two species, *B. alimentarium* and *B. tyrofermentans*. Both species have been characterized as important and beneficial components of the surface microbiota of Gruyère and Beaufort cheese (Schubert et al., 1996).

Brevibacterium aurantiacum, a species established in 2005, has entered the list. This species is like the two other *Brevibacterium* species, *B. linens* and *B. casei*, a component of the red smear ripening microbiota for surface ripened cheeses (Leclercq-Perlat et al., 2007).

Corynebacterium casei and *Corynebacterium variabile* have been added to the list as both are components of the surface ripening microbiota. *C. casei* is a relatively "new" species (Bockelmann et al., 2005).

Microbacterium has entered the list with one species, *M. gubbeenense*. *M. gubbeenense* is a component of the traditional red smear surface culture of surface ripened cheeses (Bockelmann et al., 2005). The species was first proposed by Brennan and colleagues in 2001 (Brennan et al., 2001), and before this, *M. gubbeenense* isolates would have been considered members of *Arthrobacter nicotinae*, a species already included in the "2002 IDF/EFFCA Inventory".

Micrococcus was previously represented with one species, *M. varians*. The species was renamed and attributed to the genus *Kocuria* (Stackebrandt et al., 1995). On the current list *Micrococcus* is represented with the two species *M. luteus* and *M. lylae* used for cheese ripening and meat fermentation respectively (Bonnarme et al., 2001, Garcia Fontan et al., 2007).

Propionibacterium includes one new subspecies, *P. freudenreichii* subsp. globosum, and the newly added species *P. jensenii*. The species *P. arabinosum* is considered to be synonymous with *P. acidipropionici* and is therefore no longer on the list as a separate entity.

Firmicutes

Bacillus was represented with one species, *B. coagulans*, in the 2002 IDF/EFFCA inventory. Other *Bacillus* species have been included in the inventory due to the widening of scope of the updated inventory and incorporation of new food matrices such as cocoa beans (Schwan and Wheals, 2010) and soy bean natto, *B. subtilis* (Kubo et al., 2011).

Carnobacterium is represented with three species, *C. divergens, C. maltaromaticum*, and *C. piscicola*. The inclusion of *Carnobacterium* commonly used in meat fermentations stems from widening the scope of the list from dairy to food fermentations (Hammes et al., 1992).

The genus *Lactobacillus* was already widely present in the initial inventory. Owing to its wide use in other food matrices and the new scope of the inventory, this is the genus with the largest number of changes and still well represented, now by 82 species.

Lactococcus has only been expanded with a single species *L. raffinolacti*s, a species occasionally involved in the ripening of cheese (Ouadghiri et al., 2005).

Also *Streptococcus* has grown with a single species due to the use of *S. gallolyticus* subsp. *macedonicus* in ripening cultures for cheese (Georgalaki et al., 2000).

Among the *enterococci*, *Enterococcus faecalis* has entered the list owing to its use in dairy, meat, vegetables (Foulquie Moreno et al., 2006).

Leuconostoc is also a genus having expanded considerably from the two species present in the 2002 IDF/EFFCA inventory. This is mainly due to the inclusion of species useful for coffee and vegetable fermentations, among which are also several species being proposed recently as *L. holzapfelii*, *L. inhae*, *L. kimchii,* and *L. palmae*.

Staphylococcus is now represented with 13 species. The growth in number is caused by the consideration of mostly meat fermentation processes and the role in numerous other food matrices, mostly in production of aromatic compounds (Nychas and Arkoudelos, 1990).

The genus *Tetragenococcus* was proposed in 1990 and validated in 1993 for newly identified species and some species previously belonging to *Pediococcus* and *Enterococcus*.

The genus *Weissella* was introduced in 1993 for some species previously belonging to the *Leuconostoc mesenteroides* species group. *Weissella* species are used for fermentation of meat, fish, cabbage (Kimchi), cassava, and cacao (Collins et al., 1993).

Proteobacteriaceae

Acetobacter and *Gluconacetobacter* are represented with nine and eight species, respectively. They are mainly utilized in the production of vinegar but also of importance in the fermentation of cocoa and coffee (Sengun and Karabiyikli, 2011).

Halomonas elongata, a new species of the family *Enterobacteriaceae*, has been added to the list because of its relevance in meat fermentation.

Klebsiella mobilis, formerly *Enterobacter aerogenes* in the 2002 IDF inventory, was rejected as the reference of food usage (Gassem, 1999) indicated the species as part of the spoilage microbiota.

As a consequence of the widened scope of the inventory, the genus *Zymomonas* has been added to the list. It is represented by the species *Z. mobilis*, which is widely used for the fermentation of alcoholic beverages in many tropical areas of America, Africa, and Asia (Rogers et al., 1984).

2.3. Kingdom Fungi – Fungal Species

The number of yeast species with beneficial use for foods has grown considerably, both because of taxonomic changes, and because additional yeast species have been described as important in natural fermentations. Most of the species recorded as *Candida* in the former list have been transferred to other genera or included under the teleomorphic name. At the most recent International Botanical Congress (Melbourne, July 2011) it was decided to adopt the principle of "one fungus, one name", as is already done in Zygomycota. Thus it is preferred to refer to the most well known species as *Saccharomyces cerevisiae* (the teleomorphic and holomorphic name), rather than the anamorphic name *Candida robusta*. This is in accordance with the new rules as guided by the International Code of Botanical Nomenclature Article 59, fungi in Ascomycota and Basidiomycota.

Regarding *Candida*, many additional species have been suggested for beneficial use in foods, including *C. etchellsii*, *C. intermedia*, *C. maltosa*, *C. versatilis* and *C. zeylanoides*. Teleomorphic states are not known for these species. *Candida famata* is the anamorph of *Debaryomyces hansenii*. *Candida utilis*, used for single cell protein production, should be called *Cyberlindnera jadinii*. *Williopsis mrakii* (= Hansenula mrakii) is now also included in the genus *Cyberlindnera* as *C. mrakii*. *Saccharomyces unisporus* has been transferred to *Kazachstania unispora*, and *Candida holmii* has also been transferred to *Kazachstania* as *K. exigua*. *Candida krusei* is now called *Issatchenkia orientalis*. *Candida kefyr* (= *Candida pseudotropicalis*) is placed in *Kluyveromyces marxianus*. *Candida valida* is now called *Pichia membranefaciens* and finally *Saccharomyces florentinus* is now called *Zygotorulaspora florentina* (Boekhout and Robert, 2003; Kurtzman et al., 2011).

Other species recently suggested include *Clavispora lusitanae*, *Cystofilobasidium infirmominiatum*, *Dekkera bruxellensis, Hanseniaspora uvarum, Kazachstania turicensis, Metschnikowia pulcherrima, Pichia occidentalis, Rhodosporidium sp., Saccharomyces pastorianus, Saccharomycopsis fibuligera, Saturnisporus saitoi, Sporobolomyces roseus, Torulaspora delbrueckii, Trichosporon cutaneum, Wickerhamomyces anomalus, Yarrowia lipolytica, Zygosaccharomyces bailii*, and *Z. rouxii*. Many of these species have been found as the natural biota of fruits, vegetables, cheeses, meat, etc., and since raw products and organic products are now widely accepted, many species that would formerly be regarded as spoilers, are now regarded as beneficial organisms, at least in some cases. In the current update of the inventory of microorganisms we tend to be conservative and only include species with a well documented technological benefit. One example is *Dekkera bruxellensis* (anamorph *Brettanomyces bruxellensis*), which was formerly regarded as a spoiler of beer (and wine). However, it is used for production of Belgian Lambic-Geuze beer.

D. bruxellensis produces acetic acid that in moderate amounts gives a unique taste to those beers. Other examples are *Debaryomyces hansenii* and *Yarrowia lipolytica* which are very important for aroma formation in Munster and Parmesan cheeses, in cacao fermentation *Saccharomyces cerevisiae*, *Hanseniaspora uvarum, Kluyveromyces marxianus* and *Pichia fermentans* are extremely important for the development of the fine aroma of cacao beans (Boekhout and Roberts, 2003).

Filamentous fungi (molds)

Several fungal starter cultures commonly used in Asia could potentially be used in Europe, as fungi can add fiber, vitamins, proteins etc. to fermented foods, or be consumed as single cell protein (SCP) (Nout, 2000; 2007).

Verticillium lecanii has changed to *Lecanicillium lecanii* (Zare and Gams, 2001), and this strain has been listed as potentially useful for cheese ripening.

Aspergillus species were not mentioned in the first 2002 IDF/EFFCA inventory list as they are not commonly used in fermented dairy products. *Aspergillus oryzae* and *A. sojae* are used in the production of miso and soya sauce fermentations. *Aspergillus oryzae* and *A. niger* are also used for production of sake and awamori liquors, respectively (Nout, 2000, 2007). *Aspergillus acidus* is used for fermenting tea (Puerh tea) (Mogensen et al., 2009). *Rhizopus oligosporus* is used in the fermentation process of Tempeh (Hachmeister and Fung, 1993).

Fusarium domesticum was first identified as *Trichothecium domesticum*, but was later allocated to *Fusarium* (Bachmann et al., 2005; Schroers et al., 2009; Gräfenham et al., 2011). This species has been used for cheese fermentations (cheese smear). *Fusarium solani* DSM 62416 was isolated from a Vacherin cheese, but has not been examined taxonomically in detail yet. *Fusarium venenatum* A 3/5 (first identified as *F. graminearum*) is being used extensively for mycoprotein production in Europe (Thrane, 2007). This strain is capable of producing trichothecene mycotoxins in pure culture, but does not produce them under industrial conditions (Thrane, 2007).

Penicillium camemberti is the correct name for the fungus used for white-mold fermented cheeses (Samson et al., 1977; Pitt et al., 1986; Frisvad and Samson, 2004), but synonyms such as *P. candidum, P. rogeri*, and *P. album* are still used in literature. These four latter names are illegitimate or synonyms of *P. camemberti*. Even though *P. commune, P. biforme, P. fuscoglaucum* and *P. palitans* are found on cheese, either as contaminants or "green cheese mold", they are not necessarily suitable for fermenting cheeses. *P. commune* is the wild-type "ancestor" of *P. camemberti*, however (Pitt et al., 1986; Polonelli et al., 1987; Giraud et al., 2010).

A species closely related to *P. camemberti, P. caseifulvum* has an advantage in not producing cyclopiazonic acid, a mycotoxin often found in *P. camemberti* (Lund et al., 1998, Frisvad and Samson, 2004). *P. caseifulvum* grows naturally on the surface of blue mold cheeses and has a valuable aroma (Larsen, 1998). Important mycotoxins identified in these species include cyclopiazonic acid and rugulovasine A & B (Frisvad and Samson, 2004), and cyclopiazonic acid can be detected in white-mold cheeses (Le Bars, 1979; Teuber and Engel, 1983; Le Bars et al., 1988).

Blue-mold cheeses are always fermented with *Penicillium roqueforti*, and not with the closely related species *P. carneum, P. paneum* or *P. psychrosexualis*. The latter three species produce several mycotoxins (Frisvad and Samson, 2004; Houbraken et al., 2010) and have often been referred to as *P. roqueforti* (Engel and von Milczewski, 1977; Krusch et al., 1977; Olivigni and Bullerman, 1978; Engel and Prokopek, 1980; Teuber and Engel, 1983; Erdogan and Sert, 2004). However, *P. roqueforti* itself can produce the secondary metabolites PR-toxin, roquefortine C, mycophenolic acid and andrastin A in pure culture (Frisvad et al., 2004; Nielsen et al., 2005). One of these secondary metabolites is regarded as a mycotoxin, PR-toxin. This mycotoxin is unstable in cheese and is converted to PR imine (Engel and Prokopek, 1979; Siemens and Zawistowski, 1993). Mycophenolic acid (Lafont et al., 1979; López-Díaz et al., 1996), roquefortine C (López-Díaz et al., 1996; Finoli et al., 2001) and andrastin A (Nielsen et al., 2005; Fernandez-Bodega et al., 2009) have been found in blue cheese, but the consequences for human health are probably minor (Larsen et al., 2002). Yet another species, Penicillium solitum is found on naturally fermented lamb meat on the Faroe Islands, and may be used as a starter culture. This species does not produce any known mycotoxins (Frisvad et al., 2004).

On other meat products, *Penicillium nalgiovense* and a few strains of *Penicillium chrysogenum* are used (Nout, 2000; Frisvad and Samson, 2004), especially for mold-fermented salami. However, P. nalgiovense was originally found on cheeses from Nalzovy, and may be used for fermenting cheeses too.

Finally, some fungi can be used to produce food colorants, including *Epicoccum nigrum* and

Penicillium purpurogenum, but these fungi are not used directly for food fermentation (Stricker et al., 1981; Mapari et al., 2010).

2.4. References

1. Bachmann H.P., Bobst, C., Bütikofer, U., Casey, M.G., Dalla Torre, M., Fröhlich-Wyder, M.T., Fürst, M., 2005. Occurrence and significance of Fusarium domesticum alias Anticollanti on smear-ripened cheeses. LWT- Food Sci.Technol. 38, 399-407.
2. Bockelmann, W., Willems, K.P., Neve, H., Heller, K.H., 2005. Cultures for the ripening of smear cheeses. International Dairy Journal 15, 719-732.
3. Boekhout, T., Robert, V., 2003. Yeasts in food: Beneficial and detrimental aspects. Behr's Verlag, Hamburg.
4. Bonnarme, P., Lapadatescu, C., Yvon, M., Spinnler, H.E., 2001. L-methionine degradation potentialities of cheese-ripening microorganisms. J. Dairy Res. 68, 663-674.
5. Brennan, N.M., Brown, R., Goodfellow, M., Ward, A.C., Beresford, T.P., Vancanneyt, M., Cogan, T.M., Fox, P.F., 2001. *Microbacterium gubbeenense* sp. nov., from the surface of a smear-ripened cheese. International Journal of Systematic and Evolutionary Microbiology 51, 1969-1976.
6. Collins, M.D., Samelis, J., Metaxopoulos, J., Wallbanks, S., 1993. Taxonomic studies on some Leuconostoc-like organisms from fermented sausages: description of a new genus *Weissella* for the *Leuconostoc paramesenteroides* group of species. J. Appl. Bacteriol. 75, 595-603.
7. Engel, G., Prokopek, D., 1979. Kein Nachweis von *Penicillium roqueforti*-Toxin in Käse. Milschwissenschaft 34, 272-274.
8. Engel, G., Prokopek, D., 1980. Kein Nachweis von Patulin and Penicillinsäure in mit Patulin- und Penicillinsäure-bildenden *Penicillium roquefort*i-Stämmen hergestellten Käsen. Milchwissenschaft 35, 218-220.
9. Engel, G., von Milczewski, K.E., 1977. Die gesundheitliche Unbedenklichheit von *Penicillium caseicolum, P. camemberti* und *P. roqueforti*. I. Prüfung auf Bildung bekannter Mykotoxine mit physikalisch-chemischen Methoden. Milchwissenschaft 32, 517-520.
10. Erdogan, A., Sert, S., 2004. Mycotoxin-forming ability of two *Penicillium roqueforti* strains in blue moldy Tulum cheese ripened at various temperatures. J. Food Prot. 67, 533-535.
11. Fernández-Bodega, M.A., Mauriz, E., Gómez, A., Martín, J.F., 2009. Proteolytic activity, mycotoxins and andrastin A in *Penicillium roqueforti* strains isolated from Cabrales, Valdeón and Bejes-Teresviso local varieties of blue-veined cheeses. Int. J. Food Microbiol. 136, 18-25.
12. Finoli, C., Vecchio, A., Galli, A., Dragoni, I., 2001. Roquefortine C occurrence in blue cheese. J. Food Prot. 64, 246-251.
13. Foulquie Moreno, M.R., Sarantinopoulos, P., Tsakalidou, E., De Vuyst, L., 2006. The role and application of enterococci in food and health. Int. J. Food Microbiol. 106, 1-24.
14. Frisvad, J.C., Samson, R.A., 2004. Polyphasic taxonomy of *Penicillium subgenus Penicillium*. A guide to identification of the food and air-borne terverticillate *Penicillia* and their mycotoxins. Stud. Mycol. 49, 1-173.
15. Frisvad, J.C., Smedsgaard, J., Larsen, T.O., Samson, R.A., 2004. Mycotoxins, drugs and other extrolites produced by species in *Penicillium subgenus Penicillium*. Stud. Mycol. 49, 201-241.
16. Garcia Fontan, M.C., Lorenzo, J.M., Parada, A., Franco, I., Carballo, J., 2007. Microbiological characteristics of "androlla", a Spanish traditional pork sausage. Food Microbiol. 24, 52-58.
17. Gassem, M.A., 1999. Study of the micro-organisms associated with the fermented bread (khamir) produced from sorghum in Gizan region, Saudi Arabia. J. Appl. Microbiol. 86, 221-225.
18. Georgalaki, M.D., Sarantinopoulos, P., Ferreira, E.S., De Vuyst, L., Kalantzopoulos, G., Tsakalidou, E., 2000. Biochemical properties of *Streptococcus macedonicus* strains isolated from Greek Kasseri cheese. J. Appl. Microbiol. 88, 817-825.

19. Giraud, F., Giraud, T., Aguileta, G., Fournier, E., Samson, R., Cruaud, C., Lacoste, S., Ropars, J., Tellier, A., Dupont, J., 2010. *Microsatellite loci* to recognize species for the cheese starter and contaminating strains associated with cheese manufacturing. Int. J. Food Microbiol. 137, 204-213.
20. Gräfenham, TY., Schroers, H.-J. , Nirenberg, H.I. , Seifert, K.A., 2011. An overview of the taxonomy, phylogeny, and typification of nectriaceous fungi in *Cosmospora, Acremonium, Fusarium, Stilbella*, and *Volutella*. Stud. Mycol. 68, 79-113.
21. Guan, L., Cho, K.H., Lee, J.H., 2011. Analysis of the cultivable bacterial community in jeotgal, a Korean salted and fermented seafood, and identification of its dominant bacteria. Food Microbiol. 28, 101-113.
22. Hachmeister, K.A., Fung D.Y., 1993. Tempeh: a mold-modified indigenous fermented food made from soybeans and/or cereal grains. Crit Rev Microbiol. 19(3):137-88.
23. Hammes, W. P., Weiss, N., Holzapfel, W., 1992. The *Genera Lactobacillus* and *Carnobacterium*. In: A. Balows, H. G. Truper, M. Dworkin, W. Harder, and K. H. Schleifer (eds.), The Prokaryotes. Springer-Verlag, New York, p. 1535-1594.
24. Houbraken, J., Frisvad, J.C., Samson, R.A., 2010. Sex in *Penicillium series Roqueforti*. IMA Fungus 1, 171-180.
25. Kopermsub, P., Yunchalard, S., 2010. Identification of lactic acid bacteria associated with the production of plaa-som, a traditional fermented fish product of Thailand. Int. J. Food Microbiol. 138, 200-204.
26. Krusch, von A., Lompe, A., Engel, G., von Milzewski, K.E., 1977. Die gesundheitliche Unbedenklichheit von *Penicillium caseicolum, P. camemberti* and *P. roqueforti*. II. Biologische Prüfung auf Toxinbildungsvermögen an Zellkulturen. (The harmlessness to health of *Penicillium caseicolum, P. camemberti* and *P. roqueforti*. II. Biological testing of capacity for toxin production in cell cultures) Milchwissenschaft 32, 713-715.
27. Kubo, Y., Rooney, A.P., Tsukakoshi, Y., Nakagawa, R., Hasegawa, H., Kimura, K., 2011. Phylogenetic analysis of *Bacillus subtilis* strains applicable to natto (fermented soybean) production. Appl Environ Microbiol 77, 6346-9
28. Kurtzman, C. P., Fell, J.W., Boekhout, T., 2011. The Yeasts: A Taxonomic Study, 5th edition. 3 Vol. Elsevier Science & Technology, Amsterdam.
29. Lafont, P., Siriwardana, M.G., Combemale, I., Lafont, J., 1979. Mycophenolic acid in marketed cheeses. Food Cosmet. Toxicol. 17, 147-149.
30. Larsen, T.O., 1998. Volatile flavor production by *Penicillium caseifulvum*. Int. Dairy J, 8: 883-887.
31. Larsen, T.O., Gareis, M., Frisvad, J.C., 2002. Cell cytotoxicity and mycotoxin and secondary metabolite production by common *Penicillia* on cheese. J. Agric. Food Chem. 50, 6148-6152.
32. Le Bars, J., 1979. Cyclopiazonic acid production by *Penicillium camemberti* Thom and natural occurrence of this mycotoxin in cheese. Appl. Environ. Microbiol. 38, 1052-1055.
33. Le Bars, J., Gripon, J.C., Vassal, L., Le Bars, P., 1988. Production d'acide cyclopiazonique dans des fromages en function des souches de *Penicillium camembertii* et des conditions de maturation (Production of cyclopiazonic acid in cheeses in relation to the strains of *Penicillium camemberti* and ripening conditions). Microbiol. Alim. Nutr. 6, 337-343.
34. Leclercq-Perlat, M.N., Corrieu, G., Spinnler, H.E., 2007. Controlled production of camembert-type cheeses: Part III role of the ripening microflora on free fatty acid concentrations. J. Dairy Res. 74, 218-225.
35. López-Díaz, T.M., Román-Blanco, C., García-Arias, M.T., García-Fernández, M.C., García-López, M.L., 1996. Mycotoxins in two Spanish cheese varieties. Int. J. Food Microbiol. 30, 391-395.
36. Lund, F., Filtenborg, O., and Frisvad, J.C., 1998. *Penicillium caseifulvum*, a new species found on *P. roqueforti* fermented cheeses. Journal of Food Mycology 1, 95-101.

37. Mapari, S.A.S., Thrane, U., Meyer, A.S., 2010. Fungal polyketide azaphilone pigments as future natural food colorants? Trends Biotechnol. 28, 300-307.
38. Mogensen, J.M., Varga, J., Thrane, U., Frisvad, J.C., 2009. *Aspergillus acidus* from Puerh tea and black tea does not produce ochratoxin A and fumonisin B2. Int. J. Food Microbiol. 132, 141-144.
39. Mogensen, G., Salminen, S., O'Brien, J., Ouwehand, A., Holzapfel, W., Shortt, C., Fonden, R., Miller, G.D., Donohue, D., Playne, M., Crittenden, R., Salvadori, B., Zink, R., 2002a. Food microorganisms - health benefits, safety evaluation and strains with documented history of use in foods. Bulletin of IDF 377, 4-9.
40. Mogensen, G., Salminen, S., O'Brien, J., Ouwehand, A., Holzapfel, W., Shortt, C., Fonden, R., Miller, G.D., Donohue, D., Playne, M., Crittenden, R., Salvadori, B., Zink, R., 2002b. Inventory of microorganisms with a documented history of use in food. Bulletin of IDF 377, 10-19.
41. Nielsen, K.F., Dalsgaard, P.W., Smedsgaard, J., Larsen, T.O., Andrastin, A.-D., 2005. *Penicillium roqueforti* metabolites consistently produced in blue-mold-ripened cheese. J. Agric. Food Chem. 53, 2908-2913.
42. Nout, R., 2000. Useful role of of fungi in food processing. In: Introduction to food- and airborne fungi. 6th ed. eds.: Samson, R.A., E.S. Hoekstra, J.C. Frisvad and O. Filtenborg. Centraalbureau voor Schimmelcultures, Utrecht.
43. Nout, R., 2007. The colonizing fungus as a food provider. In Dijksterhuis, J. and Samson., R.A. Food Mycology. A multifaceted approach to fungi and food. CRC Press, Boca Raton, pp. 335-352.
44. Nychas, G.J., Arkoudelos, J.S., 1990. Staphylococci: their role in fermented ausages. Soc. Appl. Bacteriol. Symp. Ser. 19: 167S-188S
45. Olivigni, F.J., Bullerman, L.B., 1978. Production of *penicillic* acid and *patulin* by an atypical *Penicillium roqueforti* isolate. Appl. Environ. Microbiol. 35, 435-438.
46. Ouadghiri, M., Amar, M., Vancanneyt, M., Swings, J., 2005. Biodiversity of lactic acid bacteria in Moroccan soft white cheese (Jben). FEMS Microbiol. Lett. 251, 267-271.
47. Paludan-Muller, C., Huss, H.H., Gram, L., 1999. Characterization of lactic acid bacteria isolated from a Thai low-salt fermented fish product and the role of garlic as substrate for fermentation. Int. J. Food Microbiol. 46, 219-229.
48. Paludan-Muller, C., Madsen, M., Sophanodora, P., Gram, L., Moller, P.L., 2002. Fermentation and microflora of plaa-som, a Thai fermented fish product prepared with different salt concentrations. Int. J. Food Microbiol. 73, 61-70.
49. Pitt, J.I., Cruickshank, R.H., Leistner, L.O., 1986. *Penicillium commune, P. camembertii*, the origin of white cheese moulds, and the production of cyclopiazonic acid. Food Microbiol. 3, 363-371.
50. Polonelli, L., Morace, G., Rosa, R., Castagnola, M., Frisvad, J.C., 1987. Antigenic characterisation of *Penicillium camemberti* and related common cheese contaminants. Appl. Environ. Microbiol. 53, 872 878.
51. Rogers, P.L., Goodman, A.E., Heyes, R.H., 1984. Zymomonas ethanol fermentations. Microbiol. Sci. 1, 133-136.
52. Saithong, P., Panthavee, W., Boonyaratanakornkit, M., Sikkhamondhol, C., 2010. Use of a starter culture of lactic acid bacteria in plaa-som, a Thai fermented fish. J. Biosci. Bioeng., 110: 553-557.
53. Samson, R.A., Eckert, C., and Orth, R. 1977. The taxonomy of Penicillium species from fermented cheeses. Antonie van Leeuwenhoek. 43, 341-350.
54. Schroers, H.-J., O'Donnell, K., Lamprecht, S.C., Kammeyer, P.L., Johnson, S., Sutton, D.A., Rinaldi, M.G., Geiser, D.M., Summerbell, R.C., 2009. Taxonomy and phylogeny of the *Fusarium dimerum* species group. Mycologia 101, 44-70.

55. Schubert, K., Ludwig, W., Springer, N., Kroppenstedt, R.M., Accolas, J.P., Fiedler, F., 1996. Two coryneform bacteria isolated from the surface of French Gruyere and Beaufort cheeses are new species of the genus *Brachybacterium*: *Brachybacterium alimentarium* sp. nov. and *Brachybacterium tyrofermentans* sp. nov. Int. J. Syst. Bacteriol. 46, 81-87.
56. Schwan, R.F., Wheals, A.E., 2004. The microbiology of cocoa fermentation and its role in chocolate quality. Crit Rev Food Sci Nutr 44(4), 205-21
57. Sengun, I.Y., Karabiyikli, S., 2011. Importance of acetic acid bacteria in food industry. Food Control 22, 647-656.
58. Siemens, K., Zawistowski, J., 1993. Occurrence of PR imine, a metabolite of *Penicillium roqueforti*, in blue cheese. Journal of food protection 56(4), p.317-325.
59. Stackebrandt, E., Koch, C., Gvozdiak, O., Schuman, P., 1995. Taxonomic dissection of the genus *Micrococcus*: *Kocuria* gen. nov., *Nesterenkonia* gen. nov., *Kytococcus* gen. nov., *Dermacoccus* gen. nov., and *Micrococcus Cohn* 1872 gen. emend. Int. J. Syst. Bacteriol. 45, 682-692.
60. Stricker R., Romailler, G.,Turian, G., Tzanos, D., 1981. Production and food applications of a mold hydrosoluble yellow pigment (Epicoccum nigrum Link). Lebensm. Wiss. Technol., 124: 18-20.
61. Teuber, M., Engel, G., 1983. Low risk of mycotoxin production in cheese. Microbiol. Alim. Nutr. 1, 193-197.
62. Thrane, U., 2007. Fungal protein for food. In: Dijksterhuis, J. and Samson., R.A. (eds.) Food Mycology. A multifaceted approach to fungi and food. CRC Press, Boca Raton, pp. 353-360.
63. Xiao, J.Z., Takahashi, S., Nishimoto, M., Odamaki, T., Yaeshima, T., Iwatsuki, K., Kitaoka, M., 2010. Distribution of *in vitro* fermentation ability of lacto-N-biose I, a major building block of human milk oligosaccharides, in bifidobacterial strains. Appl. Environ. Microbiol. 76, 54-59.
64. Zare, R., Gams, W., 2001. A revision of *Verticillium*, section *Prostrata*. IV. The genera *Lecanicillium* and *Simplicillium* gen. nov. Nova Hedwigia 73, 1-50.

3. The 2012 Inventory of Microbial Species with technological beneficial role in fermented food products

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3.1. Introduction

Fermented foods are used in every country around the world with almost every type of food matrix (Campbell-Platt, 2003, Steinkraus, 2002). The initial IDF/EFFCA inventory and its approach published earlier on (Mogensen et al, 2002a, 2002b) was originally focused on microbial cultures in European dairy food products and lacked this world perspective that has been the major driving force for the update in the past few years.

FAO initially proposed a global perspective approach on fermented food products for fruits and vegetables (Battcock and Azam-Ali, 1998), cereals (Haard et al., 1999), grains, legumes, seeds and nuts (Deshpande et al., 2000). Apart from the qualified presumption of safety (QPS) for microorganisms intentionally added to the food chain as an internal approach for the biohazard (BIOHAZ) panel (Leuschner et al, 2010), other tentative inventories have been published recently for food products such as meat (Talon and Leroy, 2011), cocoa (Schwan and Wheals, 2004) and millet (Amadou et al, 2011).

3.2. Updating process

The information needed on microbial species for consideration in the present IDF/EFFCA inventory comprised both updated taxonomy and available evidence of food usage. Each species incorporated is generally documented by two consistent published references.

Taxonomic identification of microbial species was based upon the classification of the International Committee on Systematics of Prokaryotes (ICSP - http://www.the-icsp.org/) and available publications in International Journal of Systematic and Evolutionary Microbiology (IJSEM - http://ijs.sgmjournals.org/). The Taxonomic Outline of the Bacteria and Archea (TOBA - http://www.taxonomicoutline.org/) in its release 7.7 of March 6, 2007 and the amended lists of bacterial names (Skerman et al., 1989) were also used as reference. References and

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documentation provided by the International Commission on the Taxonomy of Fungi (ICTF) on their website (http://www.fungaltaxonomy.org/), the Mycobank initiative (Crous et al., 2004), and outcomes of expert groups on invasive fungal infections and taxonomic issues (Mycoses Study Group – http://www.doctorfungus.org/) were used as the basis for fungal taxonomy.

Food usage documentation was based on published articles in peer-review food microbiology publications. The food usage is not restricted to those documented in the present inventory. For most species, reference is generally given for one type of food usage, as we considered one type of food usage the minimum evidence for considering a microbial species in the present inventory.

Some widely used species in different food matrices have been incorporated with numerous references. It is to be further considered if all the possible food usages for one defined microbial species are to be documented or if regular updates will be performed on the basis of a received submission or proposal for modification.

Consideration of desired properties of Microbial Food Cultures (MFC), as well as undesired ones leading to exclusion of microbial species, was based on previously established criteria (Bourdichon et al., 2012).

The "2002 IDF/EFFCA Inventory" listed 82 bacterial species and 31 species of yeasts and molds whereas the present "Inventory of MFC" contains 265 bacterial species and 70 species of yeasts and molds. The overview of the distribution of species over the relevant taxonomic units is given in Table 1.

3.3. 2012 IDF-EFFCA Updated Inventory

Table 1: Overview of microbial species and their taxonomy

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1963	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium adolescentis*	Dairy	Rabiu et al., 2001	ATCC 15703	Reuter, 1963
1969	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium animalis subsp animalis*	Dairy	Biavati et al., 1992	ATCC 25527	Mitsuoka, 1969
1980	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium animalis subsp lactis*	Dairy	Biavati et al., 1992	DSM 10140	Meile, et al., 1997
1924	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium bifidum*	Dairy	Ventling and Mistry, 1993	ATCC 29521	Orla-Jensen, 1924
1963	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium breve*	Dairy, Soy	Scalabrini et al. 1998	ATCC 15700	Reuter, 1963
1963	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium longum*	Dairy	Mathieu-Chandelier et al. 1998	ATCC 15707	Reuter, 1963
1969	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium pseudolongum subsp. pseudo-longum*	Dairy	Rabiu et al., 2001	ATCC 25526	Mitsuoka, 1969

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1969	Monera	*Actino-bacteria*	*Bifidobacteriaceae*	*Bifidobacterium thermophilum*	Dairy	Xiao, 2010	ATCC 25525	Mitsuoka, 1969
2004	Monera	*Actino-bacteria*	*Brevibacteriaceae*	*Brevibacterium aurantiacum*	Dairy	Leclercq-Perlat et al., 2007	ATCC 9175	Gavrish et al., 2004
1983	Monera	*Actino-bacteria*	*Brevibacteriaceae*	*Brevibacterium casei*	Dairy	Dolci et al., 2009	ATCC 35513	Collins et al., 1983
1944	Monera	*Actino-bacteria*	*Brevibacteriaceae*	*Brevibacterium linens*	Dairy	Albert et al., 1944.	DSM 20425	Bousfield, 1972
1987	Monera	*Actino-bacteria*	*Corynebacte-riaceae*	*Corynebacterium ammoniagenes*	Dairy	Bockelmann and Hoppe-Seyler, 2001	ATCC 6871	Collins, 1987
2001	Monera	*Actino-bacteria*	*Corynebacte-riaceae*	*Corynebacterium casei*	Dairy	Bockelmann et al., 2005	DSM 44701	Brennan, et al., 2001a
1979	Monera	*Actino-bacteria*	*Corynebacte-riaceae*	*Corynebacterium flavescens*	Dairy	Brennan et al., 2002	ATCC 10340	Barksdale et al., 1979
1961	Monera	*Actino-bacteria*	*Corynebacte-riaceae*	*Corynebacterium variabile*	Dairy	Bockelmann et al., 2005	ATCC 15753	Gelsomino et al., 2005
1996	Monera	*Actino-bacteria*	*Dermabacteraceae*	*Brachybacterium alimentarium*	Dairy	Schubert et al., 1996	ATCC 700067	Schubert et al., 1996
1996	Monera	*Actino-bacteria*	*Dermabacteraceae*	*Brachybacterium tyrofermentans*	Dairy	Schubert et al., 1996	ATCC 700068	Schubert et al., 1996
2001	Monera	*Actino-bacteria*	*Microbacteriaceae*	*Microbacterium gubbeenense*	Dairy	Bockelmann et al., 2005	LMG S-19263	Brennan et al., 2001b
2005	Monera	*Actino-bacteria*	*Micrococcaceae*	*Arthrobacter arilaitensis*	Dairy	Mounier et al., 2005	DSM 16368	Irlinger et al., 2005
2005	Monera	*Actino-bacteria*	*Micrococcaceae*	*Arthrobacter bergerei*	Dairy	Irlinger et al., 2005	DSM 16367	Irlinger et al., 2005
1928	Monera	*Actino-bacteria*	*Micrococcaceae*	*Arthrobacter globiformis*	Dairy	Fox, 2000	ATCC 8010	Conn, 1928
1959	Monera	*Actino-bacteria*	*Micrococcaceae*	*Arthrobacter nicotianae*	Dairy	Smacchi et al, 1999a Smacchi et al, 1999b	ATCC 14929	Giovanoz-zi-Serman-ni, 1959
1999	Monera	*Actino-bacteria*	*Micrococcaceae*	*Kocuria rhizophila*	Dairy, Meat	El-Baradei et al., 2007	DSM 11926T	Kovács et al., 1999
1900	Monera	*Actino-bacteria*	*Micrococcaceae*	*Kocuria varians*	Dairy, Meat	O'Mahony et al., 2001	DSM 20033	Stack-ebrandt et al., 1995
1872	Monera	*Actino-bacteria*	*Micrococcaceae*	*Micrococcus luteus*	Dairy	Bonnarme et al., 2001	ATCC 4698	Wieser et al., 2002

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1974	Monera	*Actino-bacteria*	*Micrococcaceae*	*Micrococcus lylae*	Meat	García Fontán, 2007	ATCC 27566	Wieser et al., 2002
1909	Monera	*Actino-bacteria*	*Propionibacte-riaceae*	*Propionibacterium acidipropionici*	Dairy	Sherman, 1921	ATCC 25562	Orla-Jensen, 1909
1928	Monera	*Actino-bacteria*	*Propionibacte-riaceae*	*Propionibacterium freudenreichii sub-sp. freudenreichii*	Dairy	Van Niel, 1928	ATCC 6207	Moore and Holdeman, 1974
1928	Monera	*Actino-bacteria*	*Propionibacte-riaceae*	*Propionibacterium freudenreichii sub-sp. shermanii*	Dairy	Van Niel, 1928	ATCC 9614	Moore and Holdeman, 1974
1928	Monera	*Actino-bacteria*	*Propionibacte-riaceae*	*Propionibacterium jensenii*	Dairy	Van Niel, 1928	DSM 20535	Britz and Riedel, 1994
1928	Monera	*Actino-bacteria*	*Propionibacte-riaceae*	*Propionibacterium thoenii*	Dairy	Van Niel, 1928	NCFB 568	Britz and Riedel, 1994
1914	Monera	*Actino-bacteria*	*Streptomyceta-ceae*	*Streptomyces griseus subsp. griseus*	Meat	Hammes and Knauf, 1994	ATCC 23345	Waksman and Hen-rici, 1943
1987	Monera	*Firmicutes*	*Bacillaceae*	*Bacillus amyloliquefaciens*	Fish	Zaman, 2011	ATCC 23350	Priest et al., 1987
1915	Monera	*Firmicutes*	*Bacillaceae*	*Bacillus coagulans*	Cocoa	Schwan et al., 1986	ATCC 7050	Hammer, 1915
1970	Monera	*Firmicutes*	*Bacillaceae*	*Bacillus subtilis*	Soy	Nagami and Tanaka, 1986	ATCC 6051	Gibson and Gordon, 1974
1987	Monera	*Firmicutes*	*Carnobacteriaceae*	*Carnobacterium divergens*	Dairy, Meat, Fish	Hammes and Hertel, 2009	ATCC 35677	Collins, 1987a
2003	Monera	*Firmicutes*	*Carnobacteriaceae*	*Carnobacterium maltaromaticum*	Dairy, Meat	Afzal et al., 2010	ATCC 27865	Mora et al., 2003
1987	Monera	*Firmicutes*	*Carnobacteriaceae*	*Carnobacterium piscicola*	Meat	Schillinger and Lücke, 1987	ATCC 35586	Collins, 1987b
1982	Monera	*Firmicutes*	*Enterococcaceae*	*Enterococcus durans*	Dairy, Sour dough	Miguel Ro-cha and Xavier Mal-cata, 1999	ATCC 19432	Sherman and Wing, 1937
1964	Monera	*Firmicutes*	*Enterococcaceae*	*Enterococcus faecalis*	Dairy, Meat, Soy, Vege-tables	Foulquie´ Moreno et al., 2006	ATCC 19433	Schleife and Kilpper-Balz, 1984
1980	Monera	*Firmicutes*	*Enterococcaceae*	*Enterococcus faecium*	Dairy, Meat, Soy, Vege-tables	Foulquie´ Moreno et al., 2006	ATCC 19434	Orla-Jensen, 1924

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1934	Monera	*Firmicutes*	*Enterococcaceae*	*Tetragenococcus halophilus*	Soy	Noda et al., 1980 Nishimura et al., 2009	ATCC 33315	Anon, 1994 Collins et al., 1990
2005	Monera	*Firmicutes*	*Enterococcaceae*	*Tetragenococcus koreensis*	Vege-tables	Lee et al.., 2005	DSM 16501	Lee et al.., 2005
1986	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus acetotolerans*	Vege-tables	Arici and Coskun, 2001	ATCC 43578	Entani et al., 1986
2005	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus acidifarinae*	Sour dough	Vancanneyt. et al., 2005	LMG 2200	Vancan-neyt. et al., 2005
2000	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus acidipiscis*	Dairy, Fish	Asteri et al., 2009 Fontana et al., 2010	CIP 106750	Tanasupa-wat et al., 2000
1950	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus acidophilus*	Dairy, Vege-tables	Weiss et al., 1968	ATCC 700396	Johnson et al., 1980
1983	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus alimentarius*	Meat, Fish	García Fontán, 2007	ATCC 29643	Reuter, 1983
1998	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus amylolyticus*	Sour dough	Pedersen, 2004	DSM 11664	Bohak et al., 1998
1994	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus amylovorus*	Sour dough	Fitzsimons, 1994	ATCC 33620	Nakamura, 1981
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus brevis*	Dairy, Vege-tables	Pedersen et al., 1962	ATCC 14869	Bergey et al., 1934
1987	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus buchneri*	Wine, Sour dough	Poittevin de De Cores, 1966	ATCC 4005	Bergey et al., 1923
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus cacaonum*	Cocoa	De Bruyne et al., 2009	DSM 21116	De Bru-yne et al., 2009
1970	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus casei subsp. casei*	Dairy	Branen and Keenan, 1971	ATCC 393	Hansen and Lessel, 1971
1972	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus collinoides*	Fruits	Carr and Davies, 1972	ATCC 27612	Carr and Davies, 1972
2007	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus composti*	Bever-ages	Endo and Okada, 2007	NRIC 0689	Endo and Okada, 2007
1988	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus co-ryniformis subsp. coryniformis*	Dairy	Hegazi and Abo-Elnaga, 1980	ATCC 25602	Abo-Elnaga and Kandler, 1965
1988	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus crispatus*	Sour dough	Ehrmann and Vogel, 2005	ATCC 33820	Moore and Holdeman, 1970

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
2007	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus crustorum*	Sour dough	Ravyts and De Vuyst , 2011	LMG 23699	Scheirlinck et al., 2007b
1993	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus curvatus subps. curvatus*	Meat	García Fontán, 2007	ATCC 25601	Abo-Elnaga and Kandler, 1965
1930	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus del-brueckii subsp. bulgaricus*	Dairy	Shahani and Chandan, 1979	ATCC 11842	Weiss et al., 1983
1960	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus del-brueckii subsp. delbrueckii*	Dairy, Vege-tables	Etchells, 1964	ATCC 11842	Beijerinck, 1901
1949	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus del-brueckii subsp. lactis*	Dairy	Lazos, 1993	ATCC 12315	Weiss et al., 1983
1961	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus dextrinicus*	Meat	Deibel, 1961	ATCC 33087	Haaken-sen, 2009
2002	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus diolivorans*	Cere-als	Krooneman et al., 2002	DSM 14421	Kroone-man et al., 2002
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus fabifermentans*	Cocoa	De Bruyne et al., 2009	DSM 21115	De Bru-yne et al., 2009
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus farciminis*	Soy, Fish	Tanasupa-wat, 2002	ATCC 29644	Reuter, 1983
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus fermentum*	Sour dough	Khetarpaul and Chau-han, 1991	ATCC 11739	Beijerinck, 1901
1996	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus fructivorans*	Bever-ages	Vogel et al., 1994	ATCC 15435	Charlton et al., 1934
2000	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus frumenti*	Cere-als	Müller et al., 2000	DSM 13145	Müller et al., 2000
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus gasseri*	Sour dough	Ehrmann and Vogel, 2005	ATCC 33323	Laue and Kandler, 1980
2007	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus ghanensis*	Cocoa	Nielsen et al., 2007	DSM 18630	Nielsen et al., 2007
2005	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus hammesii*	Sour dough	Valcheva et al., 2005	DSM 16381	Valcheva et al., 2005
2005	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus harbinensis*	Vege-tables	Miyamoto et al., 2005	DSM 16991	Miyamoto et al., 2005
1930	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus helveticus*	Dairy, Vege-tables	Schafner and Beu-chat, 1986	ATCC 15009	Bergey et al., 1925

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
<1995	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus hilgardii*	Wine	Douglas and Cruess, 1936	ATCC 8290	Douglas and Cruess, 1936
1957	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus homohiochii*	Beverages, Sour dough	Kitahara et al., 1957	ATCC 15434	Kitahara et al., 1957
2008	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus hordei*	Beverages	Rouse et al., 2008	DSM 19519	Rouse et al., 2008
1986	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus jensenii*	Sour dough	Virtanen, 2007	ATCC 25258	Gasser et al., 1970
1962	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus johnsonii*	Sour dough	Ehrmann and Vogel, 2005	ATCC 49335	Fujisawa et al., 1992
1950	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus kefiri*	Dairy	Kandler and Kunath, 1983	ATCC 35411	Kandler and Kunath, 1983
1950	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus kefiranofaciens subsp kefiranofaciens*	Dairy	Fujisawa et al., 1988	ATCC 43761	Fujisawa et al., 1988
1950	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus kefiranofaciens subsp kefirgranum*	Dairy	Takizawa et al., 1994	ATCC 51647	Vancanneyt et al., 2004
2000	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus kimchii*	Vegetables	Yoon et al., 2000	ATCC BAA-131	Yoon et al., 2000
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus kisonensis*	Vegetables	Watanabe et al., 2009	DSM 19906	Watanabe et al., 2009
1970	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus mali*	Fruits	Carr and Davies, 1970	ATCC 27053	Carr and Davies, 1970
1998	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus manihotivorans*	Sour dough	Morlon-Guyot et al., 1998	DSM 13343	Morlon-Guyot et al., 1998
2003	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus mindensis*	Sour dough	Ehrmann et al., 2003	DSM 14500	Ehrmann et al., 2003
2000	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus mucosae*	Sour dough	Vieira-Dalodé, 2007	DSM 13345	Roos et al., 2000
2000	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus nagelii*	Cocoa	Papalexandratou et al., 2011	ATCC 700692	Edwards et al., 2000
2007	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus namurensis*	Sour dough	Scheirlinck et al., 2007a	LMG 23582	Scheirlinck et al., 2007a
2006	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus nantensis*	Sour dough	Valcheva et al., 2006	DSM 19982	Valcheva et al., 2006

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus nodensis*	Dairy	Masoud et al., 2010	DSM 19682	Kashiwagi et al., 2009
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus oeni*	Wine	Manes-Lazaro et al., 2009	DSM 19972	Manes-Lazaro et al., 2009
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus otakiensis*	Vegetables	Watanabe et al., 2009	DSM 19908	Watanabe et al., 2009
1996	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus panis*	Sour dough	Wiese et al., 1996	DSM 6035	Wiese et al., 1996
2006	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus parabrevis*	Dairy, Vegetables	Pedersen et al., 1962	ATCC 53295	Vancanneyt et al, 2006
1988	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus parabuchneri*	Sour dough	Farrow et al., 1988	NCIMB 8838	Farrow et al., 1988
1970	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus paracasei subsp. paracasei*	Dairy, Meat	Sameshima, 1998	ATCC 25302	Collins et al., 1989
1994	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus parakefiri*	Dairy	Takizawa et al., 1994	ATCC 51648	Takizawa et al., 1994
1999	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus paralimentarius*	Sour dough	Cai et al., 1999	JCM 10415	Cai et al., 1999
1996	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus paraplantarum*	Dairy, Vegetables	Manolopoulou, 2003	ATCC 700211	Curk et al., 1996
1921	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus pentosus*	Dairy, Fruits, Wine	Poittevin de De Cores and Carrasco, 1966	ATCC 8041	Zanoni et al., 1987
1999	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus perolens*	Dairy, Vegetables	Ongol and Asano, 2009 Miyamoto et al., 2005 Henri-Dubernet, 2008	DSM 12744	Back et al., 1999
1965	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus plantarum subsp. plantarum*	Dairy, Meat, Vegetables	Orillo and Pederson, 1968	ATCC 14917	Bergey et al., 1923
2010	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus pobuzihii*	Vegetables	Chen et al., 2010	NBRC 103219	Chen et al., 2010
1994	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus pontis*	Sour dough	Vogel et al., 1994	DSM 8475	Vogel et al., 1994
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus rapi*	Vegetables	Watanabe et al., 2009	DSM 19907	Watanabe et al., 2009
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus reuteri*	Sour dough	Ehrmann and Vogel, 2005	ATCC 23272	Kandler et al., 1980

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1980	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus rhamnosus*	Dairy, Vege-tables, Meat	Lee et al., 2011	ATCC 7469	Collins et al., 1989
2005	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus rossiae*	Sour dough	Corsetti et al., 2005	DSM 15814	Corsetti et al., 2005
1993	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus sakei subsp carnosus*	Meat	Bover-Cid, 2000	CCUG 31331	Torriani et al., 1996
1991	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus sakei subsp. sakei*	Meat, Bever-ages	Bover-Cid, 2000 Katagiri et al., 1934	ATCC 15521	Katagiri et al., 1934
1996	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus sali-varius subsp. sali-varius*	Dairy	Coulin, 2006	ATCC 11741	Rogosa et al., 1953
1950	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus sanfranciscensis*	Sour dough	Vogel, 1999	ATCC 27651	Weiss and Schillinger, 1984
2005	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus satsumensis*	Vege-tables	Endo and Okada, 2005	NRIC 0604	Endo and Okada, 2005
2007	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus secaliphilus*	Sour dough	Ehrmann et al., 2007	DSM 17896	Ehrmann et al., 2007
2008	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus senmaizukei*	Vege-tables	Hiraga et al., 2008	NBRC 103853	Hiraga et al., 2008
2006	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus siliginis*	Sour dough	Aslam, et al., 2006	NBRC 101315	Aslam, et al., 2006
2010	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus similis*	Vege-tables	Kitahara et al., 2010	JCM 2765	Kitahara et al., 2010
2004	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus spicheri*	Sour dough	Meroth et al., 2004	DSM 15429	Meroth et al., 2004
1989	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus suebicus*	Fruits	Kleynmans et al., 1989	DSM 5007	Kleynmans et al., 1989
2009	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus sunkii*	Vege-tables	Watanabe et al., 2009	DSM 19904	Watanabe et al., 2009
2006	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus tucceti*	Dairy, Meat	Chenoll et al., 2006 Masoud et al., 2010	DSM 20183	Chenoll et al., 2006
1983	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus vaccinostercus*	Fruits, Vege-tables, Cocoa	Arici and Coskun, 2001 Papalexan-dratou et al., 2011	ATCC 33310	Kozaki and Okada, 1983
2003	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus versmoldensis*	Meat	Kröckel et al., 2003	DSM 14857	Kröckel et al., 2003

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1983	Monera	*Firmicutes*	*Lactobacillaceae*	*Lactobacillus yamanashiensis*	Bever-ages	Nonomura, 1983	ATCC 27304	Nonomura, 1983
1887	Monera	*Firmicutes*	*Lactobacillaceae*	*Pediococcus acidilactici*	Meat	Leroy, 2006	ATCC 33314	Lindner, 1887
1961	Monera	*Firmicutes*	*Lactobacillaceae*	*Pediococcus parvulus*	Wine	Arevalo-Villena et al., 2010	ATCC 19371	Gunther and White, 1961
1934	Monera	*Firmicutes*	*Lactobacillaceae*	*Pediococcus pentosaceus*	Meat	Leroy, 2006	ATCC 33316	Mees, 1934
1932	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc carnosum*	Meat	Jacobsen et al., 2003	ATCC 49367	Shaw And Harding, 1989
1989	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc citreum*	Dairy, Fish	Cibik, 2000	ATCC 13146	Farrow et al., 1989
1991	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc fallax*	Vege-tables	Barrangou, 2002	ATCC 700006	Martinez-Murcia and Collins, M.D., 1991
2007	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc holzapfelii*	Coffee	De Bruyne et al., 2007	DSM 20189	De Bru-yne et al., 2007
2003	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc inhae*	Vege-tables	Kim et al., 2003	DSM 1510	Kim et al., 2003
2000	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc kimchii*	Vege-tables	Kim et al., 2000	IMSNU 11154	Kim et al., 2000
1903	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc lactis*	Dairy	Baroudi, 1976	ATCC 19256	Garvie, 1960
1903	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc me-senteroides subsp. cremoris*	Dairy	Lazos, 1993	ATCC 8293	Garvie, 1983
1903	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc me-senteroides subsp. dextranicum*	Dairy	Keenan, 1968	ATCC 19255	Garvie, 1983
1949	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc me-senteroides subsp. mesenteroides*	Dairy, Vege-tables	Pedersen et al., 1962	ATCC 8293	Van Tieghem, 1878
2009	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc palmae*	Wine	Ehrmann et al., 2009	DSM 21144	Ehrmann et al., 2009
1989	Monera	*Firmicutes*	*Leuconostocaceae*	*Leuconostoc pseudomesen-teroides*	Dairy	Parente et al., 2001 Callon et al., 2004 Abriouel et al., 2008 Sengun et al., 2009	ATCC 12291	Farrow, 1989
1967	Monera	*Firmicutes*	*Leuconostocaceae*	*Oenococcus oeni*	Wine	Edwards, 1989	ATCC 23279	Dicks, 1995

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1969	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella confusa*	Sour dough	Katina, 2009	ATCC 10881	Collins et al., 1993
2010	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella beninensis*	Vege-tables	Padonou et al., 2010	DSM 22752	Padonou et al., 2010.
2002	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella cibaria*	Vege-tables	Björkroth et al., 2002	LMG 17699	Björkroth et al., 2002
2010	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella fabaria*	Cocoa	De Bruyne et al., 2010	DSM 21416	De Bru-yne et al., 2010
2008	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella ghanensis*	Cocoa	De Bruyne et al., 2008	LMG 24286	De Bru-yne et al., 2008
1994	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella hellenica*	Meat	Collins et al., 1993	DSM 7378	Collins et al., 1993
2002	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella koreensis*	Vege-tables	Lee et al., 2002	KCTC 3621	Lee et al., 2002
1993	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella paramesen-teroides*	Meat	Collins et al., 1993	ATCC 33313	Collins et al., 1993
2000	Monera	*Firmicutes*	*Leuconostocaceae*	*Weissella thailandensis*	Fish	Tanasupawat et al., 2000	JCM 10695	Tanasupa-wat et al., 2000
1950	Monera	*Firmicutes*	*Staphylococcaceae*	*Macrococcus caseolyticus*	Dairy, Meat	Bhowmik and Marth, 1990	ATCC 13548	Kloos et al., 1998
1970	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus carnosus subsp. carnosus*	Meat	Marchesini, 1992	ATCC 51365	Probst et al., 1998
1970	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus carnosus subsp. utilis*	Meat	Marchesini, 1992	DSM 11676	Probst et al., 1998
1975	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus cohnii*	Dairy, Meat	Deetae, 2007 Drosinos, 2007	ATCC 29974	Schleifer and Kloos, 1975
1970	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus condimenti*	Soy	Probst et al., 1998	DSM 11674	Probst et al., 1998
1997	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus equorum subsp. equorum*	Dairy, Meat	Schlafmann et al., 2002 Carnio et al., 2000	DSM 20674	Schleifer et al., 1985
2003	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus equorum subsp. linens*	Dairy	Place et al., 2003	DSM 15097	Place et al., 2003
2000	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus fleurettii*	Dairy	Vernozy-Rozand et al., 2000	CIP 106114	Vernozy-Rozand et al., 2000
1992	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus piscifermentans*	Fish	Tanasupawat et al., 1992	NRIC 1817	Tanasu-pawat et al., 1992

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1940	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus saprophyticus*	Meat	Kaban, 2008	ATCC 15305	(Fairbrother 1940) Shaw et al., 1951
1976	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus sciuri subsp. sciuri*	Dairy	O'Halloran, 1998	ATCC 29062	Kloos et al., 1976
1998	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus succinus subsp succinus*	Meat	Talon et al., 2008 Villani et al., 2008	ATCC 700337	Lambert et al.., 1998
2002	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus succinus subsp. casei*	Dairy	Place et al., 2002	DSM 15096	Place et al., 2002
<1996	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus vitulinus*	Dairy, Meat	Bannerman et al., 1994	ATCC 51145	Bannerman et al., 1994
1924	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus warneri*	Meat	Corbière Morot-Bizot, 2006	ATCC 2783	Kloos and Schleifer, 1975
1980	Monera	*Firmicutes*	*Staphylococcaceae*	*Staphylococcus xylosus*	Dairy	Corbière Morot-Bizot, 2006	ATCC 29971	Kloos and Schleifer, 1975
1903	Monera	*Firmicutes*	*Streptococcaceae*	*Lactococcus lactis subsp.cremoris*	Dairy	Thomas et al., 1980	ATCC 19257	Orla-Jensen, 1924
1903	Monera	*Firmicutes*	*Streptococcaceae*	*Lactococcus lactis subsp.lactis*	Dairy, Meat	Thomas et al., 1980	ATCC 19435	Lister, 1873
1932	Monera	*Firmicutes*	*Streptococcaceae*	*Lactococcus raffinolactis*	Dairy	Ouadghiri et al., 2005	ATCC 43920	Orla-Jensen and Hansen, 1932
1998	Monera	*Firmicutes*	*Streptococcaceae*	*Streptococcus gallolyticus subsp. macedonicus*	Dairy	Georgalaki et al., 2000	ATCC BAA249	Tsakalidou, 1998
1906	Monera	*Firmicutes*	*Streptococcaceae*	*Streptococcus salivarius subsp. salivarius*	Soy, Vegetables	Ongol and Asano, 2009 Chun et al., 2007	ATCC 7073	Andrewes and Horder, 1906
1919	Monera	*Firmicutes*	*Streptococcaceae*	*Streptococcus salivarius subsp. thermophilus*	Dairy	Sherman and Stark, 1938	ATCC 19258	Orla-Jensen, 1924
1864	Monera	*Proteobacteria*	*Acetobacteraceae*	*Acetobacter aceti subsp. aceti*	Vinegar	Beppu, 1993-1994	ATCC 15973	De Ley and Frateur, 1974
2008	Monera	*Proteobacteria*	*Acetobacteraceae*	*Acetobacter fabarum*	Cocoa, Coffee	Cleenwerck, 2008	DSM 19596	Cleenwerck, 2008
1950	Monera	*Proteobacteria*	*Acetobacteraceae*	*Acetobacter lovaniensis*	Vegetables	Ongol and Asano, 2009	IFO 16606	Lisdiyanti, 2000
2002	Monera	*Proteobacteria*	*Acetobacteraceae*	*Acetobacter malorum*	Vinegar	Gullo, 2008	DSM 14337	Cleenwerck, 2002

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2001	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Acetobacter orientalis*	Vege-tables	Ongol and Asano, 2009	ATCC 12875	Lisdiyanti, 2001
1879	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Acetobacter pas-teurianus subsp. pasteurianus*	Vin-egar, Cocoa	Nanda et al., 2001	ATCC 12874	De Ley and Frateur, 1974
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Acetobacter pomorum*	Vin-egar	Sokollek et al., 1998	DSM 11825	Sokollek et al., 1998
2001	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Acetobacter syzygii*	Vin-egar, Cocoa	Nielsen, 2007	IFO 16604	Lisdiyanti, 2001
2000	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Acetobacter tropicalis*	Cocoa, Coffee	Nielsen, 2007	IFO 16470	Lisdiyanti, 2000
2001	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter azotocaptans*	Cocoa, Coffee	Fuentes-Ramírez et al., 2001	ATCC 700988	Fuentes-Ramírez et al., 2001
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter diazotrophicus*	Cocoa, Coffee	Jimenez-Sal-gado, 1997	ATCC 49037	Yamada et al., 1998
2000	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter entanii*	Vin-egar	Schüller et al., 2000	DSM 13536	Schüller et al., 2000
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter europaeus*	Vin-egar	Gullo, 2008	ATCC 51845	Yamada et al., 1998
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter hansenii*	Vin-egar	Torija, 2010	ATCC 35959	Yamada et al., 1998
2001	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter johannae*	Cocoa, Coffee	Fuentes-Ramírez et al., 2001	ATCC 700987	Fuentes-Ramírez et al., 2001
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter oboediens*	Vin-egar	Sokollek et al., 1998h	DSM 11826	Yamada, 2000
1897	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconobacter oxydans*	Vin-egar	De Muynck, 2007	ATCC 19357	(Hen-neberg 1897) De-Ley, 1961
1998	Monera	*Proteo-bacteria*	*Acetobacteraceae*	*Gluconacetobacter xylinus*	Vin-egar	Gullo et al., 2006	ATCC 23767	Yamada et al., 1998
<1996	Monera	*Proteo-bacteria*	*Enterobacte-riaceae*	*Hafnia alvei*	Dairy	Mounier et al., 2008	ATCC 13337	Møller, 1954
1980	Monera	*Proteo-bacteria*	*Enterobacte-riaceae*	*Halomonas elongata*	Meat	Hinrichsen et al., 1994	ATCC 33173	Vreeland et al., 1980
1936	Monera	*Proteo-bacteria*	*Sphingomonad-aceae*	*Zymomonas mobi-lis subsp. mobilis*	Bever-ages	Rogers et al., 1984	ATCC 10988	Swings, 1977
1986	Fungi	*Ascomy-cota*	*Cordycipitaceae*	*Lecanicillium lecanii*	Dairy	Lund et al., 1995	CBS 102067	Zare and Gams, 2001

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1970	Fungi	*Ascomy-cota*	*Dipodascaceae*	*Galactomyces candidum*	Dairy	Castellari et al., 2010 Mounier et al., 2008 Gueguen and Lenoir, 1975	CBS 178,71	Mounier et al., 2010
1970	Fungi	*Ascomy-cota*	*Dipodascaceae*	*Geotrichum candidum*	Dairy, Meat	Castellari et al., 2010 Mounier et al., 2008 Gueguen and Lenoir, 1975	CBS 615,84	De Hoog and Smith, 2004
1951	Fungi	*Ascomy-cota*	*Dipodascaceae*	*Yarrowia lipolytica*	Dairy	Boekhout and Robert, 2003	CBS 6124	Van der Walt and Von Arx, 1980
1963	Fungi	*Ascomy-cota*	*Microascaceae*	*Scopulariopsis flava*	Dairy	Spotti et al., 2008. Moreau, 1979	CBS 207.61	Morton and Smith, 1963
2009	Fungi	*Ascomy-cota*	*Nectriaceae*	*Fusarium domesticum*	Dairy	Ratoma-henina et al., 1995	CBS 434,34	Schroers et al., 2009
1875	Fungi	*Ascomy-cota*	*Nectriaceae*	*Fusarium venenatum*	Dairy	Thrane, 2007	CBS 5421	Nirenberg, 1995
2006	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida etchellsii*	Dairy, Soy, Vege-tables	Coton et al., 2006	CBS 1750	Suezawa et al., 2006
1978	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida milleri*	Sour dough	Valmorri, 2010	ATCC 56464	Yarrow, 1978
1967	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida oleophila*	Wine	Droby et al., 1998	CBS 2219	Montroch-er, 1967
1942	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida rugosa*	Dairy	Seiler and Busse, 1990	CBS 613	Diddens and Lod-der, 1942
1923	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida tropicalis*	Vege-tables	Coulin et al., 2006	ATCC 4563	Berkhout, 1923
1942	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida versatilis*	Dairy, Soy	Seiler and Busse, 1990 van der Sluis et al., 2000 Suezawa and Suzuki, 2007	CBS 1752	Lodder and Kreger - Van Rij, 1984a
2003	Fungi	*Ascomy-cota*	*Saccharomyceta-ceae*	*Candida zemplinina*	Wine	Urso et al., 2008	CBS 9494	Sipiczki, 2003

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2008	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Candida zeylanoides*	Dairy	Seiler and Busse, 1990	CBS 519	Tsui et al., 2008 Kurtzman and Suzuki, 2010
1950	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia kudriavzevii*	Dairy, Cocoa	Padonou et al., 2009 Daniel et al., 2009 Bai et al., 2010 Li et al., 2010 El-Sharoud et al., 2009 Osorio-Cadavid et al., 2008	CBS 5147	Kurtzman et al., 2008
2008	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia occidentalis*	Dairy, Vegetables	Ongol and Asano, 2009 Arroyo-López et al., 2006 Seiler and Busse, 1990	CBS 5459	Kurtzman et al., 2008
1932	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Cyberlindnera jadinii*	Dairy	Thrane, 2007	CBS 5609	Minter, 2009
1950	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Cyberlindnera mrakii*	Wine	Erten and Tanguler, 2010	CBS 1707	Kurtzman, and Robnett, 2010
<1996	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Debaryomyces hansenii*	Dairy, Meat	Bartschi et al., 1994 Besançon et al., 1992 Besancon et al., 1995	CBS 767	Jacques et al., 2009
1964	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Dekkera bruxellensis*	Beverages	Boekhout and Robert, 2003	CBS 74	Van der Walt, 1964
1928	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Hanseniaspora guilliermondii*	Wine	Moreira et al., 2008	CBS 465	Pijper, 1928
1956	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Hanseniaspora osmophila*	Wine	Viana et al., 2008	CBS 313	Phaff et al., 1956
1923	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Hanseniaspora uvarum*	Wine	Moreira et al., 2008	CBS 314	Kreger - Van Rij, 1984
1986	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Kazachstania exigua*	Dairy, Sour dough	Zhou et al., 2009 Ottogalli et al., 1996	CBS 379	Kurtzman and Robnett, 2003 Kurtzman, 2003

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1986	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Kazachstania unispora*	Dairy	Zhou et al., 2009 Wang et al., 2008	CBS398	Kurtzman and Robnett, 2003 Kurtzman, 2003
1950	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Kluyveromyces marxianus*	Dairy	Roostita and Fleet, 1996	CBS 712	Kurtzman and Robnett, 2003 Kurtzman, 2003
1980	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Kluyveromyces lactis*	Dairy	Roostita and Fleet, 1996 Dujon et al., 2004	CBS 683	Kurtzman and Robnett, 2003 Kurtzman, 2003
1928	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Lachancea fermentati*	Wine	Romano et al., 1997	CBS 707	Kurtzman, 2003
1940	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Metschnikowia pulcherrima*	Wine	Charoenchai et al., 1997	CBS 610	Pitt and Miller, 1968
<1996	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia fermentans*	Dairy, Wine	Qing et al., 2010 Bai et al., 2010 Stringini et al., 2009 Wang et al., 2008 Rantsiou et al., 2008	CBS187	Kurtzman and Robnett, 2003 Kurtzman, 2003
<1989	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia kluyverii*	Wine	Pando et al., 1989 Guillamón et al., 1998 Anfang et al., 2009	CBS 188	Kurtzman and Robnett, 1999
<1996	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia membranifaciens*	Dairy	Shepherd et al., 1995	CBS 107	Kurtzman et al., 2008
<2000	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Pichia pijperi*	Wine	Zagorc et al., 2001	CBS 2887	Van der Walt and Tscheuschner, 1957
1950	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Saccharomyces bayanus*	Wine, Beverages	Rainieri et al., 2006	CBS 395	Kurtzman and Robnett, 2003 Kurtzman, 2003
1980	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Saccharomyces cerevisiae*	Dairy, Wine, Beverages	Roostita and Fleet, 1996	CBS 1171	Kurtzman and Robnett, 2003 Kurtzman, 2003

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1934	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Torulopsis candida*	Vegetables	Soni et al., 1986	CBS 940	Diddens and Lodder, 1934
1934	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Torulopsis holmii*	Vegetables	Batra and Millner,1974	CBS 135	Diddens and Lodder, 1934
1963	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Schwanniomyces vanrijiae*	Wine	Garcia et al., 2002	CBS 3024	Kurtzman and Suzuki, 2010
1978	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Starmerella bombicola*	Wine	Ciani and Maccarelli, 1998	CBS 6009	Rosa and Lachance, 1998
1978	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Trigonopsis cantarellii*	Wine	Toro and Vazquez, 2002	ATCC 36588	Kurtzman and Robnett, 2007
1904	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Wickerhamomyces anomalus*	Wine	Kurita, 2008	CBS 5759	Kurtzman et al., 2008
1952	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Zygosaccharomyces rouxii*	Soy	Hesseltine and Shibasaki, 1961 Suezawa et al., 2008 Solieri and Giudici, 2008	CBS 732	Lodder and Kreger - Van Rij, 1984b
1938	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Zygotorulaspora florentina*	Dairy	Boekhout and Robert, 2003	CBS 647	Kurtzman et al., 2011
1983	Fungi	*Ascomycota*	*Saccharomycetaceae*	*Lachancea thermotolerans*	Wine	Pando et al., 1989 Gonzalez et al., 2007	CBS 6340	Jacquier and Dujon, 1983
<1988	Fungi	*Ascomycota*	*Sarcosomataceae*	*Torulaspora delbrueckii*	Dairy, Wine	Westall and Filreenborg , 1998 Wyder et al., 1997 Pando et al., 1989	CLIB 230	Oda et al., 1997
1893	Fungi	*Ascomycota*	*Schizosaccharomycetaceae*	*Schizosaccharomyces pombe*	Wine	Snow and Gallender, 1979	CBS 356	Lindner, 1893
1927	Fungi	*Ascomycota*	*Sordariaceae*	*Neurospora sitophila*	Vegetables	Essers et al., 1995a	CBS 381.50	Shear and Dodge, 1927
1968	Fungi	*Ascomycota*	*Trichocomaceae*	*Aspergillus acidus*	Tea	Mogensen et al., 2009	CBS 56465	Kozakiewicz, 1989
1918	Fungi	*Ascomycota*	*Trichocomaceae*	*Aspergillus niger*	Beverages	Nout, 2000	CBS 51388	Accensi et al., 1999

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1884	Fungi	*Ascomycota*	*Trichocomaceae*	*Aspergillus oryzae*	Soy, Beverages	Bhumiratana et al., 1980 Miyake et al., 2007 Barbesgaaard et al., 1992	CBS 100925	Geiser et al., 1998
1971	Fungi	*Ascomycota*	*Trichocomaceae*	*Aspergillus sojae*	Soy	Miyake et al., 2007	CBS 100928	Godet and Munaut, 2010
1960	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium camemberti*	Dairy	Moreau, 1979	CBS 299,48	Thom, 1906
1998	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium caseifulvum*	Dairy	Lund et al., 1998	CBS 101134	Lund et al, 1998
1980	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium chrysogenum*	Dairy	Lund et al., 1995	CBS 306,48	Thom, 1910
1910	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium commune*	Dairy	Lund et al., 1995	CBS 216,30	Thom, 1910
1980	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium nalgiovense*	Dairy, Meat	Farber and Geisen, 1994	CBS 352,48	Laxa, 1932
1950	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium roqueforti*	Dairy	Moreau, 1980	CBS 221,30	Thom, 1906
1911	Fungi	*Ascomycota*	*Trichocomaceae*	*Penicillium solitum*	Meat	Frisvad et al., 2004	CBS 288.36	Westling, 1911
1827	Fungi	*Ascomycota*	*Wallemiaceae*	*Sporendonema casei*	Dairy	Ropars et al., 2012	CBS 355.29	Desmazières, 1827
1970	Fungi	*Basidiomycota*	*Cystofilobasidiaceae*	*Cystofilobasidium infirmominiatum*	Dairy	Early, 1998	CBS 323	Hamamoto, et al., 1988
1942	Fungi	*Basidiomycota*	*Cystofilobasidiaceae*	*Guehomyces pullulans*	Vegetables	Batra and Millner, 1974	CBS 2532	Fell and Scorzetti, 2004
1903	Fungi	*Zygomycota*	*Mucoraceae*	*Mucor hiemalis*	Soy	Han et al., 2004	CBS 201.65	Wehmer, 1903
1753	Fungi	*Zygomycota*	*Mucoraceae*	*Mucor mucedo*	Dairy	Oterholm, 2003a Oterholm, 2003b	CBS 640.67	Persoon, 1801.
1864	Fungi	*Zygomycota*	*Mucoraceae*	*Mucor plumbeus*	Dairy	Han et al., 2001 Hayaloglu and Kirbag, 2007	CBS 129.41	Bonorden, 1864
1850	Fungi	*Zygomycota*	*Mucoraceae*	*Mucor racemosus*	Dairy	Han et al., 2001 Hayaloglu and Kirbag, 2007	CBS 260.68	Fresenius, 1850

Documented	Kingdom	Phylum	Family	Taxonomy	Food Usage		Type Strain	Taxonomy
1904	Fungi	*Zygomy-cota*	*Mucoraceae*	*Rhizopus microsporus*	Vege-tables	Shrestha and Rati, 2003	CBS 631.82	Schipper and Stalp-ers, 1984
<1920	Fungi	*Zygomy-cota*	*Mucoraceae*	*Rhizopus oligosporus*	Soy	Rusmin and Ko, 1974	CBS 377.62	Abe et al., 2006
1895	Fungi	*Zygomy-cota*	*Mucoraceae*	*Rhizopus oryzae*	Soy	Rehms and Barz , 1995 Essers et al., 1995b	CBS 111233	Went and Prinsen Geerligs, 1895
1818	Fungi	*Zygomy-cota*	*Mucoraceae*	*Rhizopus stolonifer*	Soy	Rehms and Barz , 1995 Essers et al., 1995	CBS 403.51	Liou et al., 2007

3.4. References

1. Abe, A., Oda, Y., Asano, K , Sone, T., 2006. The molecular phylogeny of the genus *Rhizopus* based on rDNA sequences. Biosci Biotechnol Biochem. 70, 2387-93.
2. Abo-Elnaga, I.G., Kandler, O., 1965. Zur Taxonomie der Gattung *Lactobacillus* Beijerinck. I. Das Subgenus *Streptobacterium* Orla-Jensen. Zentralblatt fur Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene. Abteilung II 119, 1-36.
3. Abriouel, H., Martín-Platero, A., Maqueda, M., Valdivia, E., Martínez-Bueno, M., 2008. Biodiversity of the microbial community in a Spanish farmhouse cheese as revealed by culture-dependent and culture-independent methods. International Journal of Food Microbiology 127, 200-8.
4. Accensi, F., Cano, J., Figuera, L., Abarca, M.L., Cabañes, F.J., 1999. New PCR method to differentiate species in the *Aspergillus niger* aggregate. FEMS Microbiol Lett. 180, 191-6.
5. Afzal, M.I., Jacquet, T., Delaunay, S., Borges, F., Millière, J.B., Revol-Junelles, A.M., Cailliez-Grimal, C., 2010. *Carnobacterium maltaromaticum*: identification, isolation tools, ecology and technological aspects in dairy products. Food Microbiol. 27, 573-9.
6. Albert, J.O., Long, H.F., Hammer, B.W., 1944. Classification of the organisms important in dairy products. IV. *Bacterium linens*. Iowa State Coll. Agr. Expt. Sta. Bull.,No. 328.
7. Amadou, I., Gbadamosi, O.S., Le, G.W., 2011. Millet-based Traditional Processed Foods and beverages – A Review. Cereal Foods World 56(3) 115-121
8. Andrewes, F.W., Horder, T.J., 1906. A study of the streptococci pathogenic for man. Lancet ii:708-713.
9. Anfang, N., Brajkovich, M., Goddard, M.R., 2009. Co-fermentation with Pichia kluyveri increases varietal thiol concentrations in Sauvignon Blanc. Australian J Grape and Wine Res 15, 1–8.
10. Anon., 1994. Validation of the Publication of New Names and New Combinations Previously Effectively Published Outside the IJSB List No. 49. Int. J. Syst. Bacteriol. 44: 370 - 371.
11. Arevalo-Villena, M., Bartowsky, E.J., Capone, D., Sefton, M.A., 2010. Production of indole by wine-associated microorganisms under oenological conditions. Food Microbiol 27(5):685-90.
12. Arici, M., Coskun, F., 2001. Hardaliye: Fermented grape juice as a traditional Turkish beverage. Food Microbiology 18, 417–421.
13. Arroyo-López, F.N., Durán-Quintana, M.C., Ruiz-Barba, J.L., Querol, A., Garrido-Fernández, A., 2006. Use of molecular methods for the identification of yeast associated with table olives. Food Microbiol. (8):791-6.

14. Aslam, Z., Im, W.T., Ten, L.N., Lee, M.J., Kim, K.H., Lee, S.T., 2006. *Lactobacillus siliginis* sp. nov., isolated from wheat sourdough in South Korea. Int. J. Syst. Evol. Microbiol. 56, 2209-2213.
15. Asteri, I.A., Robertson, N., Kagkli, D.M., Andrewes, P., Nychas, G., Coolbear, T., Holland, R., Crow, V., Tsakalidou. E., 2009. Technological and flavour potential of cultures isolated from traditional Greek cheeses – A pool of novel species and starters. International Dairy Journal 19, 595-604.
16. Back, W., Bohak, I., Ehrmann, M., Ludwig, W., Pot, B., Kersers, K., Schleifer, K.H., 1999. *Lactobacillus perolens* sp. nov., a soft drink spoilage bacterium. Syst. Appl. Microbiol. 22, 354-359. DSM 12744.
17. Bai, M., Qing, M., Guo, Z., Zhang, Y., Chen, X., Bao, Q., Zhang, H., Sun, T.S., 2010. Occurrence and dominance of yeast species in naturally fermented milk from the Tibetan Plateau of China. Can J Microbiol. 56(9):707-14.
18. Bannerman, J.A., Hubner, R.J., Ballard, D.N., Cole, E.M., Bruce, J.L., Fiedler, F., Schubert, K., Kloos, W.E., 1994. Identification of the *Staphylococcus sciuri* species group with EcoRI fragments containing rRNA sequences and description of *Staphylococcus vitulus* sp. nov. Int. J. Syst. Bacteriol. 44, 454-460.
19. Barbesgaaard, P., Heldt-Hansen, H.P., Diderichsen, B., 1992. On the safety of *Aspergillus oryzae*: a review. Appl Microbiol Biotechnol. 36, 569-572.
20. Barksdale, L., Lanéelle, M.A., Pollice, M.C., Asselineau, J., Welby, M., Norgard, M.V., 1979. Biological and chemical basis for the reclassification of *Microbacterium flavum* Orla-Jensen as *Corynebacterium flavescens* nom. nov. Int. J. Syst. Bacteriol. 29, 222–233.
21. Baroudi, A.A., 1976. Microorganisms and characteristics of laban. J Dairy Sci. 59, 200-2.
22. Barrangou, R., 2002. Identification and characterization of *Leuconostoc fallax* strains isolated from an industrial sauerkraut fermentation. Appl Environ Microbiol. 68, 2877-84.
23. Bartschi, C., Berthier, J., Valla, G., 1994. Inventaire et évolution des flores fongiques de surface du reblochon de Savoie. Le Lait 74, 105-114.
24. Batra, L. R., Millner, P. D., 1974. Some Asian fermented foods and beverages and associated fungi. Mycologia, 66, 942-950.
25. Battcock, M., Azam-Ali, S., 1998. Fermented fruits and vegetables – A global perspective. FAO Agri Serv Bull, 134.
26. Beijerinck, M.W. 1901. Anhäufungsversuche mit Ureumbakterien: Ureumspaltung durch Urease und durch Katabolismus. Zentralbl. Bakteriol. Parasitenkde. Infektionskrankh. Hyg. Abt. 2 7, 33–61.
27. Beppu, T., 1993-1994. Genetic organization of *Acetobacter* for acetic acid fermentation. Antonie Van Leeuwenhoek. 64, 121-35.
28. Bergey, D.H., Breed, R.S. Hammer, B.W., Huntoon, F.M., Murray, E.G., Harrison, F.C., 1934. Bergey's Manual of Determinative Bacteriology, 4th ed. Williams and Wilkins. Baltimore, MD.
29. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W., Huntoon, F.M., 1923. Bergey's Manual of Determinative Bacteriology, 1st ed. Williams and Wilkins. Baltimore, MD.
30. Bergey, D.H., Harrison, F.C., Breed, R.S., Hammer, B.W., Huntoon, F.M., 1925. Bergey's Manual of Determinative Bacteriology, 2nd ed. Williams and Wilkins. Baltimore, MD.
31. Berkhout, C.M., 1923. De schimmelgeslachten *Monilia, Oidium, Oospora en Torula*: 44. Thesis, University of Utrecht, Netherlands.
32. Besancon, X., Ratomahenina, R., Galzy, P., 1995. Isolation and partial characterization of an esterase (EC 3.1.1.1) from a *Debaryomyces hansenii* strain. Nederlands Melk en Zuiveltijdschrift 49, 97-110.
33. Besançon, X., Smet, C., Chabalier, C., Rivemale, M., Reverbel, J.P., Ratomahenina, R., Galzy, P., 1992. Study of surface yeast flora of Roquefort cheese . Int. J. Food Microbiol. 17, 9-18.

34. Bhowmik, T. Marth, E.H., 1990. Role of *Micrococcus* and *Pediococcus* species in cheese ripening. J. Dairy Sci 73, 859-866.

35. Bhumiratana, A., Flegel, T.W., Glinsukon, T., Somporan, W., 1980. Isolation and analysis of molds from soy sauce koji in Thailand. Appl Environ Microbiol. 39, 430-5.

36. Biavati, B., Mattarelli, P., Crociani, F., 1992. Identification of bifidobacteria from fermented milk products. Microbiologica 15, 7-13.

37. Björkroth, K.J., Schillinger, U., Geisen, R., Weiss, N., Hoste, B., Holzapfel, W.H., Korkeala, H.J., Vandamme, P., 2002. Taxonomic study of *Weissella confusa* and description of *Weissella cibaria* sp. nov., detected in food and clinical samples. Int. J. Syst. Evol. Microbiol. 52, 141-148.

38. Bockelmann, W., Hoppe-Seyler, T., 2001. The surface flora of bacterial smear-ripened cheeses from cow's and goat's milk. International Dairy Journal 11, 307-314.

39. Bockelmann, W., Willems, K.P., Neve, H., Heller, K.H., 2005. Cultures for the ripening of smear cheeses. International Dairy Journal 15, 719-732.

40. Boekhout, T., Robert, V. (Eds.), 2003. Yeasts in food: Beneficial and detrimental aspects. Behr's Verlag, Hamburg.

41. Bohak, I., Back, W., Richter, L., Ehrmann, M., Ludwig, W., Schleifer, K.H., 1998. *Lactobacillus amylolyticus* sp. nov., isolated from beer malt and beer wort. Syst. Appl. Microbiol. 21, 360-364.

42. Bonnarme, P., Lapadatescu, C., Yvon, M., Spinnler, H.E., 2003. L-methionine degradation potentialities of cheese-ripening microorganisms. J Dairy Res. 68, 663-74.

43. Bonorden, H.F., 1864. Abhandlungen der Naturforschenden Gesellschaft zu Halle 8, 109.

44. Bourdichon, F., Casaregola, S., Farrokh, C., Frisvad, J.C., Gerds, M.L., Hammes, W.P., Harnett, J., Huys, G., Laulund, S., Ouwehand, A., Powell, I.B., Prajapati, J.B., Seto, Y., Ter Schure, E., Van Boven, A., Vankerckhoven, V., Zgoda, A., Tuijtelaars, S., Hansen, E.B., 2012. Food fermentations: microorganisms with technological beneficial use. Int J Food Microbiol 154(3) 87-97.

45. Bousfield, I.J., 1972. A Taxonomic Study of Some Coryneform Bacteria. Journal of General Microbiology 71, 441-455.

46. Bover-Cid, S., 2000. Mixed starter cultures to control biogenic amine production in dry fermented sausages. J Food Prot. 63, 1556-62.

47. Branen, A.L., Keenan, T.W., 1971. Diacetyl and acetoin production by *Lactobacillus casei*. Appl Microbiol. 22, 517-21.

48. Brennan, N.M., Brown, R., Goodfellow, M., Ward, A.C., Beresford, T.P., Simpson, P.J., Fox, P.F., Cogan, T.M., 2001a. *Corynebacterium mooreparkense* sp. nov. and *Corynebacterium casei* sp. nov., isolated from the surface of a smear-ripened cheese. Int. J. Syst. Evol. Microbiol. 51, 843–852.

49. Brennan, N.M., Brown, R., Goodfellow, M., Ward, A.C., Beresford, T.P., Vancanneyt, M., Cogan, T.M., Fox, P.F., 2001b. *Microbacterium gubbeenense* sp. nov., from the surface of a smear-ripened cheese. International Journal of Systematic and Evolutionary Microbiology 51, 1969-1976.

50. Brennan, N.M., Ward, A.C., Beresford, T.P., Fox, P.F., Goodfellow, M., Cogan, T.M., 2002. Biodiversity of the Bacterial Flora on the Surface of a Smear Cheese. Appl. Environ. Microbiol. 68, 820-830.

51. Britz, T.J., Riedel, K.H., 1994. *Propionibacterium* species diversity in Leerdammer cheese. Int J Food Microbiol. 22, 257-67.

52. Cai, Y., Okada, H., Mori, H., Benno, Y., Nakase, T., 1999. *Lactobacillus paralimentarius* sp. nov., isolated from sourdough. Int. J. Syst. Bacteriol. 49, 1451-1455.

53. Callon, C., Millet, L., Montel, M.C., 2004. Diversity of lactic acid bacteria isolated from AOC Salers cheese. Journal of Dairy Research 71, 231-44.

54. Campbell-Platt, G., 2003. Fermented foods – a world perspective. Food Res Int 27(3) 253-257.
55. Carnio, M., Höltzel, A., Rudolf, M., Henle, T., Jung, G., Scherer, S., 2000. The Macrocyclic Peptide Antibiotic Micrococcin P1 Is Secreted by the Food-Borne Bacterium *Staphylococcus equorum* WS 2733 and *Inhibits Listeria monocytogenes* on Soft Cheese. Appl Environ Microbiol. 66, 2378–2384.
56. Carr, J.G., Davies, P.A., 1970. Homofermentative *lactobacilli* of ciders including *Lactobacillus mali* nov. spec. J. Appl. Bacteriol. 33, 768-774.
57. Carr, J.G., Davies, P.A., 1972. The ecology and classification of strains of *Lactobacillus collinoides* nov. spec.: A bacterium commonly found in fermenting apple juice. Journal of Applied Bacteriology 35, 463-471.
58. Castellari, C., Quadrelli, A.M., Laich, F., 2010. Surface mycobiota on Argentinean dry fermented sausages. Int J Food Microbiol. 142, 149-55.
59. Charlton, D.B., Melson, M.E., Werkman, C.H. 1934. Physiology of *Lactobacillus fructivorans* sp. nov., isolated from spoiled salad dressing. Iowa State J. Sci. 9, 1–11.
60. Charoenchai, C., Fleet, G.H., Henscke, P.A., Todd, B.E.N., 1997. Screening of non-*Saccharomyces* wine yeasts for the presence of extracellular hydrolytic enzymes. Aust. J. grape Wine Res. 3, 2-8.
61. Chen, Y.S., Miyashita, M., Suzuki, K., Sato, H., Hsu, J.S., Yanagida, F., 2010. *Lactobacillus pobuzihii* sp. nov., isolated from pobuzihi (fermented cummingcordia). Int. J. Syst. Evol. Microbiol. 60, 1914-1917.
62. Chenoll, E., Macian, M.C., Aznar, R., 2006. *Lactobacillus tucceti* sp. nov., a new lactic acid bacterium isolated from sausage. Syst. Appl. Microbiol. 29, 389-395.
63. Chun, J., Kim, G.M., Lee, K., Choi, I.D., Kwon, G.H., Park, J.Y., Jeong, S.J., Kim, J.S., Kim, J.H., 2007. Conversion of Isoflavone Glucosides to Aglycones in Soymilk by Fermentation with Lactic Acid Bacteria. J Food Science 72(2) M39-44.
64. Ciani, M., Maccarelli, F., 1998. Oenological properties of non-Saccharomyces yeasts associated with winemaking. World J Microb Biot 14: 199–203.
65. Cibik, R., 2000. Molecular diversity of *Leuconostoc mesenteroides* and *Leuconostoc citreum* isolated from traditional French cheeses as revealed by RAPD fingerprinting, 16S rDNA sequencing and 16S rDNA fragment amplification. Syst Appl Microbiol. 23, 267-78.
66. Cleenwerck, I., 2002. Re-examination of the genus Acetobacter, with descriptions of *Acetobacter cerevisiae* sp. nov. and *Acetobacter malorum* sp. nov. Int J Syst Evol Microbiol. 52(Pt 5), 1551-8.
67. Cleenwerck, I., 2008. *Acetobacter fabarum* sp. nov., an acetic acid bacterium from a Ghanaian cocoa bean heap fermentation. Int J Syst Evol Microbiol. 58(Pt 9), 2180-5.
68. Collins, M.D., 1987a Transfer of *Brevibacterium ammoniagenes* (Cooke and Keith) to the genus *Corynebacterium*, as *Corynebacterium ammoniagenes* comb. nov. Int. J. Syst. Bacteriol. 37, 442–443.
69. Collins, M.D., Farrow, J.A.E., Phillips, B.A., Feresu, S., Jones, D., 1987b. Classification of *Lactobacillus divergens, Lactobacillus piscicola*, and some catalase-negative, asporogenous, rod-shaped bacteria from poultry in a new genus, *Carnobacterium*. Int. J. Syst. Bacteriol. 37, 310-316.
70. Collins, M.D., Phillips, B.A., Zanoni, P., 1989. 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. 39, 105–108.
71. Collins, M.D., Samelis, J., Metaxopoulos, J., Wallbanks, S., 1993. Taxonomic studies on some *Leuconostoc*-like organisms from fermented sausages: description of a new genus *Weissella* for the *Leuconostoc paramesenteroides* group of species. J. Appl. Bacteriol. 75, 595-603.

72. Collins, M.D., Williams, A.M., Wallbanks, S., 1990. The phylogeny of *Aerococcus* and *Pediococcus* as determined by 16S rRNA sequence analysis: description of *Tetragenococcus* gen. nov. FEMS Microbiol Lett. 58, 255-62.

73. Collins, M.D.,Farrow, J.A.E., Goodfellow, M., Minnikin, D.E., 1983. *Brevibacterium casei* sp.nov. and *Brevibacterium epidermidis* sp.nov. Systematic and Applied Microbiology 4, 388-395.

74. Conn, H.J., 1928. A type of bacteria abundant in productive soils, but apparently lacking in certain soils of low productivity. New York State Agricultural Experimental Station Technical Bulletin No. 138:3–26.

75. Corbière Morot-Bizot, S., 2006. Staphylococcal community of a small unit manufacturing traditional dry fermented sausages. Int J Food Microbiol. 108, 210-7.

76. Corsetti, A., Settanni, L., Van Sinderen, D., Felis, G.E., Dellaglio, F., Gobbetti, M., 2005. *Lactobacillus rossii* sp. nov., isolated from wheat sourdough. Int. J. Syst. Evol. Microbiol. 55, 35-40.

77. Coton E, Coton M, Levert D, Casaregola S, Sohier D, 2006. Yeast ecology in French cider and black olive natural fermentations. Int J Food Microbiol. Apr 15;108(1):130-5.

78. Coulin, P., Farah, Z., Assanvo, J., Spillmann, H., Puhan, Z., 2006. Characterisation of the microflora of attiéké, a fermented cassava product during traditional small-scale preparation. Int J Food Microbiol 106 131–6.

79. Crous, P.W., Gams, W., Stalpers, J.A., Robert, V., Stegehuis, G., 2004. MycoBank: an online initiative to launch mycology into the 21st century. Studies in Mycology 50, 19-22.

80. Curk, M.-C., Hubert, J.-C., Bringel, F., 1996. *Lactobacillus paraplantarum* sp. nov., a new species related to *Lactobacillus plantarum*. Int. J. Syst. Bacteriol. 46, 595–598.

81. Daniel, H.M., Vrancken, G., Takrama, J.F., Camu, N., De Vos, P., De Vuyst, L., 2009. Yeast diversity of Ghanaian cocoa bean heap fermentations.FEMS Yeast Res. 9(5):774-83.

82. De Bruyne, K., Camu, N., De Vuyst, L., Vandamme, P., 2009. L*actobacillus fabifermentans* sp. nov. and *Lactobacillus cacaonum* sp. nov., isolated from Ghanaian cocoa fermentations. Int. J. Syst. Evol. Microbiol. 59, 7-12.

83. De Bruyne, K., Camu, N., De Vuyst, L., Vandamme, P., 2010. *Weissella fabaria* sp. nov., from a Ghanaian cocoa fermentation. Int. J. Syst. Evol. Microbiol. 60, 1999-2005.

84. De Bruyne, K., Camu, N., Lefebvre, K., De Vuyst, L., Vandamme, P., 2008. *Weissella ghanensis* sp. nov., isolated from a Ghanaian cocoa fermentation. Int. J. Syst. Evol. Microbiol. 58, 2721-2725.

85. De Bruyne, K., Schillinger, U., Caroline, L., Boehringer, B., Cleenwerck, I., Vancanneyt, M., De Vuys, L., Franz, C.M.A.P., Vandamme, P., 2007. *Leuconostoc holzapfelii* sp. nov., isolated from Ethiopian coffee fermentation and assessment of sequence analysis of housekeeping genes for delineation of *Leuconostoc* species. Int. J. Syst. Evol. Microbiol. 57, 2952-2959.

86. De Hoog, G.S., Smith, M.T., 2004. Ribosomal gene phylogeny and species delimitation in *Geotrichum* and its teleomorphs. Stud Mycol 50, 489–515.

87. De Ley, J., Frateur, J., 1974. Genus *Acetobacter*. In: Buchanan, R.E., Gibbons, N.E. (Eds.), Bergey's Manual of Determinative Bacteriology, 8th ed. Williams and Wilkins. Baltimore, MD. 276–278.

88. De Muynck, C., 2007. The genus *Gluconobacter* oxydans: comprehensive overview of biochemistry and biotechnological applications. Crit Rev Biotechnol. 27(3):147-71.

89. Deetae, P., 2007. Production of volatile aroma compounds by bacterial strains isolated from different surface-ripened French cheeses. Appl Microbiol Biotechnol. 76(5):1161-71.

90. Deibel, R.H., 1961. Microbiology of meat curing. IV. A lyophilized *Pediococcus cerevisiae* starter culture for fermented sausage. Appl Microbiol. 9, 239-43.

91. De Ley, J., 1961. Comparative carbohydrate metabolism and a proposal for the phylogenetic relationship of the acetic acid bacteria. J. Gen. Microbiol. 24:31-50.

92. Deshpande,S.S., Salunkhe, D.K., Oyewole, O.B., Azam-Ali, S., Battcock, M.,Bressani, R., 2000. Fermented grain legumes, seeds and nuts – A global perspective. FAO Agri Serv Bull, 142.
93. Desmazières, J.B.H.J., 1827. Annales des Sciences Naturelles, Botanique 11: 246-249.
94. Dicks, L.M., 1995. Proposal to reclassify *Leuconostoc oenos* as *Oenococcus oeni* [corrig.] gen. nov., comb. nov. Int J Syst Bacteriol. 45, 395-7.
95. Diddens, H.A., Lodder, J., 1934. [Asporogenous Yeasts] Vol 1 1-256.
96. Diddens, H.A., Lodder, J., 1942. [Asporogenous Yeasts] Vol 2 1-511.
97. Dolci P, Dolci, P., Barmaz, A., Zenato, S., Pramotton, R., Alessandria, V., Cocolin, L., Rantsiou, K., Ambrosoli, R., 2009. Maturing dynamics of surface microflora in Fontina PDO cheese studied by culture-dependent and -independent methods. J Appl Microbiol. 106, 278-87.
98. Douglas, H.C., Cruess, W.V., 1936. *Lactobacillus* from California wine: *Lactobacillus hilgardii*. Food Res. 1, 113–119.
99. Droby, S., Cohen, L., Davis, A., Weiss, B., Hores, B., Chalutz, E., Kotz, H., Kerantzur, M., Shachnai, A., 1998. Commercial testing of Aspire: a yeast preparation for the biological control of postharvest decay of citrus. Biol. Control 12, 97-101.
100. Drosinos, E.H., 2007. Phenotypic and technological diversity of lactic acid bacteria and staphylococci isolated from traditionally fermented sausages in southern Greece. Food Microbiol. 24(3):260-70.
101. Dujon B, Sherman D, Fischer G, Durrens P, Casaregola S, Lafontaine I, De Montigny J, Marck C, Neuvéglise C, Talla E, Goffard N, Frangeul L, Aigle M,Anthouard V, Babour A, Barbe V, Barnay S, Blanchin S, Beckerich JM, Beyne E, Bleykasten C, Boisramé A, Boyer J, Cattolico L, Confanioleri F, De Daruvar A,Despons L, Fabre E, Fairhead C, Ferry-Dumazet H, Groppi A, Hantraye F, Hennequin C, Jauniaux N, Joyet P, Kachouri R, Kerrest A, Koszul R, Lemaire M,Lesur I, Ma L, Muller H, Nicaud JM, Nikolski M, Oztas S, Ozier-Kalogeropoulos O, Pellenz S, Potier S, Richard GF, Straub ML, Suleau A, Swennen D, Tekaia F,Wésolowski-Louvel M, Westhof E, Wirth B, Zeniou-Meyer M, Zivanovic I, Bolotin-Fukuhara M, Thierry A, Bouchier C, Caudron B, Scarpelli C, Gaillardin C,Weissenbach J, Wincker P, Souciet JL., 2004. Genome evolution in yeasts. Nature 430, 35-44.
102. Early, R., 1998. The technology of dairy products. Springer.
103. Edwards, C.G., 1989. Inducing malolactic fermentation in wines. Biotechnol Adv. 7, 333-60.
104. Edwards, C.G., Collins, M.D., Lawson, P.A., Rodriguez, A.V., 2000. *Lactobacillus nagelii* sp. nov., an organism isolated from a partially fermented wine. Int J Syst Evol Microbiol. 50 Pt 2:699-702.
105. Ehrmann, M.A., Brandt, M., Stolz, P., Vogel, R.F., Korakli, M., 2007. *Lactobacillus secaliphilus* sp. nov., isolated from type II sourdough fermentation. Int. J. Syst. Evol. Microbiol. 57, 745-750.
106. Ehrmann, M.A., Freiding, S., Vogel, R.F., 2009. *Leuconostoc palmae* sp. nov., a novel lactic acid bacterium isolated from palm wine. Int. J. Syst. Evol. Microbiol. 59, 943-947.
107. Ehrmann, M.A., Müller, M.R.A., Vogel, R.F., 2003, Molecular analysis of sourdough reveals *Lactobacillus mindensis* sp. nov. Int. J. Syst. Evol. Microbiol. 53, 7-13.
108. Ehrmann, M.A., Vogel, R.F., 2005. Molecular taxonomy and genetics of sourdough lactic acid bacteria. Trends in Food Science & Technology 16, 31-42.
109. El-Baradei, G., Delacroix-Buchet, A., Ogier, J.C., 2007. Biodiversity of bacterial ecosystems in traditional Egyptian Domiati cheese. Appl Environ Microbiol. 73, 1248-55.
110. El-Sharoud, W.M., Belloch, C., Peris, D., Querol, A., 2009. Molecular identification of yeasts associated with traditional Egyptian dairy products.J Food Sci. 74(7):M341-6.19.
111. Endo, A., Okada, S., 2005. *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. 55, 83-85.

112. Endo, A., Okada, S., 2007. *Lactobacillus composti* sp. nov., a lactic acid bacterium isolated from a compost of distilled shochu residue. Int. J. Syst. Evol. Microbiol., 57, 870-872. NRIC 0689.

113. Entani, E., Masai, H., Suzuki, K-I., 1986. *Lactobacillus acetotolerans*, a New Species from Fermented Vinegar Broth. International Journal of Systematic and Evolutionary Microbiology 36, 544-549.

114. Erten, H., Tanguler, H., 2010. Influence of *Williopsis saturnus* yeasts in combination with *Saccharomyces cerevisiae* on wine fermentation. Lett Appl Microbiol. 50, 474-9.

115. Essers, A.J., Ebong, C., van der Grift, R.M., Nout, M.J., Otim-Nape, W., Rosling, H., 1995a. Reducing cassava toxicity by heap-fermentation in Uganda. Int J Food Sci Nutr. 46(2):125-36.

116. Essers AJ, Jurgens CM, Nout MJ., 1995b. Contribution of selected fungi to the reduction of cyanogen levels during solid substrate fermentation of cassava. Int J Food Microbiol. 26(2):251-7.

117. Etchells, J.L., 1964. Pure Culture Fermentation of Brined Cucumbers. Appl Microbiol. 12, 523-35.

118. Farber, P., Geisen, R., 1994. Antagonistic Activity of the Food-Related Filamentous Fungus *Penicillium nalgiovense* by the Production of *Penicillin*. Appl Environ Microbiol. 60, 3401-3404.

119. Farrow, J.A.E., Facklam, R.R., Collins, M.D., 1989. Nucleic acid homologies of some vancomycin-resistant leuconostocs and description of *Leuconostoc citreum* sp. nov. and *Leuconostoc pseudomesenteroides* sp. nov. Int. J. Syst. Bacteriol. 39, 279-283.

120. Farrow, J.A.E., Phillips, B.A., Collins, M.D., 1988. Nucleic acid studies on some heterofermentative lactobacilli: description of *Lactobacillus malefermentans* sp. nov. and *Lactobacillus parabuchneri* sp. nov. FEMS Microbiol. Lett. 55, 163-168.

121. Fell, J.W., Scorzetti, G., 2004. Reassignment of the basidiomycetous yeasts *Trichosporon pullulans* to *Guehomyces pullulans* gen. nov., comb. nov. and *Hyalodendron lignicola* to *Trichosporon lignicola* comb. nov. Int J Syst Evol Microbiol 54(3) 995-998.

122. Fitzsimons, A. 1994. Development of an amylolytic *Lactobacillus plantarum* silage strain expressing the *Lactobacillus amylovorus* alpha-amylase gene. Appl Environ Microbiol. 60, 3529-35.

123. Fontana, C., Cappa, F., Rebecchi, A., Cocconcelli, P.S. 2010. Surface microbiota analysis of Taleggio, Gorgonzola, Casera, Scimudin and Formaggio di Fossa Italian cheeses. International Journal of Food Microbiology 138, 205-21.

124. Foulquie´ Moreno, M.R., Sarantinopoulos, P., Tsakalidou, E., Vuyst, L. De., 2006. The role and application of enterococci in food and health. International Journal of Food Microbiology 106, 1-24.

125. Fox, P.F., 2000. Fundamentals of cheese science. Springer.

126. Fresenius, G., 1850. Beiträge zur Mykologie 1, 12.

127. Frisvad, J.C., Smedsgaard, J., Larsen, T.O., Samson, R.A., 2004. Mycotoxins, drugs and other extrolites produced by species in *Penicillium subgenus Penicillium*. Stud. Mycol., 49, 201-241.

128. Fuentes-Ramírez, L.E., Bustillos-Cristales, R., Tapia-Hernandez, A., Jimenez-Salgado, T., Wang, E.T., Martinez-Romero, E., Caballero-Mellado, J., 2001. Novel nitrogen-fixing acetic acid bacteria, *Gluconacetobacter johannae* sp. nov. and *Gluconacetobacter azotocaptans* sp. nov., associated with coffee plants. Int. J. Syst. Evol. Microbiol. 51, 1305–1314.

129. Fujisawa, T., Adachi, S., Toba, T., Arihara,K., Mitsuoka, T., 1988. *Lactobacillus kefiranofaciens* sp. nov. Isolated from kefir grains. Int. J. Syst. Bacteriol. 38, 12–14.

130. Fujisawa, T., Benno, Y., Yaeshima, T., Mitsuoka, T., 1992. Taxonomic study of the *Lactobacillus acidophilus* group, with recognition of *Lactobacillus gallinarum* sp. nov. and *Lactobacillus johnsonii* sp. nov. and synonymy of *Lactobacillus acidophilus* group A3 (Johnson et al., 1980) with the type strain of *Lactobacillus amylovorus* (Nakamura 1981). Int. J. Syst. Bacteriol. 42, 487–491.
131. García Fontán, M.C., 2007. Microbiological characteristics of "androlla", a Spanish traditional pork sausage. Food Microbiol. 24, 52-8.
132. Garcia, A., Carcel, C., Dalau, L., Samson, A., Aguera, E., Agosin, E., Gunata, Z., 2002. Influence of a mixed culture with *Debaryomyces vanriji* and *Saccharomyces cerevisiae* on the volatiles in a Muscat wine. J Food Sci 67: 1138–1143.
133. Garvie, E.I., 1960. The genus *Leuconostoc* and its nomenclature. J. Dairy Res. 27, 283–292.
134. Garvie, E.I., 1983. *Leuconostoc mesenteroides* subsp. *cremoris* (Knudsen and Sørensen) comb. nov. and *Leuconostoc mesenteroides* subsp. *dextranicum* Beijernick) comb. nov. Int. J. Syst. Bacteriol. 33, 118–119.
135. Gasser, F., Mandel, M., Rogosa, M., 1970. *Lactobacillus jensenii* sp. nov., a new representative of the subgenus *Thermobacterium*. J. Gen. Microbiol. 62, 219–222.
136. Gavrish, E.Yu., Krauzova, V.I., Potekhina, N.V., Karasev, S.G., Plotnikova, E.G., Altyntseva, O.V., Korosteleva, L.A., Evtushenko, L.I., 2004. Three new species of brevibacteria, *Brevibacterium antiquum* sp. nov., *Brevibacterium aurantiacum* sp. nov., and *Brevibacterium permense* sp. nov. Microbiology (English translation of Mikrobiologiya) 73, 176–183.
137. Geiser, D.M, Pitt, J.I., Taylor, J.W., 1998. Cryptic speciation and recombination in the aflatoxin-producing fungus *Aspergillus flavus*. Proc Natl Acad Sci U S A. 95, 388-393.
138. Gelsomino, R., Vancanneyt, M., Snauwaert, C., Vandemeulebroecke, K., Hoste, B., Cogan, T.M., Swings, J., 2005. *Corynebacterium mooreparkense*, a later heterotypic synonym of *Corynebacterium variabile*. Int. J. Syst. Evol. Microbiol. 55, 1129-1131.
139. Georgalaki, M.D.,Sarantinopoulos, P., Ferreira, E.S., De Vuyst, L., Kalantzopoulos, G., Tsakalidou, E., 2000. Biochemical properties of *Streptococcus macedonicus* strains isolated from Greek Kasseri cheese. Journal of Applied Microbiology 88, 817-25.
140. Gibson, T., Gordon, R., 1974. Endospore-forming rods and cocci. Family I. *Bacillacea*, genus I. *Bacillus Cohn*, p. 529-550. In: Buchanan, R.E., Gibsons, N.E. (Eds.), Bergey's manual of determinative bacteriology, 8th ed. The Williams & Wilkins Co., Baltimore.
141. Giovanozzi-Sermanni, G., 1959. Una nuova specie di *Arthrobacter* determinante la degradazione della nicotina: *Arthrobacter nicotianae*. II Tabacco. 63:83–86.
142. Godet, M., Munaut, F., 2010. Molecular strategy for identification in *Aspergillus* section Flavi. FEMS Microbiol Lett. 304, 157-68.
143. Gonzalez, S.S., Barrio, E., Querol, A., 2007. Molecular identification and characterization of wine yeasts isolated from Tenerife. J Appl Microbiol. 102, 1018-1025.
144. Gueguen, M., Lenoir, J., 1975. Aptitude de l'espèce *Geotrichum candidum* à la production d'enzymes protéolytiques. Le Lait 55 (543-544) 145-162.
145. Guillamón, J.M., Sabaté, J., Barrio, E., Cano J., 1998. Amparo QuerolRapid identification of wine yeast species based on RFLP analysis of the ribosomal internal transcribed spacer (ITS) region. Arch Microbiol 169 : 387–392.
146. Gullo, M., 2008. Acetic acid bacteria in traditional balsamic vinegar: phenotypic traits relevant for starter cultures selection.Int J Food Microbiol. 125, 46-53.
147. Gullo, M., Caggia, C., De Vero, L., Giudici, P., 2006. Characterization of acetic acid bacteria in "traditional balsamic vinegar". Int J Food Microbiol. 106, 209-12.
148. Gunther, H.L., White, H.R., 1961. The cultural and physiological characters of the *pediococci*. J. Gen. Microbiol. 26:185-197.
149. Haakensen, M., 2009. 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. 59(Pt 3), 615-21.

150. Haard, N.F., Odunfa, S.A., Lee, C.H., Quintero-Ramirez, R., Lorence-Quinones, A., Wacher-Radarte, C., 1999. Fermented cereals – A global perspective. FAO Agri Serv Bull, 138.

151. Hamamoto, M., Sugiyama, J.,Komagata, K., 1988. Transfer of *Rhodosporidium infirmominiatum* to the genus *Cystofilobasidium* as *Cystofilobasidium infirmominiatum* comb. nov. J Gen Appl Microbiol 34, 271–278.

152. Hammer, B.W., 1915. Bacteriological studies on the coagulation of evaporated milk. Iowa Agr. Expt. Sta., Res. Bull. 19.

153. Hammes, W.P., Hertel, C., 2009. "*Carnobacterium*". In: De Vos, P., Schleifer, K-H., Ludwig, W., Whitman, W.B., Garrity, G., Jones, D., Rainey, F., Krieg, N.R. (Eds.), Bergey's Manual of Systematic Bacteriology, Volume 3, The Firmicutes; p.p. 549 - 557, Springer.

154. Hammes, W.P., Knauf, H.J., 1994. Starter in the processing of meat products. Meat Science 36, 155-168.

155. Han, B.Z., Kuijpers, A.F.A., Thanh, N.V., Nout., R.M.J., 2004. *Mucoraceous* moulds involved in the commercial fermentation of Sufu Pehtze. Antonie van Leeuwenhoek Volume 85, Number 3, 253-257.

156. Han, B.Z., Rombouts, F.M., Nout, M.J., 2001. A Chinese fermented soybean food. Int J Food Microbiol. 65, 1-10.

157. Hansen, P.A., Lessel, E.F., 1971. *Lactobacillus casei* (Orla-Jensen) comb. nov. Int. Syst. Bacteriol. 21, 69–71.

158. Hayaloglu, A.A., Kirbag, S., 2007. Microbial quality and presence of moulds in Kuflu cheese. Int J Food Microbiol. 115, 376-80.

159. Hegazi, F.Z., Abo-Elnaga, I.G., 1980. Characters of *Lactobacillus coryniformis*, isolated from an Iraqi cheese. Zentralbl Bakteriol Naturwiss. 135, 205-11.

160. Henri-Dubernet, S., 2008. Diversity and dynamics of *lactobacilli* populations during ripening of RDO Camembert cheese. Can J Microbiol. 54, 218-228.

161. Hesseltine, C.W., Shibasaki, K., 1961. Miso - III. Pure Culture Fermentation with *Saccharomyces rouxii*. Appl Microbiol. 9: 515–518.

162. Hinrichsen, L.L., Montel, M.C., Talon, R., 1994. Proteolytic and lipolytic activities of *Micrococcus roseus* (65), *Halomonas elongata* (16) and *Vibrio* sp. (168) isolated from Danish bacon curing brines. Int J Food Microbiol. 22(2-3), 115-26.

163. Hiraga, K., Ueno,Y., Sukontasing, S., Tanasupawat, S., Oda, K., 2008. *Lactobacillus senmaizukei* sp. nov., isolated from Japanese pickle. Int. J. Syst. Evol. Microbiol. 58, 1625-1629.

164. Irlinger, F., Bimet, F., Delettre, J., Lefevre, M., Grimont, P.A.D., 2005. *Arthrobacter bergerei* sp. nov. and *Arthrobacter arilaitensis* sp. nov., novel coryneform species isolated from the surfaces of cheeses. Int. J. Syst. Evol. Microbiol. 55, 457-462.

165. Jacobsen, T., Budde, B.B., Koch, A.G., 2003. Application of *Leuconostoc carnosum* for biopreservation of cooked meat products. J Appl Microbiol. 95, 242-249.

166. Jacques, N., Mallet, S., Casaregola, S., 2009. Delimitation of the species of the *Debaryomyces hansenii* complex by intron sequence analysis. Int J Syst Evol Microbiol. 59(Pt 5), 1242-51.

167. Jacquier, A., Dujon, B., 1983. "The intron of the mitochondrial 21S rRNA gene: distribution in different yeast species and sequence comparison between *Kluyveromyces thermotolerans* and *Saccharomyces cerevisiae*." Mol Gen Genet 192(3):487-99.

168. Jimenez-Salgado, T., 1997. Coffea arabica L., a new host plant for *Acetobacter diazotrophicus*, and isolation of other nitrogen-fixing acetobacteria. Appl Environ Microbiol. 63, 3676-83.

169. Johnson, J.L., Phelps, C.F., Cummins, C.S., London, J., Gasser, F., 1980. Taxonomy of the *Lactobacillus acidophilus* Group. International Journal of Systematic and Evolutionary Microbiology 30, 53-68.

170. Kaban, G.J., 2008. Identification of lactic acid bacteria and Gram-positive catalase-positive cocci isolated from naturally fermented sausage (sucuk). Food Sci. 73(8):M385-8.

171. Kandler, O., Kunath, P., 1983. *Lactobacillus kefiri* sp. nov., a component of the microflora of kefir. Syst. Appl. Microbiol. 4, 286–294.

172. Kandler, O., Stetter, K.O., Köhl, R., 1980. *Lactobacillus reuteri* sp. nov., a new species of *heterofermentative lactobacilli*. Zentralbl. Mikrobiol. Parasitenkd. Infektionskr. Hyg. Abt. 1 Orig. C1, 264-269.

173. Kaneuchi, C., Seki, M., Komagata, K., 1988. Taxonomic study of *Lactobacillus mali* Carr and Davis 1970 and related strains: validation of *Lactobacillus mali* Carr and Davis 1970 over *Lactobacillus yamanashiensis* Nonomura 1983., Int. J. Syst. Bacteriol. 38, 269-272.

174. Kashiwagi, T., Suzuki, T., Kamakura, T., 2009. *Lactobacillus nodensis* sp. nov., isolated from rice bran. Int. J. Syst. Evol. Microbiol. 59, 83-86.

175. Katagiri, H., Kitahara, K., Fukami, K., 1934. The characteristics of the lactic acid bacteria isolated from moto, yeast mashes for sake manufacture. IV. Classification of the lactic acid bacteria. Bulletin of the Agricultural Chemical Society of Japan 10, 156-157.

176. Katina, K., 2009. *In situ* production and analysis of *Weissella confusa* dextran in wheat sourdough. Food Microbiol. 26(7):734-43.

177. Keenan, T.W., 1968. Production of acetic acid and other volatile compounds by *Leuconostoc citrovorum* and *Leuconostoc dextranicum*. Appl Microbiol. 16, 1881-5.

178. Khetarpaul, N., Chauhan, B.M., 1991. Biological utilisation of pearl millet flour fermented with yeasts and *lactobacilli*. Plant Foods Hum Nutr. 41, 309-19.

179. Kim, B., Lee, J., Jang, J., Kim, J., Han, H., 2003. *Leuconostoc inhae* sp. nov., a lactic acid *bacterium* isolated from kimchi. Int. J. Syst. Evol. Microbiol. 53, 1123-1126.

180. Kim, J., Chun, J., Han, H.U., 2000. *Leuconostoc kimchii* sp. nov., a new species from kimchi. Int. J. Syst. Evol. Microbiol. 50, 1915-1919.

181. Kitahara, K., Kaneto, T., Goto, O., 1957. Taxonomic studies on the hiochi-bacteria, specific saprophytes of sake. II. Identification and classification of hiochi-bacteria. Journal of General and Applied Microbiology 3, 111-120.

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

183. Kleynmans, U., Heinzl, H., Hammes, W.P., 1989. *Lactobacillus suebicus* sp. nov., an obligately heterofermentative *Lactobacillus* species isolated from fruit mashes. Syst. Appl. Microbiol. 11, 267-271.

184. Kloos, W.E., Ballard, D.N., George, C.G.,Webster, J.A., Hubner, R.J., Ludwig, W., Schleifer, K.H., Fiedler, F. Schubert, K., 1998. Delimiting the genus *Staphylococcus* through description of *Macrococcus caseolyticus* gen. nov., comb. nov. and *Macrococcus equipercicus* sp. nov., *Macrococcus bovicus* sp. nov. and *Macrococcus carouselicus* sp. nov. Int. J. Syst. Bacteriol. 48, 859-877.

185. Kloos, W.E., Schleifer, K.H., 1975. Isolation and characterization of *staphylococci* from human skin. II. Description of four new species: *Staphylococcus warneri, Staphylococcus capitis, Staphylococcus hominis*, and *Staphylococcus simulans*. International Journal of Systematic Bacteriology 25, 62-79.

186. Kloos, W.E., Schleifer, K.H., Smith, R.F., 1976. Characterization of *Staphylococcus sciuri* sp. nov. and its subspecies. International Journal of Systematic Bacteriology 26, 22-37.

187. Kovács, G., Burghardt, J., Pradella, S., Schumann, P., Stackebrandt, E., Màrialigeti, K., 1999. *Kocuria palustris* sp. nov. and *Kocuria rhizophila* sp. nov., isolated from the *rhizoplane* of the narrow-leaved cattail (Typha angustifolia). Int J Syst Bacteriol. 49, 167-73.

188. Kozaki, M., Okada, S., 1983. *Lactobacillus vaccinostercus* sp. nov. In: Validation of the Publication of New Names and New Combinations Previously Effectively Published Outside the IJSB, List no. 10. Int J Syst Bacteriol 33, 438–440.

189. Kozakiewicz, Z., 1989. *Aspergillus* species on stored products. Mycological Papers 161, 1–188.

190. Kreger-van Rij, N.J.W., 1984. The Yeasts: a taxonomic study, 3rd Edition. 1-1082.

191. Kröckel, L., Schillinger, U., Franz, C.M.A.P., Bantleon, A., Ludwig, W., 2003. *Lactobacillus versmoldensis* sp. nov., isolated from raw fermented sausage. Int. J. Syst. Evol. Microbiol. 53, 513-517.

192. Krooneman, J., Faber, F., Alderkamp, A.C., Oude Elferink, S.J.H.W., Driehuis, F., Cleenwerck, I., Swings, J., Gottschal, J.C., Vancanneyt, M., 2002. *Lactobacillus diolivorans* sp. nov., a 1,2-propanediol-degrading bacterium isolated from aerobically stable maize silage. Int. J. Syst. Evol. Microbiol. 52, 639-646.

193. Kurita, O., 2008. Increase of acetate ester-hydrolysing esterase activity in mixed cultures of *Saccharomyces cerevisiae* and *Pichia anomala*. J Appl Microbiol 104: 1051–1058.

194. Kurtzman, C. P., Robnett, C. J., Basehoar-Powers, E., 2008. Phylogenetic relationships among species of *Pichia, Issatchenkia* and *Williopsis* determined from multigene sequence analysis, and the proposal of *Barnettozyma* gen. nov., Lindnera gen. nov. and *Wickerhamomyces* gen. nov. FEMS Yeast Res 8:939-54.

195. Kurtzman, C.P., Fell, J.W., Boekhout, T., 2011. The Yeasts: A Taxonomic Study, 5th edition. 3 Vol. Amsterdam: Elsevier Science & Technology.

196. Kurtzman, C.P., Robnett, C.J., 1999. Identification and phylogeny of ascomycetous yeasts from analysis of nuclear large subunit (26S) ribosomal DNA partial sequences. Antonie van Leeuwenhoek 73, 331-71.

197. Kurtzman, C.P., Robnett, C.J., 2003. Phylogenetic relationships among yeasts of the '*Saccharomyces* complex' determined from multigene sequence analyses. FEMS Yeast Res. 3, 417-32.

198. Kurtzman, C.P., Robnett, C.J., 2007.Multigene phylogenetic analysis of the *Trichomonascus*, *Wickerhamiella* and *Zygoascus* yeast clades, and the proposal of *Sugiyamaella* gen.nov. and 14 new species combinations. FEMS Yeast Res 7 141–151.

199. Kurtzman, C.P., Robnett, C.J., 2010. Systematics of methanol assimilating yeasts and neighboring taxa from multigene sequence analysis and the proposal of Peterozyma gen. nov., a new member of the *Saccharomycetales*. FEMS Yeast Res. 10, 353-61.

200. Kurtzman, C.P., Robnett, C.J., Basehoar-Powers, E., 2008. Phylogenetic relationships among species of *Pichia, Issatchenkia* and *Williopsis* determined from multigene sequence analysis, and the proposal of *Barnettozyma* gen. nov., *Lindnera* gen. nov. and *Wickerhamomyces* gen. nov. FEMS Yeast Res. (6):939-54.

201. Kurtzman, C.P., Suzuki, M., 2010. Phylogenetic analysis of ascomycete yeasts that form coenzyme Q-9 and the proposal of the new genera *Babjeviella, Meyerozyma, Millerozyma, Priceomyces*, and *Scheffersomyces*. Mycoscience 51: 2-14.

202. Kurtzman, CP., 2003. Phylogenetic circumscription of *Saccharomyces, Kluyveromyces* and other members of the *Saccharomycetaceae*, and the proposal of the new genera *Lachancea, Nakaseomyces, Naumovia, Vanderwaltozyma* and *Zygotorulaspora*. FEMS Yeast Res 4 233-245.

203. Lambert, L.H., Cox, T., Mitchell, K., Rosselló-Mora, R.A., Del Cueto, C., Dodge, D.E., Orkand, P., Cano, R.J., 1998. *Staphylococcus succinus* sp. nov., isolated from Dominican amber. Int J Syst Bacteriol. 48 Pt 2:511-8.

204. Lauer, E., Kandler, O., 1980. *Lactobacillus gasseri* sp. nov., a new species of the subgenus *Thermobacterium. Zentralbl*. Bakteriol. Parasitenkde. Infektionskrankh. Hyg. Abt. 1 Orig. C 1, 75–78.

205. Laxa, O., 1932. Über die Reifung des Ellischauer Käses. Zentralblatt für Bakteriologie und Parasitenkunde, Abteilung 2, 86, 160-165.

206. Lazos, E.S., 1993. The fermentation of trahanas: a milk-wheat flour combination. Plant Foods Hum Nutr. 44, 45-62.

207. Leclercq-Perlat, M.N., Corrieu, G., Spinnler, H.E., 2007. Controlled production of camembert-type cheeses: part III role of the ripening microflora on free fatty acid concentrations. J Dairy Res. 74, 218-25.

208. Lee, J.S., Lee, K.C., Ahn, J.S., Mheen, T.I., Pyun, Y.R., Park, Y.H., 2002. *Weissella koreensis* sp. nov., isolated from kimchi. Int. J. Syst. Evol. Microbiol. 52, 1257-1261.

209. Lee, H., Yoon, H., Ji, Y., Kim, H.,Park, H., Lee, J., Shin, H., Holzapfel, W. 2011. Functional properties of *Lactobacillus* strains isolated from kimchi. Int J Food Microbiol. 145, 155-61.

210. Lee, M., Kim, M.K., Vancanneyt, M., Swings, J. Kim, S.H., Kang,. M.S., Lee, S.T., 2005. *Tetragenococcus koreensis* sp. nov., a novel rhamnolipid-producing *bacterium*. Int. J. Syst. Evol. Microbiol. 55, 1409-1413.

211. Leroy, F., 2006. Functional meat starter cultures for improved sausage fermentation. Int J Food Microbiol. 106, 270-85.

212. Leuschner, R.-G.K., Robinson, T., Hugas, M., Cocconcelli, P.S., Richard-Forget, F., Klein, G., Licht, T.R., Nguyen-The, C., Querol, A., Richardson, M., Suarez, J.E., Vlak, J.M., von Wright, A., 2010. Qualified presumption of safety (QPS): a generic risk assessment approach for biological agents notified to the European Food Safety Authority (EFSA). Trends Food Sci. Technol 21 425-435.

213. Li, S.S., Cheng, C., Li, Z., Chen, J.Y., Yan, B., Han, B.Z., Reeves, M., 2010. Yeast species associated with wine grapes in China. Int J Food Microbiol 138(1-2):85-90.

214. Lindner, P., 1887. Über ein neues in Malzmaischen vorkommendes, milchsäurebildendes Ferment. Wochenschrift fur Brauerei 4, 437-440.

215. Lindner, P., 1893. [*Schizosaccharomyces* pombe n. sp., a new starter] Wochenschrift für Brauerei 10 1298-1300.

216. Liou, G.Y., Chen, S.R., Wei, Y.H., Lee, F.L., Fu, H.M., Yuan, G.F., Stalpers, J.A., 2007. Polyphasic approach to the taxonomy of the *Rhizopus stolonifer* group. Myc Res III 196-203.

217. Lisdiyanti, P., 2000. Systematic study of the genus *Acetobacter* with descriptions of *Acetobacter indonesiensis* sp. nov., *Acetobacter tropicalis* sp. nov., *Acetobacter orleanensis* (Henneberg 1906) comb. nov., *Acetobacter lovaniensis* (Frateur 1950) comb. nov., and *Acetobacter estunensis* (Carr 1958) comb. nov. J Gen Appl Microbiol. 46, 147-165.

218. Lisdiyanti, P., 2001. Identification of *Acetobacter* strains isolated from Indonesian sources, and proposals of *Acetobacter syzygii* sp. nov., *Acetobacter cibinongensis* sp. nov., and *Acetobacter orientalis* sp. nov. J Gen Appl Microbiol. 47, 119-131.

219. Lister, J., 1873. A further contribution to the natural history of bacteria and the germ theory of fermentative changes. Quart. Microbiol. Sci. 13, 380–408.

220. Lodder, J., Kreger-van Rij, N. J. W., 1984a, The Yeast: a Taxonomic Study. p.831.

221. Lodder, J., Kreger-van Rij, N. J. W., 1984b, The Yeast: a Taxonomic Study p.462.

222. Lund, F., Filtenborg, O., Frisvad, J.C., 1995. Associated mycoflora of cheese. Food Microbiol.12, 173-180.

223. Lund, F., Filtenborg, O., Frisvad, J.C., 1998. *Penicillium caseifulvum*, a new species found on fermented blue cheese. J. Food Mycol. 2, 95–100.

224. Manes-Lazaro, R., Ferrer, S., Rossello-Mora, R., Pardo, I., 2009. *Lactobacillus oeni* sp. nov., from wine. Int. J. Syst. Evol. Microbiol. 59, 2010-2014.

225. Manolopoulou, E., 2003. Evolution of microbial populations during traditional Feta cheese manufacture and ripening. Int J Food Microbiol. 82, 153-61.

226. Marchesini, B., 1992. Microbiological events during commercial meat fermentations. J Appl Bacteriol. 73, 203-9.

227. Martinez-Murcia, A.J., Collins, M.D., 1991. A phylogenetic analysis of an atypical *Leuconostoc*: description of *Leuconostoc fallax* sp. nov. FEMS Microbiol. Lett. 82, 55-60. VL 40.

228. Masoud, W., Takamiya, M., Vogensen, F.K., Lillevang, S., Al-Soud, W.A., Sørensen, S.J., Jakobsen, M., 2010. Characterization of bacterial populations in Danish raw milk cheeses made with different starter cultures by denaturating gradient gel electrophoresis (DGGE) and pyrosequencing. International Dairy Journal 21, 142-148.

229. Mathieu-Chandelier, C., Colombel, J.F., Cortot, A., Neut, C., Romond, C., 1998. Effect of milk fermented with *Bifidobacterium longum* on colonic fermentation. Presse Med. 18, 358.

230. Mees, R.H., 1934. Onderzoekingen over de Biersarcina. Thesis. Technical University Delft, Holland, pp. 1-110.
231. Meile, L., Ludwig, W., Rueger, U., Gut, C., Kaufmann, P., Dasen, G., Wenger, S., Teuber, M., 1997. *Bifidobacterium lactis* sp.nov., a moderately oxygen tolerant species isolated from fermented milk. Syst. Appl. Microbiol. 20, 57–64.
232. Meroth, C.B., Hammes, W.P., Hertel, C., 2004. Characterisation of the microbiota of rice sourdoughs and description of *Lactobacillus spicheri* sp. nov. Syst. Appl. Microbiol. 27, 151-159.
233. Miguel Rocha, J., Xavier Malcata, F., 1999. On the Microbiological Profile of Traditional Portuguese Sourdough. Journal of Food Protection 62, 1416–1429.
234. Minter, D.W., 2009. *Cyberlindnera*, a replacement name for *Lindnera Kurtzman* et al., nom. illegit. Mycotaxon. 110, 473-476.
235. Mitsuoka, T., 1969. Comparative studies on bifidobacteria isolated from the alimentary tract of man and animals. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1, Orig. Reihe A210, 52–64.
236. Miyake, Y., Ito, C., Itoigawa, M., Osawa, T., 2007. Isolation of the Antioxidant Pyranonigrin-A from Rice Mold Starters Used in the Manufacturing Process of Fermented Foods. Biosci Biotechnol Biochem. 71, 2515-21.
237. Miyamoto, M., Seto, Y., Hao, D.H., Teshima, T., Sun, Y.B., Kabuki, T., Yao, L.B., Nakajima, H., 2005. *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. 28, 688-694.
238. Mogensen, G., Salminen, S., O'Brien, J., Ouwehand, A., Holzapfel, W., Shortt, C., Fonden, R., Miller, G.D., Donohue, D., Playne, M., Crittenden, R., Salvadori, B., Zink, R., 2002a. Food microorganisms - health benefits, safety evaluation and strains with documented history of use in foods. Bulletin of IDF 377, 4-9.
239. Mogensen, G., Salminen, S., O'Brien, J., Ouwehand, A., Holzapfel, W., Shortt, C., Fonden, R., Miller, G.D., Donohue, D., Playne, M., Crittenden, R., Salvadori, B., Zink, R., 2002b. Inventory of microorganisms with a documented history of use in food. Bulletin of IDF 377, 10-19.
240. Mogensen, J.M., Varga J., Thrane, U., Frisvad, J.C., 2009. *Aspergillus acidus* from Puerh tea and black tea does not produce ochratoxin A and fumonisin B2. Int. J. Food Microbiol. 132, 141-144.
241. Møller, V., 1954. Distribution of amino acid decarboxylases in *Enterobacteriaceae*. Acta Pathologica et Bacteriologica Scandinavica 35, 259-277.
242. Montrocher, R., 1967. [Quelques nouvelles espèces et variétés du genre *Candida* (*Levures asporogènes*)]. Rev. Mycol. 32, 69-92.
243. Moore, W.E.C., Holdeman, L.V., 1970. *Propionibacterium, Arachnia, Actinomyces, Lactobacillus* and *Bifidobacterium*. In: Cato, E.P., Cummins, C.S., Holdeman, L.V., Johnson, J.L., Moore, W.E.C., Smibert, R.M., Smith, L.D.S. (Eds), Outline of Clinical Methods in Anaerobic Bacteriology, 2nd revision, Virginia Polytechnic Institute, Anaerobe Laboratory, Blacksburg, Virginia, 1970, pp. 15-22.
244. Moore, W.E.C., Holdeman, L.V., 1974. *Propionibacterium*. In: Buchanan, R.E., Gibbons, N.E. (Eds.), Bergey’s Manual of Determinative Bacteriology, 8th ed. Williams & Wilkins. Baltimore, MD. 633–644.
245. Mora, D., Scarpellini, M., Franzetti, L., Colombo, S., Galli, A., 2003. Reclassification of *Lactobacillus maltaromicus* (Miller et al. 1974) DSM 20342T and DSM 20344 and *Carnobacterium piscicola* (Collins et al. 1987) DSM 20730T and DSM 20722 as *Carnobacterium maltaromaticum* comb. nov. Int. J. Syst. Evol. Microbiol. 53, 675-678.
246. Moreau, C., 1979. Nomenclature des *Penicillium* utiles à la préparation du Camembert. Le Lait 59, 219-233.

247. Moreau, C., 1980. Le *Penicillium* roqueforti, morphologie, physiologie, intérêt en industrie fromagère, mycotoxines. (Révision bibliographique). Lait 60, 254-271.

248. Moreira, N., Mendes, F., Guedes de Pinho, P., Hogg, T., Vasconcelos, I., 2008. Heavy sulphur compounds, higher alcohols and esters production profile of *Hanseniaspora uvarum* and *Hanseniaspora guilliermondii* grown as a pure and mixed cultures in grape must. Int J Food Microbiol 124: 231–238.

249. Morlon-Guyot, J., Guyot, J.P., Pot, B., Jacobe de Haut, I., Raimbault, M., 1998. *Lactobacillus manihotivorans* sp. nov., a new starch-hydrolysing lactic acid *bacterium* isolated during cassava sour starch fermentation. Int. J. Syst. Bacteriol. 48, 1101-1109.

250. Morton, F.J. Smith, G., 1963, Mycological Papers 86: 1-96.

251. Mounier J, Le Blay G, Vasseur V, Le Floch G, Jany JL, Barbier G., 2010. Application of denaturing high-performance liquid chromatography (DHPLC) for yeasts identification in red smear cheese surfaces. Lett Appl Microbiol. 51(1):18-23.

251. Mounier, J., Gelsomino, R., Goerges, S., Vancanneyt, M., Vandemeulebroecke, K., Hoste, B., Scherer, S., Swings, J., Fitzgerald, G.F., Cogan, T.M., 2005. Surface microflora of four smear-ripened cheeses. Appl Environ Microbiol. 71, 6489-500.

252. Mounier, J., Monnet, C., Vallaeys, T., Arditi, R., Sarthou, A.S., Hélias, A., Irlinger, F., 2008. Microbial interactions within a cheese microbial community. Appl Environ Microbiol. 74, 172-81.

253. Müller, M.R.A., Ehrmann, M.A., Vogel, R.F., 2000. *Lactobacillus frumenti* sp. nov., a new lactic acid *bacterium* isolated from rye-bran fermentations with a long fermentation period. Int. J. Syst. Evol. Microbiol. 50, 2127-2133.

254. Nagami, Y., Tanaka, T., 1986. Molecular cloning and nucleotide sequence of a DNA fragment from *Bacillus natto* that enhances production of extracellular proteases and levansucrase in *Bacillus subtilis*. J Bacteriol. 166, 20-8.

255. Nakamura, L. K. 1981. *Lactobacillus amylovorus*, a new starch-hydrolyzing species from cattle waste-corn fermentations. Int. J. Syst. Bacteriol. 31:56–63.

256. Nanda, K., Taniguchi, M., Ujike, S., Ishihara, N., Mori, H., Ono, H., Murooka, Y., 2001. Characterization of acetic acid bacteria in traditional acetic acid fermentation of rice vinegar (komesu) and unpolished rice vinegar (kurosu) produced in Japan. Appl Environ Microbiol. 67, 986-90.

257. Nielsen, D.S., 2007. The microbiology of Ghanaian cocoa fermentations analysed using culture-dependent and culture-independent methods. Int J Food Microbiol. 114, 168-86.

257. Nielsen, D.S., Schillinger, U., Franz, C.M.A.P., Bresciani, J., Amoa-Awua, W., Holzapfel, W.H., Jakobsen, M., 2007. *Lactobacillus ghanensis* sp. nov., a motile lactic acid *bacterium* isolated from Ghanaian cocoa fermentations. Int. J. Syst. Evol. Microbiol. 57, 1468-1472.

258. Nirenberg, H.I., 1995. Morphological differentiation of *Fusarium sambucinum* Fuckel *sensu stricto*, F. torulosum (Berk. & Curt.) Nirenberg comb. nov. and F. *venenatum* Nirenberg sp. nov. Mycopathologia 129, 131-141.

259. Nishimura, I., Igarashi, T., Enomoto, T., Dake, Y., Okuno, Y., Obata, A., 2009. Clinical efficacy of halophilic lactic acid *bacterium Tetragenococcus halophilus* Th221 from soy sauce moromi for perennial allergic rhinitis. Allergol Int. 58:179-85.

260. Noda, F., Hayashi, K., Mizunuma, T., 1980. Antagonism Between Osmophilic Lactic Acid Bacteria and Yeasts in Brine Fermentation of Soy Sauce. Appl Environ Microbiol. 40, 452-457.

261. Nonomura, H., 1983. *Lactobacillus yamanashiensis* subsp. *yamanashiensis* and *Lactobacillus yamanashiensis* subsp. *mali* sp. and subsp. nov., nom. rev. Int. J. Syst. Bacteriol. 33, 406-407.

262. Nout, R., 2000. Useful role of of fungi in food processing. In: Samson, R.A., Hoekstra, E.S., Frisvad, J.C., Filtenborg, O. (Eds.), Introduction to food- and airborne fungi. 6th ed. Centraalbureau voor Schimmelcultures, Utrecht, the Netherlands.

263. Oda, Y., Yabuki, M., Tonomura, K., Fukunaga, M., 1997. Reexamination of Yeast Strains Classified as *Torulaspora delbrueckii* (Lindner). Int J Syst Bacteriol 47, 1102-1106.

264. O'Halloran, R., 1998. Purification of an extracellular proteinase from *Staphylococcus sciuri* found on the surface of Tilsit cheese. Biochem Soc Trans. 26, S29.

265. Ongol, M.P., Asano, K., 2009. Main microorganisms involved in the fermentation of Ugandan ghee. Int J Food Microbiol. 133(3):286-91.

266. Orillo, C.A., Pederson, C.S., 1968. Lactic acid bacterial fermentation of burong dalag. Appl Microbiol. 16, 1669-71.

267. Orla-Jensen, A.D., Hansen, P.A., 1932. The bacteriological flora of spontaneously soured milk and of commercial starters for butter making. Zentralbl. Bakteriol. Parasitenkd. Infektionskr Hyg. Abt. 2 86, 6-29.

268. Orla-Jensen, S. 1924. La classification des bactéries lactiques. Lait 4, 468–474.

269. Orla-Jensen, S., 1909. Die Hauptlinien des natürlichen Bakteriensystems. Zb. Bakteriol., Abt. 2 22, 305-346.

270. Osorio-Cadavid, E., Chaves-López, C., Tofalo, R., Paparella, A., Suzzi, G., 2008. Detection and identification of wild yeasts in Champús, a fermented Colombian maize beverage. Food Microbiol. 25(6):771-7.

271. Oterholm, A., 2003a. [Norwegian cheeses from a historical perspective — Gamelost]. Meieriposten, 9, 200–211.

272. Oterholm, A., 2003b. [Norwegian cheeses from a historical perspective — Pultost]. Meieriposten, 9, 264–274.

273. Ottogalli, G., Galli, A., Foschino, R., 1996. Italian bakery products obtained with sour dough: Characterization of the typical microflora. Advances in food sciences 18, 131-144.

274. Ouadghiri, M.,Amar, M., Vancanneyt, M., Swings, J., 2005. Biodiversity of lactic acid bacteria in Moroccan soft white cheese (Jben).FEMS Microbiol Lett. 251, 267-71.

275. Padonou, S.W., Schillinger, U., Nielsen, D.S., Franz, C.M.A.P., Hansen, M., Hounhouigan, J.D., Nago, M.C., Jakobsen, M., 2010. *Weissella beninensis* sp. nov., a motile lactic acid *bacterium* from submerged cassava fermentations, and emended description of the genus *Weissella*. Int. J. Syst. Evol. Microbiol. 60, 2193-2198.

276. Padonou, W.S., Nielsen, D.S., Hounhouigan, J.D., Thorsen, L., Nago, M.C., Jakobsen, M., 2009. The microbiota of Lafun, an African traditional cassava food product. Int J Food Microbiol. 133(1-2):22-30.

277. Paludan-Müller, C., 1999. Characterization of lactic acid bacteria isolated from a Thai low-salt fermented fish product and the role of garlic as substrate for fermentation. Int J Food Microbiol. 46, 219-29.

278. Pando, I., Garcia, M.J., Zuniga, M., Uruburu, F., 1989. Dynamics of Microbial Populations during fermentation of Wines from the Utiel-Requena Region of Spain. App Env Microbiol 539-541.

279. Papalexandratou, Z., Camu, N., Falony, G., de Vuyst, L., 2011. Comparison of the bacterial species diversity of spontaneous cocoa bean fermentations carried out at selected farms in Ivory Coast and Brazil. Food Microbiol 28 964-73.

280. Parente, E., Grieco, S., Crudele, M.A., 2001. Phenotypic diversity of lactic acid bacteria isolated from fermented sausages produced in Basilicata (Southern Italy). Journal of Applied Microbiology. 90, 943-52.

281. Pedersen, C., 2004. Microbiological characterization of wet wheat distillers' grain, with focus on isolation of *lactobacilli* with potential as probiotics. Appl Environ Microbiol. 70, 1522-7.

282. Pedersen, C.S., Niketic, G., Albury, M.N., 1962. Fermentation of the Yugoslavian pickled cabbage. Appl Microbiol. 10, 86-9.

283. Persoon, C.H., 1801.Synopsis methodica fungorum, 1-706.

284. Phaff, H.J., Miller, M.W., Shifrine, M., 1956. The taxonomy of yeasts isolated from Drosophila in the Yosemite region of California. Antonie van Leeuwenhoek 22, 145-161.

285. Pijper, A., 1928. [A new Hanseniaspora] Verhandelingen, Koninklijke Nederlandse Akademie van Wetenschappen, Afdeling Natuurkunde 37, 868-871.

286. Pitt, J.I., Miller, M.W., 1968. Sporulation in *Candida pulcherrima*, *Candida reukaufii* and *Chlamydozyma* species: their relationships with *Metschnikowia*. Mycologia 60 (3): 663-85.

287. Place, R.B., Hiestand, D., Burri, S., Teuber, M., 2002. *Staphylococcus succinus* subsp. *casei* subsp. nov., a dominant isolate from a surface ripened cheese. Systematic and Applied Microbiology 25, 353-9.

288. Place, R.B., Hiestand, D., Gallmann, H.R., Teuber, M., 2003. *Staphylococcus equorum* subsp. *linens*, subsp. nov., a starter culture component for surface ripened semi-hard cheeses. Syst. Appl. Microbiol. 26, 30-37.

289. Poittevin de De Cores, 1966. [Study on malolactic fermentation of wines in Uruguay. V. Study of the metabolism of *Lactobacillus plantarum* (*pentosus* and *arabinosus*) and of L*actobacillus buchneri* isolated from wines and their enologic uic use] [Article in Spanish] Rev Latinoam Microbiol Parasitol (Mex) 8, 33-7.

290. Poittevin de De Cores, Carrasco, A., 1966. [Study on malolactic fermentation of wines in Uruguay. V. Study of the metabolism of *Lactobacillus plantarum* (*pentosus* and *arabinosus*) and of *Lactobacillus buchneri* isolated from wines and their enologic use]. Rev Latinoam Microbiol Parasitol (Mex) 8, 33-7.

291. Priest, F.G., Goodfellow, M., Shute, L.A., Berkeley, R.C.W., 1987. *Bacillus amyloliquefaciens* sp. nov., nom. rev. Int J Syst Bacteriol 37, 69-71.

292. Probst, A.J., Hertel, C., Richter, L., Wassill, L., Ludwig, W., Hammes, W.P., 1998. *Staphylococcus condimenti* sp. nov., from soy sauce mash, and S*taphylococcus carnosus* (Schleifer and Fischer 1982) subsp. utilis subsp. nov. Int. J. Syst. Bacteriol. 48, 651-658.

293. Qing, M., Bai, M., Zhang, Y., Liu, W., Sun, Z., Zhang, H., Sun, T., 2010. Identification and biodiversity of yeasts from Qula in Tibet and milk cake in Yunnan of China. Wei Sheng Wu Xue Bao. 50, 1141-6.

294. Rabiu, B.A., 2001. Synthesis and fermentation properties of novel *galacto-oligosaccharides* by *beta-galactosidases* from *Bifidobacterium* species. Appl Environ Microbiol. 67, 2526-30.

295. Rainieri, S., Kodama, Y., Kaneko, Y., Mikata, K., Nakao, Y. Ashikari, T., 2006. Pure and mixed genetic lines of *Saccharomyces bayanu*s and *Saccharomyces pastorianus* and their contribution to the lager brewing strain genome. Appl Envir Microbiol 72, 3968-3974.

296. Rantsiou, K., Urso, R., Dolci, P., Comi, G., Cocolin, L., 2008. Microflora of Feta cheese from four Greek manufacturers. J Dairy Sci. 91, 3798-805.

297. Ratomahenina, R., Van den Booms, S., Galzy, P., Dieu, B., 1995. Study of growth parameters of *Cylindrocarpon* sp., a mould isolated from "saint nectaire" cheese. Chem Mikrobiol Technol Lebens 17, 169-171.Ravyts F, De Vuyst L., 2011. Prevalence and impact of single-strain starter cultures of lactic acid bacteria on metabolite formation in sourdough. Food Microbiol 28(6):1129-39.

298. Rehms H, Barz W., 1995. Degradation of stachyose, raffinose, melibiose and sucrose by different tempe-producing Rhizopus fungi. Appl Microbiol Biotechnol. 44(1-2):47-52.

299. Reuter, G., 1963. Vergleichende Untersuchunge über die Bifidus-Flora im Säuglings- und Erwachsenenstuhl. Zentralbl. Bakteriol. Parasitenkd. Infektionskr. Hyg. Abt. 1, Orig. Reihe A191 486–507.

300. Reuter, G., 1983. *Lactobacillus alimentarius* sp. nov., nom. rev. and *Lactobacillus farciminis* sp. nov., nom. rev. Syst. Appl. Microbiol. 4, 277–279.

301. Rogers, P.L., Goodman, A.E., Heyes, R.H., 1984. *Zymomonas* ethanol fermentations. Microbiol Sci. 1, 133-6.

302. Rogosa, M., Wiseman, R.F., Mitchell, J.A., Disraely, M.N., 1953. Species differentiation of oral *lactobacilli* from man including descriptions of *Lactobacillus salivarius* nov. spec. and *Lactobacillus cellobiosus* nov. spec. Journal of Bacteriology 65, 681-699.

303. Romano, P., Suzzi, G., Domizio, P., Fatichenti, F., 1997. Secondary products formation as a tool for discriminating non-*Saccharomyces* wine strains. Strain diversity in non-*Saccharomyces* wine yeasts. Antonie Van Leeuwenhoek. 71(3):239-42.

304. Roos, S., Karner, F., Axelsson, L., Jonsson, H., 2000. *Lactobacillus mucosae* sp. nov., a new species with in vitro mucus-binding activity isolated from pig intestine. Int. J. Syst. Evol. Microbiol. 50, 251-258. S32.

305. Roostita, R., Fleet, G.H., 1996. The occurrence and growth of yeasts in Camembert and Blue-veined cheeses. Int. J. Food Microbiol. 28, 393-404.

306. Ropars, J., Cruaud, C., Lacoste, S., Dupont, J., 2012. A taxonomic and ecological overview of cheese fungi. Int. J. Food Microbiol. 155(3): 199-210.

307. Rosa,C.A., Lachance, M.A., 1998. The yeast genus *Starmerella* gen. nov. and *Starmerella bombicola* comb. nov., the teleomorph of *Candida bombicola* (Spencer, Gorin et Tullock) Meyer et Yarrow. Int J Syst Evol Microbiol 48, 1413-1417.

308. Rouse, S., Canchaya, C., Van Sinderen, D., 2008. *Lactobacillus hordei* sp. nov., a bacteriocinogenic strain isolated from malted barley. Int. J. Syst. Evol. Microbiol. 58, 2013-2017.

309. Rusmin, S., Ko, S.D., 1974. Rice-Grown *Rhizopus oligosporus Inoculum* for Tempeh Fermentation. Appl Microbiol. 28, 347-50.

310. Sameshima, T., 1998. Effect of intestinal *Lactobacillus starter* cultures on the behaviour of *Staphylococcus aureus* in fermented sausage. Int J Food Microbiol. 41, 1-7.

311. Scalabrini, P., Rossi, M., Spettoli, P., Matteuzzi, D., 1998. Characterization of *Bifidobacterium* strains for use in soymilk fermentation. Int J Food Microbiol. 39, 213-9.

312. Schafner, D.W., Beuchat, L.R., 1986. Fermentation of aqueous plant seed extracts by lactic acid bacteria. Appl Environ Microbiol. 51, 1072-6.

313. Scheirlinck, I., Van der Meulen, R., Van Schoor, A., Cleenwerck, I., Huys, G., Vandamme, P., Devuyst, L., Vancanneyt, M., 2007a. *Lactobacillus namurensis* sp. nov., isolated from a traditional Belgian sourdough. Int. J. Syst. Evol. Microbiol. 57, 223-227.

314. Scheirlinck, I., Van der Meulen, R., Van Schoor, A., Huys, G., Vandamme, P., De Vuyst, L., Vancanneyt, M., 2007b. *Lactobacillus crustorum* sp. nov., isolated from two traditional Belgian wheat sourdoughs. Int J Syst Evol Microbiol. 57(Pt 7):1461-7.

315. Schillinger, U., Lücke, F.-K., 1987. Identification of *lactobacilli* from meat and meat products. Food Microbiol. 4, 199–208.

316. Schipper, M.A.A, Stalpers, J.A., 1984. A revision of the genus *Rhizopus*. II. The *Rhizopus microsporus*-group. Studies in Mycology 25, 20-34.

317. Schlafmann, K., Meusburger, A.P., Hammes, W.P., Braun, C., Fischer, A., Hertel, C., 2002. Starterkulturen zur Verbesserung der Qualität von Rohschinken. Fleischwirtschaft 11, 108-114.

318. Schleifer, K.H., Kilpper-Balz, R., 1984. Transfer of *Streptococcus faecalis* and *Streptococcus faecium* to the genus *Enterococcus* nom. rev. as *Enterococcus faecalis* comb. nov. and *Enterococcus faecium* comb. nov. Int. J. Syst. Bacteriol. 34, 31-34.

319. Schleifer, K.H., Kilpper-Bälz, R., Devriese, L.A., 1985. *Staphylococcus arlettae* sp. nov., *S. equorum* sp. nov. and *S. kloosii* sp. nov.: three new coagulase-negative, novobiocin-resistant species from animals. Syst. Appl. Microbiol. 5, 501-509.

320. Schleifer, K.H., Kloos, W.E., 1975. Isolation and characterization of *staphylococci* from human skin. I. Amended descriptions of *Staphylococcus epidermidis* and *Staphylococcus saprophyticus* and descriptions of three new species: *Staphylococcus cohnii*, *Staphylococcus haemolyticus*, and *Staphylococcus xylosus*. International Journal of Systematic Bacteriology 25, 50-61.

321. Schroers, H.J., O'Donnell, K., Lamprecht, S.C., Kammeyer, P.L., Johnson, S., Sutton, D.A., Rinaldi, M.G., Geiser D.M., Summerbell, R.C., 2009. Taxonomy and phylogeny of the *Fusarium dimerum* species group. Mycologia 101, 44-70.
322. Schubert, K., Ludwig, W., Springer, N., Kroppenstedt, R.M., Accolas, J.P., Fiedler, F., 1996. Two coryneform bacteria isolated from the surface of French Gruyère and Beaufort cheeses of the genus *Brachybacterium*: *Brachybacterium alimentarium* sp. nov. and *Bracybacterium tyrofermentans* sp. nov. Int J Syst Bacteriol. 46, 81-7.
323. Schüller, G., Hertel, C., Hammes, W.P., 2000. Gluconacetobacter entanii sp. nov., a new species isolated from submerged high-acid industrial vinegar fermentations. Int. J. Syst. Evol. Microbiol. 50, 2013–2020.
324. Schwan, R.F., Vanetti, M.C.D., Silva, D.O., Lopez, A., de Moraes, C.A., 1986. Characterization and distribution of aerobic, spore-forming bacteria from cacao fermentations in Bahia. J. Food Sci. 51:1583–1584.
325. Schwan, R.F., Wheals, A.E., 2004. The microbiology of cocoa fermentation and its role in chocolate quality. Crit Rev Food Sci Nutr 44(4), 205-21.
326. Seiler, H., Busse, M., 1990. The yeasts of cheese brines. Int J Food Microbiol. 11(3-4): 289-303.
327. Sengun, I.Y., Nielsen, D.S., Karapinar, M., Jakobsen, M., 2009. Identification of lactic acid bacteria isolated from Tarhana, a traditional Turkish fermented food. International Journal of Food Microbiology 135, 105-11.
328. Shahani, K.M., Chandan, R.C., 1979. Nutritional and healthful aspects of cultured and culture-containing dairy foods. J Dairy Sci. 62, 1685-94.
329. Shaw, B. G., Harding, C.D., 1989. *Leuconostoc gelidum* sp. nov and *Leuconostoc carnosum* sp. nov. from chill stored meats. Int. J. Syst. Bacteriol. 39, 217–223.
330. Shaw, C., Stitt, M., Cowan, S.T., 1951. *Staphylococci* and their classification. J. Gen. Microbiol. 5, 1010-1023.
331. Shear, G.L., Dodge, B.O., 1927. Life histories and heterothallism of the red bread-mold fungi of the *Monilia sitophila* group. J Agri Res 34(11): 1019-1041.
332. Shepherd, R., Rockey, J., Sutherland, I.W., Roller, S., 1995. Novel bioemulsifiers from microorganisms for use in foods. J Biotechnol. 40, 207-217.
333. Sherman, J.M., 1921. The cause of eyes and characteristic flavor of Emmental cheese. J. Bact. 6, 379-392.
334. Sherman, J.M., Stark, P., 1938. The Fermentation of Disaccharides by *Streptococcus thermophilus*. J Bacteriol. 36, 77-81.
335. Sherman, J.M., Wing, H.U., 1937 *Streptococcus durans* N. Sp. Jour. Dairy Sci. 20, 165-167.
336. Shrestha, H., Rati, E.R., 2003. Defined microbial starter for the production of Poko - a traditional fermented food product of Nepal. Food Biotechnol 17(1) 15-25.
337. Sipiczki, M., 2003. *Candida zemplinina* sp. nov., an osmotolerant and psychrotolerant yeast that ferments sweet botrytized wines. Int J System Evol Microbiol 53, 2079–2083.
338. Skerman, V.B.D., McGowan, V., Sneath, P.H., 1989. Approved Lists of Bacterial Names (Amended). ASM Press, Washington DC.
339. Smacchi, E., Fox, P.F., Gobbetti, M. 1999a. Purification and characterization of two extracellular proteinases from *Arthrobacter nicotianae* 9458. FEMS Microbiol Lett. 170, 327-33.
340. Smacchi, E., Gobbetti, M.,Lanciotti, R., Fox, P.F., 1999b. Purification and characterization of an extracellular *proline imine peptidase* from *Arthrobana*, 58. FEMS Microbiol Lett. 178(1):191-7.
341. Snow, P.G., Gallender, G.F., 1979. Deacidification of white table wines through partial fermentation by *Schizosaccharomyces pombe*. Am J Enol Viticult 30, 45–48.
342. Sokollek, S.J., Hertel, C., Hammes, W.P., 1998. Description of *Acetobacter oboediens* sp. nov. and *Acetobacter pomorum* sp. nov., two new species isolated from industrial vinegar fermentations. Int. J. Syst. Bacteriol. 48, 935–940.

343. Solieri, L., Giudici, P., 2008. Yeasts associated to Traditional Balsamic Vinegar: ecological and technological features. Int J Food Microbiol 125(1): 36-45.

344. Soni, S.K., Sandhu, D.K., Vikhu, K.S., Karma, N., 1986. Microbiological studies on dosa fermentation. Food Microbiol 3, 45–53.

345. Spotti, E., Berni, E., Cacchioli, C., 2008. Characteristics and Applications of Molds. Meat Biotechnology Part II, 181-195.

346. Stackebrandt, E., Koch, C., Gvozdiak, O., Schumann, P., 1995. Taxonomic dissection of the genus *Micrococcus: Kocuria* gen. nov., *Nesterenkonia* gen. nov., *Kytococcus* gen. nov., *Dermacoccus* gen. nov., and *Micrococcus* Cohn 1872 gen. emend., ex *Micrococcus varians* Migula 1900 Int. J. Syst. Bacteriol. 45, 682-692. (Approved Lists 1980).

347. Steinkraus, K.H., 2002. Fermentations in World Food Processing. Comp Rev Food Sci Food Safety [serial online]. 1, 23-32.

348. Stringini, M., Comitini, F., Taccari, M., Ciani, M., 2009. Yeast diversity during tapping and fermentation of palm wine from Cameroon. Food Microbiol. 26, 415-20.

349. Suezawa ,Y., Suzuki, M., 2007. Bioconversion of Ferulic Acid to 4-Vinylguaiacol and 4-Ethylguaiacol and of 4-Vinylguaiacol to 4-Ethylguaiacol by Halotolerant Yeasts Belonging to the Genus *Candida*. Biosci Biotechnol Biochem. 71, 1058-62.

350. Suezawa, Y., Kimura, I., Inoue, M., Gohda, N., Suzuki, M., 2006. Identification and typing of miso and soy sauce fermentation yeasts, *Candida etchellsii* and *C. versatilis*, based on sequence analyses of the D1D2 domain of the 26S ribosomal RNA gene, and the region of internal transcribed spacer 1, 5.8S ribosomal RNA gene and internal transcribed spacer 2. Biosci Biotechnol Biochem. 70(2): 348-354.

351. Suezawa, Y., Suzuki, M., Mori, H., 2008. Genotyping of a Miso and Soy Sauce Fermentation Yeast, *Zygosaccharomyces rouxii*, Based on Sequence Analysis of the Partial 26S Ribosomal RNA Gene and Two Internal Transcribed Spacers, Biosci Biotechnol Biochem. 72:2452-5.

352. Swings, J., De Ley, J., 1977. The biology of *Zymomonas*. Bacteriol Rev. 41, 1-46.

353. Takizawa, S., Kojima, S., Tamura, S., Fujinaga, S., Benno, Y., Nakase, T., 1994. *Lactobacillus kefirgranum* sp. nov. and *Lactobacillus parakefiri* sp. nov., two new species from kefir grains. Int J Syst Bacteriol 44, 435–439.

354. Talon, R., Leroy, S., Lebert, I., Giammarinaro, P., Chacornac, J.P., Latorre-Moratalla, M., Vidal-Carou, C., Zanardi, E., Conter, M., Lebecque, A., 2008. Safety improvement and preservation of typical sensory qualities of traditional dry fermented sausages using autochthonous starter cultures. International Journal of Food Microbiology 126, 227-34.

355. Talon, R., Leroy, S., 2011. Diversity and safety hazards of bacteria involved in meat fermentations. Meat Sci 89(3) 303-9.

356. Tanasupawat, S., 2002. Lactic acid bacteria isolated from soy sauce mash in Thailand. J Gen Appl Microbiol. 48, 201-9.

357. Tanasupawat, S., Hashimoto, Y., Ezaki, T., Kozaki, M., Komagata, K., 1992. *Staphylococcus piscifermentans* sp. nov., from fermented fish in Thailand. Int. J. Syst. Bacteriol. 42, 577-581.

358. Tanasupawat, S., Shida, O., Okada, S., Komagata, K., 2000. *Lactobacillus acidipiscis* sp. nov. and *Weissella thailandensis* sp. nov., isolated from fermented fish in Thailand. International Journal of Systematic and Evolutionary Microbiology 50, 1479-85.

359. Thom, C., 1906. Fungi in cheese ripening; Camembert and Roquefort. Bull. Bur. Anim. Ind. US Dep. Agric. 82, 33.

360. Thom, C., 1910. U.S.D.A. Bureau of Animal Industry Bulletin 118, 1-107.

361. Thomas, T.D., Turner, K.W., Crow, V.L., 1980. Galactose fermentation by *Streptococcus lactis* and *Streptococcus cremoris*: pathways, products, and regulation. J Bacteriol. 144, 672-82.

362. Thrane, U., 2007. Fungal protein for food. In: Dijksterhuis, J., Samson., R.A. (Eds.), Food Mycology. A multifaceted approach to fungi and food. CRC Press, Boca Raton, pp. 353-360.

363. Torija, M.J., 2010. Identification and quantification of acetic acid bacteria in wine and vinegar by TaqMan-MGB probes. Food Microbio. 27, 257-65.

364. Toro, M.E., Vazquez, F., 2002. Fermentation behaviour of controlled mixed and sequential cultures of *Candida cantarellii* and *Saccharomyces cerevisiae* wine yeasts. World J Microb Biot 18, 347–354.

365. Torriani, S., Van Reenen, C.A., Klein, G., Reuter, G., Dellaglio, F., Dicks, L.M.T., 1996. *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-Elnaga and Kandler 1965 and *Lactobacillus sake* Katagiri, Kitahara, and Fukami 1934 (Klein et al. 1996, emended descriptions), respectively. Int. J. Syst. Bacteriol. 46, 1158-1163.

366. Tsakalidou, E., 1998. Identification of streptococci from Greek Kasseri cheese and description of *Streptococcus macedonicus* sp. nov. Int J Syst Bacteriol. 48 Pt 2, 519-27.

367. Tsui, T.H.M., Daniel, H.M., Robert, V., Meyer, W., 2008. Re-examining the phylogeny of clinically relevant *Candida* species and allied genera based on multigene analyses. FEMS Yeast Res. 8, 651–659.

368. Urso, R., Rantsiou, K., Dolci, Rolle, L., Comi, G., Cocolin, L., 2008. Yeast biodiversity and dynamics during sweet wine production as determined by molecular methods. FEMS Yeast Res. 8, 1053–1062.

369. Valcheva, R., Ferchichi, M.F., Korakli, M., Ivanova, I., Gänzle, M.G., Vogel, R.F., Prévost, H., Onno, B., Dousset, X., 2006. *Lactobacillus nantensis* sp. nov., isolated from French wheat sourdough. Int. J. Syst. Evol. Microbiol. 56, 587-591.

370. Valcheva, R., Korakli, M., Onno, B., Prévost, H., Ivanova, I., Ehrmann, M.A., Dousset, X., Gänzle, M.G., Vogel, R.F., 2005. *Lactobacillus hammesii* sp. nov., isolated from French sourdough. Int. J. Syst. Evol. Microbiol. 55, 763-767.

371. van der Sluis, C., Mulder, A.N., Grolle, K.C., Engbers, G.H., ter Schure, E.G., Tramper, J., Wijffels, R.H., 2000. Immobilized soy-sauce yeasts: development and characterization of a new polyethylene-oxide support. J Biotechnol. 80:179-88.

372. van der Walt,J.P.,Tscheuschner,I.T.Three new yeasts. Antonie van Leeuwenhoek, 1957, Vol. 23, 184-190

373. van der Walt, J.P., 1964. Dekkera, a new genus of the *Saccharomycetaceae*. Antonie van Leeuwenhoek 30, 273-280.

374. van der Walt, J.P., von Arx, J.A., 1980. The yeast genus *Yarrowia* gen. nov. Antonie van Leeuwenhoek 46, 517-521.

375. Van Niel, 1928. The genus *Propionibacterium*. J.W. Boisevain, Haarlem, the Netherlands.

376. Van Tieghem, P.E.L., 1878. Sur la gomme de sucrerie. Ann. Sci. Nat. Bot., 6e Ser. 67, 180–202.

377. Vancanneyt, M., Mengaud, J., Cleenwerck, I., Vanhonacker, K., Hoste, B., Dawyndt, P., Degivry, M.C., Ringuet, D., Janssens, D., Swings, J., 2004. Reclassification of *Lactobacillus kefirgranum* Takizawa et al. 1994 as *Lactobacillus kefiranofaciens* subsp. *kefirgranum* subsp. nov. and emended description of L. kefiranofaciens Fujisawa et al. 1988. Int. J. Syst. Evol. Microbiol., 54, 551-556.

378. Vancanneyt, M., Naser, S.M., Engelbeen, K., De Wachter, M., Van der Meulen, R., Cleenwerck, I., Hoste, B., De Vuyst, L., Swings, J., 2006. Reclassification of *Lactobacillus brevis* strains LMG 11494 and LMG 11984 as *Lactobacillus parabrevis* sp. nov. Int. J. Syst. Evol. Microbiol. 56, 1553-1557.

379. Vancanneyt. M., Neysens, P., De Wachter, M., Engelbeen, K., Snauwaert, C., Cleenwerck, I., Van der Meulen, R., Hoste, B., Tsakalidou, E., De Vuyst, L., Swings, J., 2005. *Lactobacillus acidifarinae* sp. nov. and *Lactobacillus zymae* sp. nov., from wheat sourdoughs. Int J Syst Evol Microbiol. 55, 615-620.

380. Ventling, B.L., Mistry, V.V., 1993. Growth characteristics of *bifidobacteria* in ultrafiltered milk. J Dairy Sci. 76, 962-71.

381. Vernozy-Rozand, C., Mazuy, C., Meugnier, H., Bes, M., Lasne, Y., Fiedler, F., Etienne, J., Freney, J., 2000. *Staphylococcus fleurettii* sp. nov., isolated from goat's milk cheeses. Int. J. Syst. Evol. Microbiol. 50, 1521-1527.
382. Viana, F., Gil, J.V., Genovés, S., Vallés, S., Manzanares, P., 2008. Rational selection of non-*Saccharomyces* wine yeasts for mixed starters based on ester formation and enological traits. Food Microbiol 25: 778–785.
383. Vieira-Dalodé, G., 2007. Lactic acid bacteria and yeasts associated with gowé production from sorghum in Bénin. J Appl Microbiol. 103, 342-9.
384. Villani, F., Casaburi, A., Pennacchia, C., Filosa, L., Russo, F., Ercolini, D., 2008. Microbial ecology of the soppressata of Vallo di Diano, a traditional dry fermented sausage from southern Italy, and in vitro and in situ selection of autochthonous starter cultures. Applied and Environmental Microbiology 73, 5453-63.
385. Virtanen, T., 2007. Development of antioxidant activity in milk whey during fermentation with lactic acid bacteria. J Appl Microbiol. 102, 106-15.
386. Vogel, R.F., 1999. Non-dairy lactic fermentations: the cereal world. Antonie Van Leeuwenhoek 76(1-4), 403-11.
387. Vogel, R.F., Böcker, G., Stolz, P., Ehrmann, M., Fanta, D., Ludwig, W., Pot, B., Kersters, K., Schleifer, K.H., Hammes, W.P., 1994. Identification of lactobacilli from sourdough and description of *Lactobacillus pontis* sp. nov. Int. J. Syst. Bacteriol. 44, 223-229.
388. Vreeland, R.H., Litchfield, C.D., Martin, E.L., Elliot, E., 1980. *Halomonas elongata*, a new genus and species of extremely salt-tolerant bacteria. Int. J. Syst. Bacteriol. 30, 485-495.
389. Waksman, S.A., Henrici, A.T., 1943. The nomenclature and classification of the *actinomycetes*. J. Bacteriol. 46, 337–341.
390. Wang, S.Y., Chen, H.C., Liu, J.R., Lin, Y.C., Chen, M.J., 2008. Identification of Yeasts and Evaluation of their Distribution in Taiwanese Kefir and Viili Starters. J Dairy Sci. 91, 3798-3805.
391. Watanabe, K., Fujimoto, J., Tomii, Y., Sasamoto, M., Makino, H., Kudo., Y., Okada, S., 2009. *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. 59, 754-760.
392. Wehmer, C., 1903. Der Mucor der Hanfrötte, M. hiemalis nov. spec. Annales Mycologici 1, 37-41.
393 Weiss, N., Busse, M., Kandler, O., 1968. [The origin of fermentation by-products in the lactic acid fermentation of *Lactobacillus acidophilus*]. Arch Mikrobiol. 62, 85-93.
394. Weiss, N., Schillinger, U., 1984. *Lactobacillus sanfrancisco* sp. nov., nom. rev. Syst. Appl. Microbiol. 5, 230-232.
395. Weiss, N., Schillinger, U., Kandler, O., 1983. *Lactobacillus lactis, Lactobacillus leichmannii* and *Lactobacillus bulgaricus*, subjective synonyms of *Lactobacillus delbrueckii*, and description of *Lactobacillus delbrueckii* subsp. *lactis* comb. nov. and *Lactobacillus delbrueckii* subsp. *bulgaricus* comb. nov. Syst. Appl. Microbiol. 4, 552–557.
396. Went, F.A.F.C., Prinsen Geerligs, H.C., 1895. [Observation of Yeast and Moulds for Arack fermentation]. Verhandelingen, Koninklijke Nederlandse Akademie van Wetenschappen, Afdeling Natuurkunde. 4, 3-31.
397. Westall, S., Filreenborg ,O., 1998. Yeast occurence in Danish feta cheeses. Food Micro. 15, 215-222.
398. Westling, R., 1911. Über die grünen Spezies der Gattung *Penicillium* Journal: Arkiv før Botanik 11, 1-156.
399. Wiese, B.J., Strohmar, W., Rainey, F.A., Diekmann, H., 1996. *Lactobacillus panis* sp. nov., from sourdough with a long fermentation period. Int. J. Syst. Bacteriol. 46, 449-453.

400. Wieser, M., Denner, E.B.M., Kampfer, P., Schumann, P., Tindall, B., Steiner, U., Vybiral, D., Lubitz, W., Maszenan, A.M., Patel, B.K.C., Seviour, R.J., Radax, C., Busse, H.J., 2002. Emended descriptions of the genus *Micrococcus, Micrococcus luteus* (Cohn 1872) and *Micrococcus lylae* (Kloos et al. 1974). Int. J. Syst. Evol. Microbiol.52, 629-637.

401. Wyder, T.M., Spillmann, H., Puhan, Z., 1997. Investigation of yeast flora in dairy products. Food technol. biotechnol. 35, 4, 299-304.

402. Xiao, J.Z., 2010. Distribution of in vitro fermentation ability of lacto-N-biose I, a major building block of human milk oligosaccharides, in bifidobacterial strains. Appl Environ Microbiol. 76, 54-9.

403. Yamada, Y., 2000. Transfer of *Acetobacter oboediens* Sokollek et al 1998 and *Acetobacter intermedius* Boesch et al. 1998 to the genus *Gluconacetobacter* as *Gluconacetobacter oboediens* comb. nov. and Gluconacetobacter intermedius comb. nov. Int J Syst Evol Microbiol. 50 Pt 6, 2225-7.

404. Yamada, Y., Hoshino, K.-I., Ishikawa, T., 1998. Validation of publication of new names and new combinations previously effectively published outside the IJSB. List No. 64: *Gluconacetobacter* nom. corrig. (*Gluconoacetobacter* [sic]). Int. J. Syst. Bacteriol. 48, 327–328.

405. Yarrow, D., 1978. Candida milleri sp. nov. Int J Syst Bacteriol 28, 608-610.

406. Yoon, J.H., Kang, S.S., Mheen, T.I., Ahn, J.S., Lee, H.J., Kim, T.K., Park, C.S., Kho, Y.H., Kang, K.H., Park, Y.H., 2000. *Lactobacillus kimchii* sp. nov., a new species from kimchi. Int. J. Syst. Evol. Microbiol. 50, 1789-1795.

407. Zagorc, T., Maraz, A., Cadez, N., Povhe Jemec, K., Peter, G., Resnik, M., Nemanic, J., Raspor, P., 2001. Indigenous wine killer yeasts and their application as a starter culture in wine fermentation. Food Micro. 2001, 18, 441-451.

408. Zaman MZ, 2011. Novel starter cultures to inhibit biogenic amines accumulation during fish sauce fermentation. Int J Food Microbiol 145(1):84-91.

409. Zanoni, P.J., Farrow, A.E., Phillips, B.A., Collins, M.D., 1987. *Lactobacillus pentosus* (Fred, Peterson, and Anderson) sp. nov., nom. rev. Int. J. Syst. Bacteriol. 37, 339–341.

410. Zare, R., Gams, W., 2001. A revision of *Verticillium* section *Prostrata*. IV. The genera *Lecanicillium* and *Simplicillium*. Nova Hedwigia 73, 1-50.

411. Zhou, J., Liu, X., Jiang, H., Dong, M., 2009. Analysis of the microflora in Tibetan kefir grains using denaturing gradient gel electrophoresis. Food Microbiol. 26, 770-5.

4. Conclusion: Continuous Update of the Inventory of Microbial Food Cultures

Microbiology is a rapidly evolving science. The inventory can therefore not be considered complete as such, owing to the continuous developments in taxonomy and systematics. The identification and isolation of new microbial species and new descriptions of their role in various fermented food products is a constant challenge to the relevance of the inventory. The same issue is valid for any list of microorganisms with a defined purpose. Updating the inventory of microbial species used in fermented food products can be considered as a never-ending task. The exclusion of a microbial species from the published inventory shall be considered in cases of new evidence for potential risks, e.g. opportunistic infections or toxin production.

While Microbial Risk Assessment (MRA) as initially proposed by the World Health Organization (WHO) was focused solely on pathogenic species, the increase in available scientific knowledge provides new screening techniques and also enables a specific benefit risk assessment approach. The potential adverse effect of a particular microbial species in a specific food matrix will also be assessed, to make sure the risk does not outweigh the benefit. Specific food usage and its consequences are also to be considered, e.g. as proposed by Franz and collaborators for enterococci.

In the 2010-2012 updating process, not all species submitted by IDF National Committees could be incorporated in the present inventory, mostly owing to lack of demonstration of use in food.

An update is already foreseen in the near future. IDF will therefore dedicate a specific action team to work on continuous updating of the recently published up-to-date inventory, based on thorough evaluation of any new scientific evidence that is provided. The dedicated action team within the Standing Committee on Microbiological Hygiene (SCMH) will endeavour to incorporate and investigate new dairy Microbial Food Cultures (MFC), regularly check on available scientific data, and reassess whether updating of the approach itself should also be considered. IDF invites submissions for addition of new species or withdrawal of species currently included in the inventory. Non-dairy MFC can also be proposed through IDF National Committees to IDF on a voluntary basis, as the action team will be able to consider all types of food matrices outside its core scope. In this regard, IDF has already benefited from previously published work of FAO as well as considering existing initiatives outside dairy food products such as cereals, fermented meat products and cocoa.

An updated publication of the proposed inventory of microbial species with history of use in fermented foods will be considered every two years and be made available on the IDF website.

SAFETY DEMONSTRATION OF MICROBIAL FOOD CULTURES (MFC) IN FERMENTED FOOD PRODUCTS

ABSTRACTS

A Safety Assessment of Microbial Food Cultures with History of Use in Fermented Dairy Products

F. Bourdichon, B. Berger, S. Casaregola, C. Farrokh, J.C. Frisvad, M.L. Gerds, W.P. Hammes, J. Harnett, G. Huys, M. Kleerebezem, S. Laulund, A. Ouwehand, I.B. Powell, J.B. Prajapati, Y. Seto, E. Ter Schure, A. Van Boven, V. Vankerckhoven, A. Zgoda, E. Bech Hansen

A science based classification of MFC used for food purposes is proposed based on taxonomy, regulatory considerations, food purpose and history of use, safety assessment of undesired properties.

12 pp - English only

Index: Food microbiology, Fermentation, History of use, Safety assessment, Microbial Food Cultures

Building an Inventory of Microbial Food Cultures with a Technological Role in Fermented Food Products

F. Bourdichon, B. Berger, S. Casaregola, C. Farrokh, J.C. Frisvad, M.L. Gerds, W.P. Hammes, J. Harnett, G. Huys, M. Kleerebezem, S. Laulund, A. Ouwehand, I.B. Powell, J.B. Prajapati, Y. Seto, E. Ter Schure, A. Van Boven, V. Vankerckhoven, A. Zgoda & E. Bech Hansen

As part of the process of reviewing the microbial species used in food fermentations, regulatory systems, legal terms, and scientific criteria relevant for MFC were evaluated to establish an updated inventory.

9 pp – English only

Index: Food microbiology, Fermentation, History of use, Microbial Food Cultures, Lactic acid bacteria, Fungi

The 2012 Inventory of Microbial Species with Technological Beneficial Role in Fermented Food Products

F. Bourdichon, P. Boyaval, S. Casaregola, J. Dupont, C. Farrokh, J.C. Frisvad, W.P. Hammes, G. Huys, S. Laulund, J. Mounier, A. Ouwehand, Y. Seto, A. Zgoda & E. Bech Hansen

The proposed inventory of microbial species used in production of fermented foods covers 195 bacterial species and 70 species of yeasts and moulds. The inventory comprises species with a documented beneficial technological purpose, and history of use which also applies to newly established taxonomic units. The inventory cites references in the scientific literature that demonstrate the safety in use.

41 pp – English only

Index: Food microbiology, Fermentation, History of use, Taxonomy

Conclusion: Continuous Update of the Inventory of Microbial Food Cultures.

Since both microbial taxonomy and the role of MFC in foods evolve constantly through new scientific evidence, an action team has been established within a standing committee of the IDF to update, and thereby maintain the relevance of the newly published inventory.

1 pp – English only

Index: Food microbiology, Fermentation, History of use, Taxonomy

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Example: 1 Singh, H. & Creamer, L.K. Aggregation & dissociation of milk protein complexes in heated reconstituted skim milks. J. Food Sci. 56:238-246 (1991).

Example: 2 Walstra, P. The role of proteins in the stabilization of emulsions. In: G.O. Phillips, D.J. Wedlock & P.A. William (Editors), Gums & Stabilizers in the Food Industry - 4. IRL Press, Oxford (1988).

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" .... Usually double quotes and not single quotes
? ! .... Half-space before and after question marks, and exclamation marks
± .... Half-space before and after
micr<u>oo</u>rganisms .... Without a hyphen
Infra-red .... With a hyphen
et al. .... Not underlined nor italic
e.g., i.e.,... .... Spelled out in English - for example, that is
lit<u>re</u> .... Not liter unless the author is American
ml, mg,... .... Space between number and ml, mg,...
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sulfuric, sulfite, sulfate .... Not sulphuric, sulphite, sulphate (as agreed by IUPAC)
AOAC <u>International</u> .... Not AOAC<u>I</u>
progra<u>mme</u> .... Not program unless a) author is American or b) computer program
milk and milk product .... rather than "milk and dairy product" - Normally some latitude can be allowed in non scientific texts
-ize, -ization .... Not -ise, -isation with a few exceptions
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Milkfat .... One word
USA, UK, GB .... No stops
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