

ISSN 2509-4327 (print)
ISSN 2510-4780 (online)



Deutscher Wissenschaftsherold German Science Herald

№ 3/2017

Die Zeitschrift „Deutscher Wissenschaftsherold“ ist eine Veröffentlichung mit dem Ziel ein breites Spektrum der Wissenschaft allgemeinverständlich darzustellen. Die Redaktionsleitung versteht sich als Vermittler zwischen Wissenschaftlern und Lesern. Durch die populärwissenschaftliche Bearbeitung wird es möglich unseren Lesern neue wissenschaftliche Leistungen am besten und vollständigsten zu vermitteln. Es werden Untersuchungen, Analysen, Vorlesungen, kurze Berichte und aktuelle Fragen der modernen Wissenschaft veröffentlicht.

Impressum

Deutscher Wissenschaftsherold – German Science Herald

Wissenschaftliche Zeitschrift

Herausgeber:

InterGING

Sonnenbrink 20

31789 Hameln, Germany

Inhaber: Marina Kisiliuk

Tel.: + 49 51519191533

Fax.: + 49 5151 919 2560

Email: info@dwherold.de

Internet: www.dwherold.de

Chefredakteur/Editor-in-chief:

Marina Kisiliuk

Korrektur:

O. Champela

Gestaltung:

N. Gavrilets

Auflage: № 3 2017 (August) – 23

Redaktionsschluss August, 2017

Erscheint vierteljährlich

Editorial office: InterGING

Sonnenbrink 20

31789 Hameln, Germany

Tel.: + 49 51519191533

Fax.: + 49 5151 919 2560

Email: info@dwherold.de

Deutscher Wissenschaftsherold - German Science Herald is an international, German/English language, peer-reviewed, quarterly published journal.

№ 3 2017

Passed in press in August 2017

Druck: WIRmachenDRUCK GmbH

Mühlbachstr. 7

71522 Backnang

Deutschland

Der Abdruck, auch auszugsweise, ist nur mit ausdrücklicher Genehmigung der InterGING gestattet. Die Meinung der Redaktion oder des Herausgebers kann mit der Meinung der Autoren nicht übereinstimmen. Verantwortung für die Inhalte übernehmen die Autoren des jeweiligen Artikels.

INDEXING: Google Scholar, WorldCat, InfoBase Index, Journal Index, Citefactor, International Scientific Indexing, JIFACTOR, Scientific Indexing Services, International Institute of Organized Research.



JIFACTOR



CiteFactor
Academic Scientific Journals



Scientific Indexing Services



INTERNATIONAL
Scientific Indexing



UNIVERSITAT DE BARCELONA

MIAR

<http://miar.ub.edu/issn/2509-4327>

© InterGING

© Deutscher Wissenschaftsherold – German Science Herald

REDAKTIONSKOLLEGIUM / INTERNATIONAL EDITORIAL BOARD:

Jurga Bernatoniene, Dr., Prof.
Physics Lithuania
jurgabernatoniene@yahoo.com

Arvidas Galdikas, Dr. habil., professor
Physics Lithuania,
arvidas.galdikas@ktu.lt

Kristina Ramanauskienė, Ph.dr., Prof.
Pharmacy, Lithuania
kristinaraman@gmail.com

Khpaliuk Alexander, Dr. med. habil., Prof.
Pharmakologie, Belarus
clinicfarm@bsmu.by

Arnold M. Gegechkori, Dr., full Prof.
Biology, Georgia
arngegechkori@yahoo.com

Omari Mukbaniani, Prof., DSc.
Chemistry, Georgia
omar.mukbaniani@tsu.ge

Teimuraz Lezhava, Prof.
Genetics, Georgia
teimuraz.lezhava@tsu.ge

Shota A. Samsoniya, Prof.
Chemistry, Georgia
shota.samsonia@tsu.ge

Mdzinarashvili Tamaz, DSc., Prof.
Biophysics, Georgia
tamaz.mdzinarashvili@tsu.ge

Aliaksandr V.Prokharau, MD, PhD, MSc Prof.
Oncology, Belarus
aprokharau@gmail.com

Pyrochkin V., MD, PhD, MSc Prof.
Theraphy, Belarus
wlad_cor@mail.ru

Golubev A.P., BD, Prof.
Ecology, Belarus
algiv@rambler.ru

Makarevich A., MD, PhD, Prof.
Theraphy, Belarus
makae@bsmu.by

Kanunnincova N., BD, Prof.
Physiology, Belarus
n.kanunnikova@grsu.by

Giedrius Vanagas, Prof.
Internal Medicine, Lithuania
Giedrius.Vanagas@lsmuni.lt

Armuntas Baginskas, Prof.
Neurofiziologija, Lithuania
Armuntas.Baginskas@lsmuni.lt

Ricardas Radisauskas, MD., Ph.D., Prof.
Cardiology, Lithuania
Ricardas.Radisauskas@lsmuni.lt

Meyramov Gabit, Prof.
Cytology and Histology, Kazakhstan
meyramow@mail.ru

Aisha Mohammed Abd al-salam Shahlol
Ph.D. in Medical Bacteriology, Libya
Ais.shahlol@sebhau.edu.ly

Edmundas Kadusevicius, MD, PharmD, PhD, Prof.
Pharmacology, Lithuania
Edmundas.Kadusevicius@lsmuni.lt

Ivo Grabchev, Prof., PhD.
Chemistry, Bulgaria
i.grabchev@chem.uni-sofia.bg
grabchev@mail.bg

Mariyana Ivanova Lyubenova, Prof., PhD.
Ecology, Bulgaria
ryann@abv.bg
ryana_1@yahoo.com

Tsvetanka Tsankova Marinova, MD, PhD, DMedSci,
Biologv. Bulgaria
tmarinova@yahoo.com

Evgueni D. Ananiev, Prof PhD,
Biology. Bulgaria
evgueni_ananiev@yahoo.com

Plamen G. Mitov, Prof., PhD.
Biology, Bulgaria
mitovplamen@gmail.com

Atanas Dimov Arnaudov, Ph.D.
Physiology, Bulgaria
arny87@yahoo.co.uk

Iliana Georgieva Velcheva, PhD,
Ecology, Bulgaria
anivel@abv.bg

Osman Demirhan, Prof.
Biology, Turkey
osdemir@cu.edu.tr

Jharna Ray, M. Sc., PhD, Prof.
Neurogenetics, India
Indijaharnaray@gmail.com

Marián Halás doc. RNDr, Ph.D.
Human geography, Czech
marian.halas@upol.cz

Ayfer Pazarbasi Prof.Dr.
Biology, Turkey
payfer@cu.edu.tr

Tusharkanti Ghosh Prof.
Physiology, India
tusharkantighosh53@yahoo.in

Khudaverdi Gambarov Gambarov, Prof.
Microbiology, Azerbaijan
khuda1949@mail.ru

Rovshan Ibrahimkhalil Khalilov, Prof.
Biophysics, Azerbaijan
hrovshan@hotmail.com

Svitlana Antonyuk, Dr.phil.
Stony Brook University, USA
Linguistics

Samuel M.Johnson, Prof.Dr.phil.
Theology, Wells, Maine, USA
djtjohnson@earthlink.net

Satanovsky Leon MD/PhD.
Perio-odontologie, Israel
satleonid@gmail.com

Lists of references are given according to the Vancouver style

Masoumikia R.Y.,
Ganbarov Kh.G.,
Abdullayeva N.A.,

Department of microbiology, Baku State University, Baku, Azerbaijan

Youshari N.

Student Research Committee, School of Nutrition, Tabriz University of Medical Sciences, Tabriz, Iran

SCREENING, ISOLATION AND IDENTIFICATION LACTIC ACID BACTERIA WITH PROBIOTIC POTENTIAL FROM TRADITIONAL DAIRY PRODUCTS OF AZERBAIJAN

Abstract Probiotics are defined as live bacterial preparation with clinical documented health effects in human. Human health is deemed to be maintained by the crosstalk among the body and probiotic bacteria. Thus the search for isolation and identification of friendly human bacteria from traditional fermented foods is important in medicine. Lactic acid bacteria (LAB) are a major group of probiotics. In this research, as five traditional dairy product (home-made cheese, suzme) from Dashkasan, Ismailli and khachmaz regions in Republic of Azerbaijan was characterized for the isolation 15 species of Lactic acid bacteria with probiotic potentiality. Afterwards, the selected strains were examined for their tolerance to acidic pH=3 and 0.3% bile salt. Finally, the isolates were identified by 16s rDNA sequencing. The results clearly revealed two species with higher homology to the *L.brevis* and *L.plantarum* with high probiotic potentiality were isolated. This study showed that the Traditional Dairy Products of Azerbaijan contained probiotic bacteria, hence, isolate and evaluate probiotic bacteria from traditional fermented foods which can be used as probiotics as well as starter cultures in food industry and in medicine, which are capable of fighting against pathogenic bacteria and living in the digestive tract.

Key words: Probiotic, lactic acid bacteria, acid and bile resistant bacteria, 16s rDNA sequencing

Introduction. Probiotic terms derived from Greek words Pro (favor) and bios (life) [1]. Probiotics are a subgroup of microorganisms with positive effects such as the improvement of human immune system, rearrangement of intestinal microflora, and establishment of antagonistic effect on the growth of harmful bacteria [2,3]. On the host health through improving the gut bacterial balance. These bacteria were first discovered by Metchnikoff in 1907 [4]. Lactic acid bacteria (LAB) are the most common types of probiotics. These bacteria have a long-term survival in fermented products [5]. *Lactobacillus* is a Gram-positive, non-spore-forming, rarely motile bacteria, while *Lactococcus* is a Gram-positive, spherical and rarely motile bacteria, both of which are present in considerable amounts in dairy products [6]. LAB make an acidic condition and prevent the growth of pathogens by converting the milk sugar (lactose) into lactic acid [7]. In the food industry, LAB is widely employed as starter cultures and has been indexed as part of human microbiota. Yogurt, cheese and fermented

milk products are mentioned as the main food sources of probiotics. The use of Lactic Acid Bacteria (LAB) in foods and food supplements has a long history and most strains are considered commensal microorganisms with no pathogenic potential lactic acid bacteria (LAB) are widely used in fermented food production and are considered as generally recognized as safe (GRAS) organisms which is safely applied in medical and veterinary functions. Today, the probiotic human-friendly bacteria are isolated from foods, cheese yogurt [8] as well as human himself, human milk [9] infant feces [10] women vagina [11] etc. According to WHO guidelines for evaluation of probiotics, putative strains should be screened for resistance to gastric acidity and bile salts, antimicrobial compound production and safety properties such as antibiotic resistance. To analyses and rapidly identify bacteria from microbial communities, classical physiological and biochemical tests are not adequately efficient, since bacterial population involved often has similar nutritional requirements and grows under similar

environmental conditions. Therefore, a clear identification within the species by simple phenotypic tests may sometimes be difficult. The development of molecular techniques has opened up new perspectives for characterizing strains from fermented dairy foods [12].

Objective: isolation and identification lactic acid bacteria with probiotic potential from traditional dairy products of Azerbaijan.

Materials and methods. Sampling and isolation of bacteria. 5 cheese and suzme (curds) samples were collected from Dashkasan, Ismaili and khachmaz regions, and then 1 g of each sample was homogenized into 10 ml sodium citrate. Then, 1 ml was inoculated with MRS broth (Fluka, Buchs, Switzerland) and incubated in aerobic condition for 48 h at 37 °C. For screening the tolerance of lactobacilli to acidic condition (harsh condition of gastrointestinal tract), 1 ml of each enriched culture was inoculated in 10 ml PBS buffer (pH = 2.5) [12] and incubated for 3 h. After centrifugation, survived organisms were resuscitated by addition to 10 ml MRS broth and incubation for 24 h at 37 °C. Additionally, the modified method was used for LAB screening against bile salt [13]. Briefly, the overnight cultures of LAB were inoculated in MRS broth containing 0.3% (w/v) oxgall (Sigma, Louis, USA) and incubated for 4h at 37 °C. Serial dilutions were prepared from acid and bile resistant cultures, then 0.01 ml of 10⁻⁵ dilution were spread onto MRS-agar plates and incubated for 24-48 h at 37 °C. Several single colonies were randomly picked up and incubated in 10 ml MRS broth. Preliminary screening of isolates was performed by morphological evaluation (gram staining, cell morphology) of the single clones. The isolates were subcultured in MRS broth and then conserved in MRS broth with skim milk and glycerol (25%) at 70 °C.

Antibiotic susceptibility of potentially probiotic isolates. The resistance of the isolates were determined using the NCCLS modified Kirby-Bauer disc diffusion method [14] for the following clinically important antibiotics: chloramphenicol (30 µg), vancomycin (30 µg), tetracycline (30 µg), erythromycin (15 µg), Ampicillin (10 µg), and methicillin (10 µg). All antibiotic discs were purchased from Padtan Teb Co (Tehran, Iran). Antibiotic susceptibility assays were performed

according to the producer's guideline and the isolates were classified into mediate and sensitive. Then the sensitive isolates were subjected to further characterization.

DNA extraction and molecular identification of probiotic bacteria. The bacterial genomic DNA was extracted according to a previously published method [15].

Amplification of the 16s rDNA was carried out using the primer pair reported previously as: 16lacF5' - AGAGTTTGATCMTGGCTCAG-3' 1 6lacR5' - TACCTTGTTAGGACTTCACC-3' [16]. Reactions were performed in an automatic thermal cycler (Bio-Rad, Hercules, CA, USA) under the following conditions: initial denaturation at 94°C for 4 min; 32 cycles of 94°C for 50 s, 59°C for 50 s and 72°C for 90 s and final extension at 72°C for 10 min and holding at 4°C. PCR products were ligated to the pGEM T/A cloning vector (Promega, Madison, WI, USA) according to the manufacturing instruction. Then, they were transformed to the E. coli DH5α according to the literature [17]. The plasmids were then sent to a commercial sequencing facility (Macrogen, Seoul, Korea). The sequences were compared to those reported in GenBank, using Basic Local Alignment Search Tool (BLAST) algorithm. The isolates were identified by similarity with standard strains in GenBank.

Results and discussion. The screening of isolates (strains) in simulated condition of human gastrointestinal system (i.e., pH=3 for 2.5 h and 0.3% bile salts for 4 h) led to the attainment of acid fig.1 and bile fig. 2 resistant rod-shaped isolates.

Antibiotic susceptibility of potentially probiotic isolates. As shown in fig. 3, approximately 100% of the selected strains were sensitive or semi-sensitive to the entire routinely used antibiotics in the inhibition zone evaluation [18].

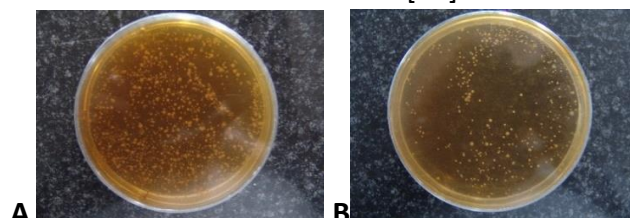


Fig. 1. Screening of lactobacilli tolerance to acidic condition in simulated condition of human gastrointestinal system at pH=3 for 2.5 h. A: the colonies are mix of resistant and unresistant bacteria in acidic condition, that many of them should be removed in screening process. B: the colonies are resistant bacteria in acidic condition.

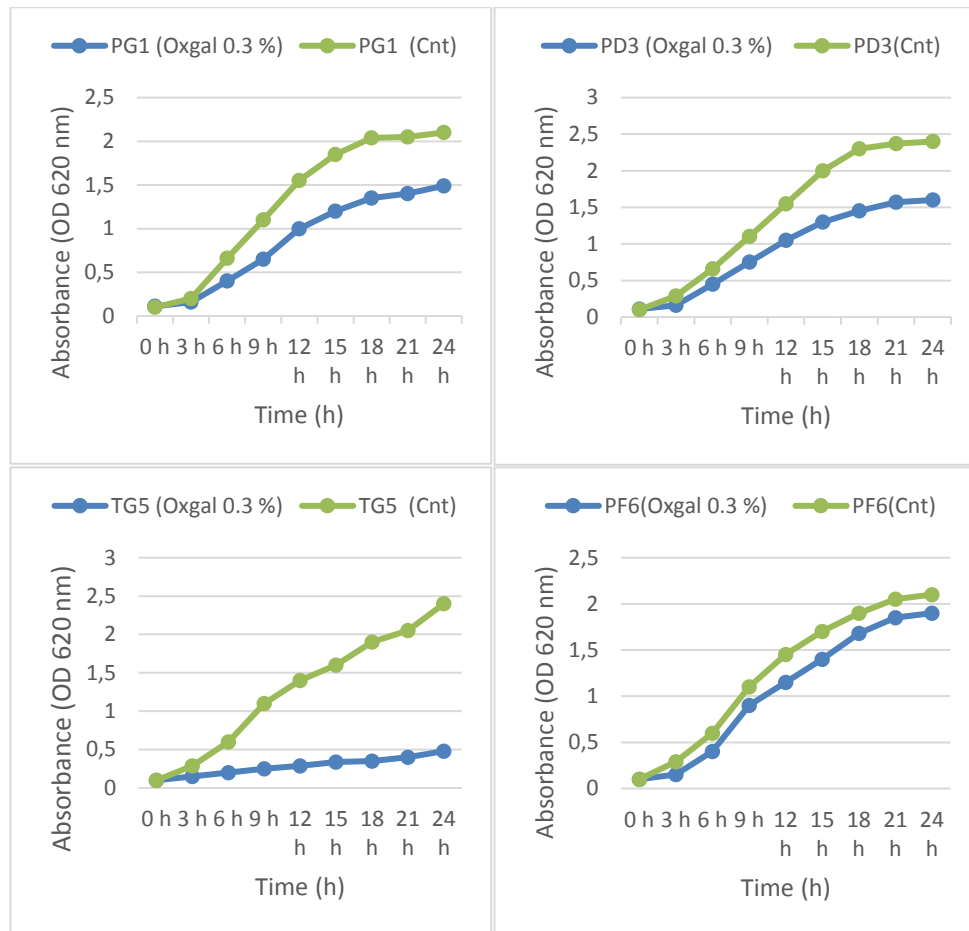


Fig. 2. The growth inhibitory of oxgal (0.3%) for candidate probiotics at overnight incubation. Strain TG5 was very sensitive to bile as compared with strains PF6, PG1, and PD3.

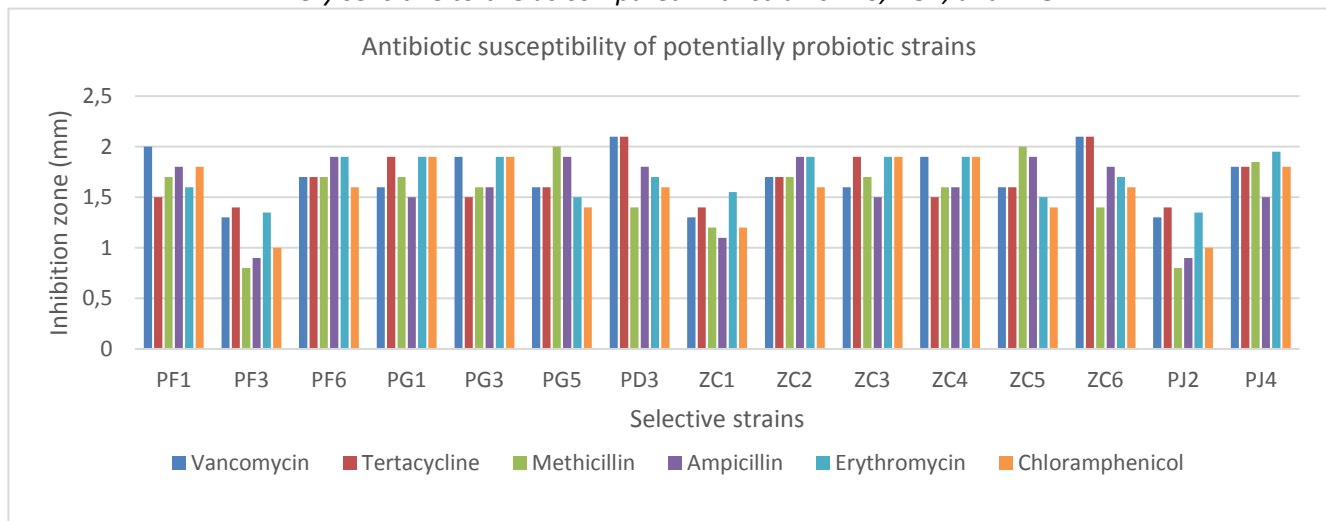


Fig.3. The inhibition zone of routinely used antibiotics (Vancomycin, Tetracycline, Methicillin, Ampicillin, Erythromycin, Chloramphenicol) against selective strains.

Identification of Lactocilli by 16s rDNA pattern. The 16s rDNA PCR product of the isolates with high probiotic potential and physiological characterization of selected *Lactobacillus*, namely, PF6 and PD3 were cloned in plasmids and sequenced fig. 4, Then the sequencing results were aligned using BLAST ([http://](http://blast.ncbi.nlm.nih.gov/Blast.cgi)

blast.ncbi.nlm.nih.gov/Blast.cgi) and compared with the sequences deposited in NCBI GenBank for different lactobacillus species. The isolates had 100% similarity with *L.brevis* and *L.plantarum*, with high probiotic potentiality were isolated.

It is recommended that human friendly bacteria be isolated with respect to native foods

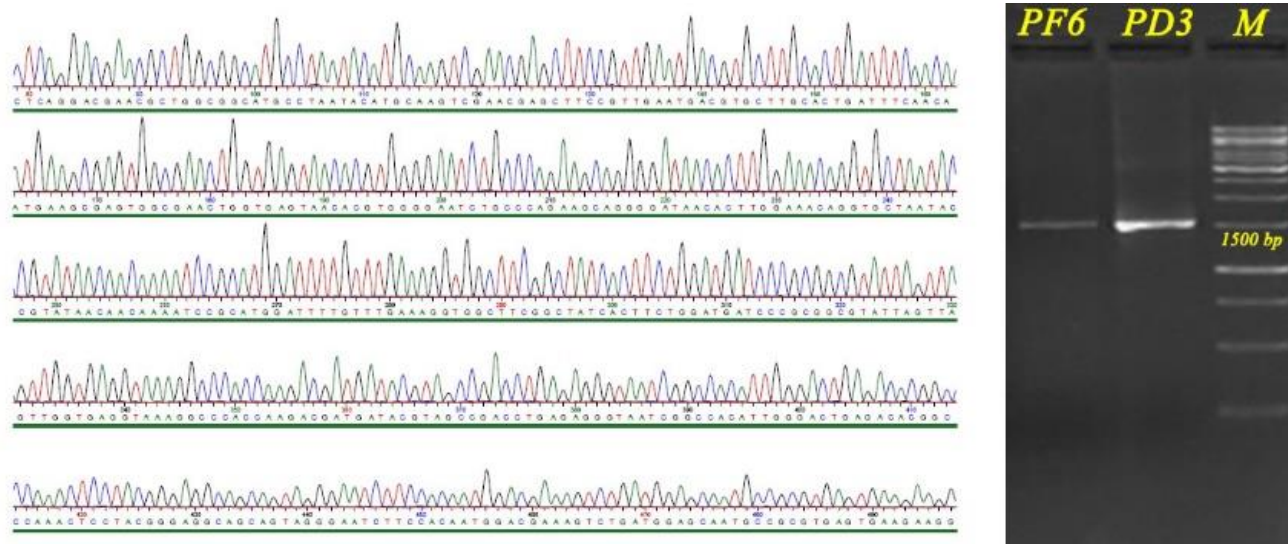


Fig. 4. PCR electrophoresis of 16s rDNA. After amplification the PCR product was inserted on pGEM vector and sequenced . The sequence of our strains was blasted on NCBI for identification.

[19] due to their efficacy in the same population [20] in this study, we found out that in the rural regions of Dashkasan, Ismaili and khachmaz in Republic of Azerbaijan, homemade cheese could be a valuable source to get the probiotics. It could be applied in designing starter culture for industrial dairy products to save the natives' health and prevent modern diseases that the world suffers from as a result of industrial lifestyles. Also, according to the WHO guideline, probiotic bacteria such as *Lactobacillus* are expected to display high sensitivity to conventional antibiotics. This implies that use/abuse of antibiotics can change the bacterial resistance patterns in different regions. In this region due to large traditional medications, no antibiotic resistance was detected in any of the isolates. Another feature of health beneficial probiotic LAB in WHO guideline is its inhibitory effect on the growth of pathogenic bacteria. The health beneficial impacts from probiotics can be merely stemmed from the effect of bacteriocin secretion. Therefore in this study, pronase treatment was applied for the degradation of bacteriocin and discrimination of bacteriocin and non-bacteriocin effects.

Conclusion. The acid- and bile-resistant lactobacilli strains from traditional dairy product (home-made cheese, suzme) from Dashkasan, Ismaili and khachmaz regions in Republic of Azerbaijan, where people have a traditional life-style and continue to follow largely the traditional medications, were identified by 16s rDNA as *L.brevis* and *L.plantarum*. These bacteria were

preserved in a biobank for future studies for medicinal applications and food industry.

References:

1. Masoumikia R, Ganbarov Kh. Antagonistic activity of probiotic lactobacilli against human enteropathogenic bacteria in homemade tvorog curd cheese from Azerbaijan. *BiolImpacts*. 2015;(5) p. 151-4.
2. Setyawardani T, Rahayu W, Maheswari R, Palupi N. Identification and Characterization of Probiotic Lactic Acid Bacteria Isolated from Indigenous Goat Milk. *Animal Production*. 2011;13:57-63.
3. Liao Q, Hang X, Liu X, Pan J, Zhang H. The influence of pH on heat stress response by probiotic *Lactobacillus plantarum*. *Ann Microbiol*. 2010;60:341-8.
4. Rashid S, Hassanshahian M. Screening, Isolation And Identification of Lactic Acid Bacteria From a Traditional Dairy Product of Sabzevar. *Inter Jour Enteric Pathog*. 2014;2:183-93.
5. Barakat O, Ibrahim G, Tawfik N, El-Kholy W. Identification and probiotic characteristics of *Lactobacillus* strains isolated from traditional Domiati cheese *Inter.Jour. Microbiol Res*. 2011;3:59-66.
6. Buyukyoruk S, Cibik R, Cetinkaya F, Soyutemiz G, Goksoy E. Isolation, phenotypic and molecular identification of *Lactococcus lactis* isolates from traditionally produced village cheeses. *Jour Anim Vet Adv*. 2010;9:2154-8.
7. Simova E, Beshkova D, Angelov M. Bacteriocin production by strain *Lactobacillus delbrueckii ssp. bulgaricus* BB18 during continuous

prefermentation of yogurt starterculture and subsequent batch coagulation of milk. *Jour Ind Microbiol Biotechnol*. 2008;35:559-67.

8. Houshang J, Hassan S. Isolation and Identification of Lactobacilli Found in Nomads Tradional Yogurt in the City of Jahrom Using PCR Method and, the Study of their Interactional Effects on Streptococcus mutans as Cuase of Tooth decay Using dise and Auger Hole Methods. *Advances in Environmental Biology*. 2014;8:421-7.

9. Chiu Y, Tsai J, Lin S, Chotirosvakin C, Lin M. Characterisation of bifidobacetria with immunomodulatory properties isolated from human breast milk. *Jour of Functional Foods*. 2014;7:700-8.

10. Rubio R, Jofre A, Martin B, Aymerich T, Garriga M. Caraceterization of lactic fermented sausages. *Food Microbiology*. 2014;38:303-11.

11. Al Kassaa I, Hamze M, Hober D, Chihib N, Drider D. Identification of vaginal lactobacilli with potential probiotic properties isolated from women in North Lebanon. *Microbial Ecology*. 2014;67:722-34.

12. Erkkila S, Petaja E. Screening of commercial meat starter cultures at low pH and in the presence of bile salts for potential probiotic use. *Meat Science*. 2000;55:297-300.

13. Gilliland S, Staley T, Bush L. Importance of bile tolerance of *Lactobacillus acidophilus* used as a dietary adjunct. *Jour. of Dairy Science*. 1984;67:3045-51.

14. Bauer A., Kirby W., Shersis J., Turck M. Antibiotic susceptibility testing by a standardized single disk method. *American Jour. of Clinical Pathology*. 1966;45:493-6.

15. Atashpaz S, Khani S, Barzegari A, Barar J, Vahed S, Azerbaijani R. A robust universal method for extraction of genomic DNA from bacterial species. *Mikrobiologiia*. 2010;79:562-6.

16. Lane D, Pace B, Olsen G, Stahl D, Sogin M, Pace N. Rapid determination of 16S ribosomal RNA sequences for phylogenetic analyses. *Proceedings of the National Academy of Sciences of the United States of America*. 1985;82:6955-9.

17. Sanebandi D, Saeib A, Zarredar H, Barzegari A. Vibration and glycerolmediated plasmid DNA transformation for *Escherichia coli*. *FEMS Microbiology Letters*. 2013;348:74-8.

18. Temmerman R., Pot B., Huys G., Swings J. Identification and antibiotic susceptibility of bacterial isolates from probiotic products. *International Jour. of Food Microbiology* 2003;81:1-10.

19. Barzegari A, Saei A. Designing probiotics with respect to the native microbiome. *Future Microbiology*. 2012;7:571-5.

20. Mojarad Khanghah S, Ganbarov Kh. *Lactobacillus* with probiotic potential from Azerbaijan. *Biolmpacts*. 2014;(4):49-52.

CONTENT:

Grechko S.I., Trefanenko I.V., Shumko G.I., Shuper V.O., Reva T.V. Combined control of the heart rhythm in patients with acute coronary syndrome	3
Dudenko V.G., Avrunin O.G., Tymkovych M.Yu., Kurinnyi V.V. Construction of a statistical three-dimensional model of the human diaphragm on the basis of tomography findings	6
Sakhatska I.M. Market analysis on medicinal plant raw material	9
Kondratiuk O.S., Korshun M.M., Garkavii S.I. Adaptive capacity assessment of primary school children in case of various forms of organization of physical training classes	12
Kononova O.V. Influence of psychosomatic conditions on the periodontal tissue of patients	15
Pavlovych L.B., Bilous I.I. Pathogenetic treatment of diabetic polyneuropathy	20
Badiuk M.I., Shevchuk O.S., Biryuk I.G., Kukovska I.L., Kovalchuk P.E., Sykrytska T.B. Developmental features of up-to-date combatants psychological support	23
Dmytrenko R.R., Galagdina A.A. Age functional peculiarities of the gingival tissue response in rats to discontinuous hypobaric hypoxia and photoperiod of a different duration	27
Masoumikia R.Y., Ganbarov Kh.G., Abdullayeva N.A., Youshari N. Screening, isolation and identification lactic acid bacteria with probiotic potential from traditional dairy products of azerbaijan	30
Melnik A.V. Effect of polyphenol compounds on the aorta state in male and female rats under conditions of hyperhomocysteinaemia	35
Kholodkova O., Prus R., Sadovska Y., Horiuk I., Ternovyi D. Peculiarities of structural changes in the liver, myocardium and kidneys of rats at different age under conditions of craniocerebral injury	39
Arzu Kaska, Nahide Deniz, Ramazan Mammadov Antioxidative capacities and phenolic compounds of various extracts of Aubrieta Deltoidea	42
Goshovska A.V., Goshovskyi V.M., Proniayev D.V., Sharhan V.I. Assessment of intrauterine fetal condition in women with prolonged pregnancy	47
Cherkasova V.V. Oxidative stress in case of acute pancreatitis and under conditions of dexamethasone correction	50
Polianskyi I.Yu., Moroz P.V. Peculiarities of immunological and metabolic disorders in case of diffuse peritonitis with different variants of IL1 β (-511 c/T) gene	55
Kryvetska I.I. Pedagogical innovations personality oriented approach in the doctor's professional training system	61
Fochuk P., Kasiyanchuk M., Kasiyanchuk R., Kramer B. Morphological background saving opportunities for adaptive soft tissue to the second stage of dental implantation	64
Batih V.M., Ivanitska O.V., Borysenko A.V., Lynovytska L.V. Treatment of chronic apical periodontitis in patients with prevalent parasympathic vegetative nervous system	69
Boyчук O.M., Bambuliak A.V., Galagdina A.A., Dmytrenko R.R. Assessment of the ethmoid bone size in the perinatal period of human ontogenesis and infants	74
Fedoruk O.S., Vizniuk V.V. Analysis of morphological examination of animal kidneys under conditions of ozone therapy	77
Kurta S.A., Ribun V.S., Fedorchenko S.V. Dewaxing of motor fuels is the complex method of increasing the octane and cetane numbers of gasoline and diesel	81



Deutscher Wissenschaftsherold **German Science Herald**

Bibliographic information published by the Deutsche Nationalbibliothek
The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed
bibliographic data are available on the Internet at <http://dnb.dnb.de>

№ 3/2017 – 23
Passed in press in August 2017



WirmachenDruck.de

Sie sparen, wir drucken!