Summaries of the publications
of assistant professor Sevginar Feimova Ibryamova, PhD

for participation in a procedure for obtainig the academic position “associate professor” in the field of higher education: 4. Natural sciences, mathematics and informatics, professional direction 4.3. Biological Sciences (Microbiology - ecology of microorganisms and biotechnology) in the Department of Biology at the Faculty of Natural Sciences of “Konstantin Preslavsky” University Shumen, announced in State Gazette No.68/08.08.2023.

I. Monograph:

1. Ibryamova, S. (2023), Microbial exopolysaccharides. Konstantin Preslavski University Publishing House, Shumen. ISBN 978-619-201-710-1.

The aim of the monographic work is to give a complete picture of the microbial EPS, their role in the formation of the microbial biofilm, as well as the various techniques for their determination and proof. The proposed isolation and proof methods are the result of many years of experience in the Microbiology Laboratory of the "Konstantin Preslavski" University of Shumen on the proposed topic. The monograph is intended for students who study microbiology and have to work with microorganisms, and is a modern aid for improving knowledge, both in scientific and practical aspects.

In the monographic work, exopolysaccharides are classified, their chemical composition, structure, biosynthesis, functional properties and spheres and methods of application are described. Particular attention is paid to the group of lactic acid bacteria, which have GRAS status and the exopolysaccharides synthesized by them are used as natural alternatives for the production of all-natural food products without additives. Exopolysaccharides produced by lactic acid bacteria are classified depending on their chemical composition and method and place of synthesis, their functionality, the type of producer and their methods of application. The most widely used worldwide exopolysaccharides and their commercial importance are described in detail. It is essential for the commercial and therapeutic importance of the products to provide information on the primary molecular structures of the exopolysaccharides. The monograph describes the various modern methods for the isolation, purification and quantification of exopolysaccharides from lactic acid bacteria, the composition of the nutrient media for the cultivation of different producers and the formation of biofilms.

II. Scientific publications in journals that are referenced and indexed in world-renowned of scientific information databases (Web of Science and Scopus):

1. Ignatova-Ivanova Ts., **Ibryamova S**., Bachvarova D., Salim S., Valkova S., Simeonova Y., Dimitrov D., Ivanov R., Chipev N., Natchev N. (2022). Determination of the antimicrobial activity of lactic acid bacteria isolated from the Black sea mussel Mytilus galloprovincialis Lamarck, 1819. Pharmacia 69 (3): 637–644. ISSN 04280296, Q 3. DOI 10.3897/pharmacia.69.e84850.

The present study reports on the determination of the antimicrobial activity of lactic acid bacteria (LAB) isolated from the Black sea mussel Mytilus galloprovincialis Lamarck, 1819. The samples were collected in the period of August 2018 until March 2021. The BIOLOG system was used for microbiological determination. From the mussel M. galloprovincialis Lam. four species of LAB were isolated - *Sporolactobacillus kofuensis, Lactobacillus sakei, Streptococcus gallolyticus ss gallolyticus* and *Lactibacillus brevis*. The activity of the strains was determined against test cultures (*Escherichia coli 3398, Staphylococus aureus 745, Bacillus subtilis 6633, Salmonella typhimurium 3591, Listeria monocytogens 863 Enterobacter aerogenes 3691, Aspergillus niger, Penicillium claviforme, Saccharomyces cerevisae, Candida albicans 8673 and Candida glabrata 72*). Before the analysis for antimicrobial activity, the LAB were cultured in media with different concentrations of sugars - 2, 5 and 10%. The results showed that 4 strains *S. kofuensis, L. sakei, S, gallolyticus ss gallolyticus and L. brevis* cultured on glucose and oligosaccharides completely lost their activity in all studied variants. Therefore, some carbohydrates (glucose) and oligosaccharides induce the synthesis outside the cell of biologically active molecules, which can probably be attributed to peptides/proteins.

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2. **Ibryamova, S.**, B. Pavlova, E. Stanachkova, S. Salim, A. Lyatif, D. Dimitrov, D. Bachvarova, N. Chipev, N. Natchev, Ts. Ignatova-Ivanova. (2022). Seasonal variations of the microflora of wedge clam Donax trunculus (Linnaeus, 1758) from the region of Arkutino (Bulgarian Black Sea aquatory). Biorisk, 2022, Issue 17, pp. 253-262;. Scopus, Q3,. doi: 10.3897/biorisk.17.77097.

The main goal of the present study was to investigate the impact of the state of the environment on the microbiota of the wedge clam *Donax trunculus* (Linnaeus, 1758) from the region of Arkutino (Bulgarian Black Sea aquatory). The species *Enterococcus hirae* was isolated during the summer (from May to August). The species *P. mendocina* prefers the warmer months and the species *P. alcaligenes* the colder ones. The temperature followed a course of decrease during the period September 2020 to January 2021, followed by a slow increase from February 2021. Comparing May 2020 with May 2021, it became evident that in 2021 the temperature was 1.5 °C lower. We can say that the number of the species *P. alcaligenes* was twice as high in May 2021. It is likely that this species preferred lower optimum temperatures and constant other parameters. For the species *Enterococcus hirae* such dependence was not observed - the number remained constant in May, but with increasing temperature the number of microorganisms decreased during the summer months. The species seemed to preferably develop at pH 7.78. The species A. gyllenbergii preferably grows at temperatures between 20.3–25.7 °C and the optimal temperature was 25.7 °C. For *C. farmeri* the optimum conditions were temperature 26.2 °C and pH 7.3. The species *E. vulneris* was probably related not only to the increase in water temperature, but also to the anthropogenic factor, as it was found only in July.

3. Bachvarova, D., M. Stancheva, Ts. Ignatova-Ivanova, **S. Ibryamova,** N. Chipev, A. Alexandrova. (2022). Trace metal accumulation in tissues of wedge clams from sandy habitats of the Bulgarian Black Sea coast. BioRisk, 2021, 17, Special issues, ISSN 1313-2652 (online), ISSN 1313-2644 (print), Issue 17, pp. 73-81; Q3, (IF2020/2021 = 0.667; SJR2020 = 0.235), Web of Science and Scopus. doi: 10.3897/biorisk.17.77290.

The aim of the present study was to carry out an initial screening of trace metals bioaccumulation in soft tissues of the wedge clam (*Donax trunculus Linnaeus, 1758*) from different localities of the Bulgarian Black Sea coastal area and to evaluate the bioindicator potential of this species. Wedge clams were collected in June and September 2020 from sublittoral sandy habitats at different localities of the Bulgarian Black Sea coast. Soft tissues of individual clams were digested with nitric acid followed by ICP-OES analytical determination. The content of trace metals in the wedge clams differed significantly amongst localities. Higher metal content was present in wedge clams from Sveti Vlas, Shkorpilovtsi, Slanchev Bryag, Ahtopol and Kranevo. The highest values of lead (Pb) (2.51 mg/kg) and cadmium (Cd) (0.32 mg/ kg) were found in samples from Sveti Vlas and the highest concentration of copper (Cu) (34.12 mg/kg), iron (Fe) (269.52 mg/kg) and nickel (Ni) (0.32 mg/kg) were detected in wedge clams from Shkorpilovtzi. Maximum content of chromium (Cr) (0.58 mg/kg) was present in samples from Slanchev Bryag, together with high values of Fe. The highest concentration of zinc (Zn) (18.04 mg/kg) together with high values of Cr and Fe were measured in wedge clams from Irakli. In conclusion, the wedge clams from the localities known to have higher coastal inflows and touristic pressures, i.e. Varna, Shkorpilovtzi, Sveti Vlas, Slanchev Bryag and Ahtopol accumulated significantly higher metal elements in their tissues. Only few significant seasonal differences in the concentration of metal elements in wedge clams were present and the observed seasonal variations were probably connected to the hydrological parameters of the ecosystems. The wedge clam D. trunculus is a suitable bioindicator for assessment and monitoring of metal pollution in the Bulgarian Black Sea environment.

4**. Ibryamova, S**., Toschkova, S., Pavlova, B., Stanachkova, E., Ivanov, R., Natchev, N., Chipev, N., Ignatova-Ivanova, Ts., A study of the microbiology of the intestinal tract in different species of Teleost fish from the Black Sea, BioRisk, 2022, vol. 18, pp. 105-113 (ISSN: 1313-2644, eISSN: 1313-2652, SJR(2021)=0.167, Q4, Scopus, Web of Science, https://doi.org/10.3897/biorisk.18.80357.

This paper presents a study on the microbial status of different fish species and their habitats in the Bulgarian Black Sea area. The samples were collected in the period of January 2021 until March 2021. The fish species we used in this study were Black Sea turbot (*Scophthalmus maximus*), round goby (*Neogobius melanostomus*), shore rockling (*Gaidropsarus mediterraneus*) and European anchovy (*Engraulis encrasicolus*). The BIOLOG system was used for microbiological determination. From the different fish species, different species of microorganisms were isolated (using selective nutrient media). From the torbut, we isolated species *Enterococcus villorum* with 24 × 103 cells in 1 ml, *Moraxella nonliquefaciens* with 70 × 103 cells in 1 ml and *Pseudomonas synxantha* with 123 × 103 cells. *Pseudomonas putida* was isolated from the round goby with 20 × 103 cells in 1 ml. The species Streptococcus entericus with 123 × 103 cells in 1 ml was isolated from the shore rockling. *Pseudomonas fulva* with 60 × 103 cells in 1 ml was isolated from the European anchovy. A total of 223 × 103 cells in 1 ml of *Pseudomonas agarici* were isolated from Trachinus draco. *Pseudomonas tolaasii* with 145 × 103 cells in 1 ml were isolated from Merlangius merlangus. A different species of bacteria of the genus

Pseudomonas was found for each of the investigated species of Black Sea fish. Apparently, the species *Pseudomonas* is characteristic of marine Teleostei and is important for the life and metabolism of these vertebrates. These microorganisms probably are resident species and developed not as result of pollution or environmental change.

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5. **Ibryamova S.**, S.Toschkova, D. Bachvarova, A. Lyatif , E.Stanachkova, R. Ivanov, N. Natchev, Ts. Ivanova (2022) ASSESSMENT OF THE BIOACCUMULATION OF MICROPLASTICS IN THE BLACK SEA MUSSEL MYTILUS GALLOPROVINCIALIS L., 1819. 28 (4), pp. 4676-4682. Journal of IMAB - Annual Proceeding (Scientific Papers) ISSN: 1312-773X, SJR 0,225. DOI: 10.5272/jimab.2022284.4676.

The accumulation of microplastics in the world oceans is one of the main global problems of the modern world. The Black Sea is the main source of seafood for people from several countries, including Bulgaria. The pollution of the Black sea is a result of various factors, especially anthropogenic. The aim of this study was to determine the presence and accumulation of microplastics in the Black Sea mussel *Mytilus galloprovincialis L., 1819*, harvested from different locations along the northern Bulgarian Black Sea coast. Within each microplastic morphological group, three size classes were recognized: 100-200 μm, 25-100 μm, and ≤ 25 μm. Microplastics were found in the soft tissues of all studied specimens but in a different ratio of pellets, fibers and fragments. Generally, the pellets were the most often registered particles, followed by irregularly-shaped fragments, whereas fibers were less numerous. The dominant part of the isolated plastics are made of polyethylene (PE), and polyethylene terephthalate (PET). Our results pointed out serious pollution with plastic particles in the Bulgarian Black Sea aquatory, which in the future may seriously affect the health of the mussel population and also human health.

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6. Alexandrova, A. V., Ignatova-Ivanova, T. V., Bachvarova, D. G., Toschkova, S. G., Doichinov, A. H., **Ibryamova, S.**, Chipev, N. H. (2022). Pilot screening and assessment of microplastic bioaccumulation in wedge clams Donax trunculus Linnaes, 1758 (Bivalvia) from the Bulgaria Black Sea Coast, Acta Zoologica Bulgarica, 2022, vol. 74, issue 4, pp. 569-577 (ISSN: 0324-0770, Web of Science, Scopus, IF(2021)=0.362, SJR(2021)=0.213, Q4).

Pollution with plastic waste and its effects on marine organisms is a global problem, the Black Sea being no exception. This study aimed to assess for the first time the presence of microplastics (MPs) in wedge clams *Donax trunculus Linnaeus,* 1758 from different localities along the Bulgarian Black Sea coast. Three morphological forms of MPs were identified: pellets, fibers and fragments. Within each form, three size classes were recognised: 100–200 μm, 25–100 μm and ≤ 25 μm. MPs were present in all studied clams but with a different ratio (pellets – 94.7%; fibres – 64.9%; fragments – 21.1%). The mean number of MPs (per individual) in the wedge clams, collected from Ahtopol (4.46±1.09), Konstantin & Elena (3.66±1.09) and Sveti Vlas (3.56±1.07) was significantly higher, compared to the other localities. The lowest mean number of MPs was found in the southern localities Duni (0.31±0.07) and Arkutino (0.90±0.20). This is the first study to compare MPs in *D. trunculus* between two seasons and results showed significantly higher (t-test; $p<0.005$) number in summer. Multiple ANOVA proved interdependent effects of the categorical variables (form, locality, season) on the distribution and accumulation of MPs in the wedge clams. This confirmed that the local accumulation of MPs in the

wedge clams was determined by multidirectional effects of many different factors, such as plastics sources, local environmental conditions, penetration pathways, physiological state of clams, etc.

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7. Petkova N., Arabadzhieva R., Hambarliyska I., Vassilev D., Gencheva G., Tumbarski Y., Ignatova-Ivanova Ts., **Ibryamova S.**, Koleva M., Denev P. (2021). Ultrasound-Assisted Synthesis of Antimicrobial Inulin and Sucrose Esters with 10-Undecylenic Acid. Biointerface Research in Applied ChemistryPlatinum Open Access Journal (ISSN: 2069-5837), 11(4), pp. 12055-12067. SJR 0,161, Q4.

An environmentally friendly and sustainable ultrasound-assisted esterification of longchained inulin and sucrose with monounsaturated 10-undecylenic acid was performed. The obtained esters were characterized by thin-layer chromatography (TLC), Fourier transforms infrared spectroscopy (FTIR), and nuclear magnetic resonance (NMR) spectroscopy. The spectral analyses demonstrated the successful incorporation of the hydrophobic 10-undecylenoyl residue in the watersoluble carbohydrate backbone. Additionally, the antimicrobial potential of 10-undecylenic esters of inulin and sucrose were tested against nine microorganisms (Gram-positive and Gram-negative bacteria, yeasts, and fungi). Both esters inulin 10-undecylenate and sucrose 10-undecylenate (1 mg/ml) inhibited *Bacillus subtilis ATCC 6633, Listeria monocytogenes ATCC 8632, Staphylococus aureus 745, Escherichia coli 3398, yeast Candida albicans 8673, and fungi Penicillium sp*. Only inulin 10- undecylenate demonstrated antimicrobial activity against *Salmonella typhy 745.* Both esters were inactive against fungi *Aspergillus niger.* The current research demonstrated a new antimicrobial activity of inulin esters. Moreover, the use of "eco-friendly" synthesized inulin and sucrose esters with 10- undecylenic acid as antimicrobial substances with future applications in pharmaceutical and cosmetic products were demonstrated.

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8. Petkova N., R. Arabadzhiva, Y. Tumbarski, M. Todorova, I. Hambarlyiska, I. Ivanov, S. Ibryamova, Ts. Ignatova-Ivanova. (2021). Physicochemical Properties and Antimicrobial Activity of Acetylated Chicory Fructooligosaccharides.2021. Philippine Journal of Science, 150 (4): 633-642, August 2021, ISSN 0031 - 7683, Q3, IF 0,576.

Inulin acetates attract attention as the novel drug carrier. However, the acetylated derivaties of fructooligosaccharides (FOSs) (a low molecular fraction of inulin) were not evaluated. The study aimed to obtain FOSs acetyl esters and to evaluate their foaming properties, water- and oilholding capacities (WHC and OHC), as well as their antimicrobial activity. One-pot acetylation of chicory FOS with two different degrees of polymerization (DP = 7–9 and 9–12) was performed. The resulting FOSs esters presented white, bitter, water-insoluble substances. The spectroscopic techniques as ultraviolet (UV), Fourier-transform infrared (FTIR), and nuclear magnetic resonance (NMR) spectroscopy were used for characterization and structural elucidation. The antimicrobial activity of acetylated FOSs (1 mg/mL) was tested against 16 microorganisms (Gram-positive and negative bacteria, yeasts, and fungi). Foams prepared with 0.2% FOSs acetates demonstrated the formation of highly stable foams (50–70%). FOSs acetates showed antifungal activity against Fusarium oxysporum and Aspergillus niger and inhibited the growth of yeasts Candida albicans 8673. The inhibition against Gram-positive (Bacillus subtilis 46/H1 and Bacillus subtilis ATCC 6633) and negative (Salmonella abony and Escherichia coli ATCC 8739) bacteria were not observed. However, FOSs acetate with DP 7–9 were active against E. coli 3398, Salmonella typhy 745, and Staphylococus aureus 745 against – which other acetates with DP = 9–12

were inactive. These results demonstrate the potential applications of FOS acetates as a foaming agent and an antifungal substance in pharmaceutical and cosmetic preparations.

9. **Ibryamova S**., V. Petkov, Ts. Ignatova-Ivanova, G. Kolev. (2021). SOCIAL STATUS AND GUT MICROBIAL DYSBIOSIS IN ADULTS AND CHILDREN WITH AUTISM SPECTRUM DISORDERS: A PROFOUND REVIEW OF THE AVAILABLE LITERATURE SOURCES.2021.Journal of IMAB - Annual Proceeding (Scientific Papers),ISSN: 1312-773X (Online), Issue: 2021, vol. 27, issue3, pp.3939-3946. WoS, SJR 0,225. DOI: 10.5272/jimab.2021273.3939.

Autism is a complex disorder without a specific diagnosis, so the disease is defined by its specific characteristics described in the literature as cognitive defects, social, communication and behavioral problems, repetitive behaviors, unusual sensitivity to stimuli such as noise, restricted interests, and self stimulation. There are many models in the literature explaining the biology of autism, which are based on genetics, immunity, various environmental factors and diet. There is a lot of literature data that people with Autism Spectrum Disorders (ASD) often have gastrointestinal problems that also affect their behavior. ASD suffer developmental disabilities from an early age, which can be both physical and psychological. Often people suffer these problems even throughout their lives. This review aims to provide basic information on definitions, historical data, diagnostic methods, behavioral etiology, gastrointestinal and social problems in adults and children with ASD.

10. Pavlova B., **S. Ibryamova**, D. Bachvarova, D. Doichev, E. Stanachkova, S. Salim, N. Natchev, Ts. Ignatova-Ivanova1. (2021). SPECIFIC MICROBIOLOGY SPECTRUM OF WHITE SAND MUSSELS FROM KEY SAMPLE SPOTS FROM BULGARIAN BLACK SEA AQUATORY.2021.Journal of IMAB - Annual Proceeding (Scientific Papers). 2021 Oct-Dec;27(4) 4077-4083. ISSN: 1312-773X, DOI: 10.5272/jimab.2021274.4077, Q3, SJR 0, 225, Web of sciences.

The “white sand mussels” are edible bivalves inhabiting the littoral shores usually buried in the sand. They are invasive species for the Bulgarian waters of the Black Sea. The samples for this study were collected from different points on the northern and southern Black Sea Bulgarian coast in the period January 2020 to December 2020. The study of different types of microorganisms was performed by using the microbial identification system model: MicroLog M® BIO45101 BiologInc and the software product GEN III. The physic-chemical parameters of the waters – temperature, pH, salinity and dissolved O2 were also determined. In the different species, we had detected specific microbiological complexes. The species *Pseudomonas viridilivida* and *Citrobacter farmer* were isolated only from Donax trunculus. The species Escherichia hermannii was found only in Mya arenaria, and Acinetobacter johnsonii was detected only in Chamelea gallina. The isolated species *Acinetobacter gyllenbergii* and *Acinetobacter johnsonii* are related to humans and are indicators for pollution of the water with channel waste waters. Our results demonstrated an increase of the quantity of the coliforms in the region of Sveti Vlas from August, where they were 50 the norms. In the region of Arkutino in July and Ahtopol in August, the quantity of the fecal coliforms is 190 and 30 times the norms prescribed in the Ordinance No. 4 from 20.10.2000 for the quality of fisheries water and the breeding of shellfish (the amount of fecal coliforms in the intershell content should be less than 300 NVB). We noticed also a serious pollution of the Varna lake even months after an accident with a leaky pipe.

11. Petkova N., R. Arabadzhieva, D. Vassilev, G. Gencheva, Y. Tumbarski, Ts Ignatova-Ivanova, **S. Ibryamova**, M. Todorova, M. Koleva, P. Denev (2020). Physicochemical Characterization And Antimicrobial Properties Of Inulin Acetate Obtained By Microwave-Assisted Synthesis. Journal of Renewable Materials, 8(4), pp. 365-381. Q3, Scopus and Web of Sciences ISSN: 2164-6325 (printed), IF:1.427 ISSN: 2164-6341 (online).DOI:10.32604/jrm.2020.09292.

Microwave-assisted irradiation was performed for esterification of chicory inulin with high degree of polymerization with acetic anhydride without a solvent only with a catalyst. The resulting esters were characterized by melting point, hydrophilic-lipophilic balance, thin-layer chromatography, ultraviolet spectroscopy, Fourier transform infrared spectroscopy (FTIR) and nuclear magnetic resonance (NMR) spectroscopy. Inulin acetate demonstrated a high degree of acetylation (2.5–3.0) and presented a white, water-insoluble substance with bitter taste. The FTIR and NMR spectra confirmed esterification and demonstrated the incorporation of hydrophobic residue to the water soluble inulin backbone. Swelling capacity, water holding, oil-holding capacities, the foamability, foam stability and emulsifying properties were also evaluated. Inulin acetate showed promising foam stability 52% for 60 min and formed stable emulsions at concentration 0.2 g/ L with 50 and 80% oil phases. Its water holding capacity was lower than the oil holding capacity. In addition to this, for the first time, the antimicrobial potential of inulin acetate was tested against seventeen microorganisms (Gram-positive and Gram-negative bacteria, yeasts and fungi). Inulin acetate (10 mg/ml) inhibited the growth of *Bacillus cereus, Escherichia coli ATCC 8739, Salmonella abony, Candida albicans and Penicillium sp. However, inulin acetate demonstrated antimicrobial activity at concentration 1 mg/ml against Listeria monocytogenes 863, Escherichia coli 3398, Candida albicans 8673, Fusarium oxysporum and Aspergillus niger.* The current study demonstrated the applications of "green" synthesized inulin acetate as a foaming agent, oil-in-water emulsion stabilizer and antimicrobial substance in pharmaceutical, agricultural and cosmetic preparations.

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12. Pavlova B., **S. Ibryamova**, N. Arhangelova, D. Doichev, R. Ivanov, N. Chipev, N. Natchev, Ts. Ignatova-Ivanova. (2020). Integrative investigation on the ecology of the Black sea mussel Mytilus galloprovincialis Lam. and its habitat. Ecologia balkanica, Special edition 3, pp. 10-17. (Q4, SJR 0.1)

The present work is reporting a preliminary investigation on the ecology of the Black sea mussel (Mytilus galloprovincialis Lam.) and its habitat by monitoring of the physicochemical indicators of the water, the microbiology and the radionucleids in the region of Shkorpilovci and Kavarna (NE Bulgaria). The samples were collected in the period of August 2018 to October 2019. The microbiological determination was performed by the use of the system "BIOLOG". *Enterococcus durans* and *E. haere* were isolated from the Shkorpilovci region and *Streptococcus gallolyticus ss gallolyticus, E. haere, Lactobacillus brevis and L. sakei ss sakei were found from Kavarna. We isolated the* lactic acid bacterium *Streptococcus gallolyticus ss gallolyticus*, a species associated with colon-rectal tumors on the one hand and as a producer of bacteriocins on the other. Additionally, the study includes information on the naturall and tehnogenic radionuclides in the marine environment. No technogenic radionuclides were found in the mussel samples. The calculated indicators for radiation hazard were in accordance with the norms quoted fixed in the local an interntional legislation.

13. **Ibryamova S**., N. Arhangelova, T. Koynova, D. Dimitrov, Zh. Dimitrova, R. Ivanov, K. Kalchev, Nescho Chipev, Nikolay Natchev, Tsveteslava Ignatova-Ivanova. Antifungal Activity of Lactic Acid Bacteria, Isolated from (Mytilus galloprovincialis Lam.) in The Bulgarian Black Sea aquatory, 2020. Journal of IMAB - Annual Proceeding (Scientific Papers) SJR 0.225; Web of sciences,.ISSN: 1312-773X, 26 (1), pp.2875-2882. Q3.

In the present study we present the results from antifungal activity of Lactic Acid Bacteria, isolated from *M. galloprovincialis Lam*. from the Bulgarian Black Sea aquatory. The Black Sea mussel (M. galloprovincialis Lam.) is in fact the only marine species grown as aquaculture in the Bulgarian section of the Black Sea. The mussels have an exceptional nutritional value, making them highly suitable for the human diet. The cultivation of sea products, in particular the Black Sea clam, is becoming an important part of the Western Black Sea industry. With increasing of the tourist pressure and the construction activities on the Black Sea coast, maritime pollution increased in the last decades. The pollutants include various pathogenic microorganisms - *Escherichia coli, Staphylococcus aureus, Salmonella thyphimurium, Hymeniacidon perlevis,* incl. the cholera cause *(Vibrio cholera)*. Such pathogenic microorganisms are often present in the mussels and can cause the spread of various diseases. In this study 2 isolates Lactic acid bacteria, from M. galloprovincialis Lam have been identified as *Lactobacillus sp*. and characterized as cultures with promising antifungal activity. The antifungal activity of our new isolates *Lactobacillus sp.* lineages, seems to be a promising advantage, suggesting their potential applications in different food technologies.

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14. Ibryamova S., Hasanov H., Ignatova-Ivanova Ts. (2020). ANTIFUNGAL ACTIVITY OF A PHOSPHORYLATED 3-(alfa-HYDROXYALKYL) ALLENES ETHANOL EXTRACTS. Journal of IMAB - Annual Proceeding (Scientific Papers).Jul-Sep;26(3):3328-3332.DOI: 10.5272/jimab.2020263.3328.ISSN: 1312-773X (Online), Q3, Web of Sciences, SJR 0,225.

Antifungal effects of a 4-(Diphenylphosphinoyl)-2- methyl-4-phenylbuta-2,3-dien-1-ol (PA-2) on pathogenic yeast and fungi had been established. PA-2 (50mg/ml, 25mg/ml, 12.5mg/ml, 6.25mg/ml and 3.125mg/ml) exerted different inhibitory effect on different yeast and fungi cells in vitro. The effects of PA-2 on eukaryotic cells have not been studied yet. The present study was aimed to assess the antifungal activity of PA-2on pathogenic yeast and fungi. Experimental approach: In vitro antifungal test: Aspergillus niger, Penicillium claviforme, Saccharomyces cerevisae, Candida albicans 8673 and Candida glabrata 72 were treated for 24 hours with PA-2(50mg/ml, 25mg/ ml, 12.5mg/ml, 6.25mg/ml and 3.125mg/ml), Fluconazole (150 mg/ml). The antifungal activity was assayed by the goot diffusion method with a digital caliper. Determination of minimum inhibitory concentrations (MICs): The MIC of PA-2, that shows antifungal activity was determined by 2-fold dilution methods and MICs were read in ìg/ml after overnight incubation at 37ºC. Determination of Minimum fungal concentration (MFC): The MFC was carried out to check whether the test microbes were killed or only their growth was inhibited. Potato Dextrose Agar (PDA, Oxoid, Hampshire, UK) was prepared and sterilized at 121ºC for 15 minutes, the medium was poured into sterile petri dishes and was allowed to cool and solidify. The contents of the MIC in the serial dilution were then subcultured onto the prepared medium, incubation was made at 37ºC for 24 h, after which each plate was observed for colony growth. All experiments were performed in triplicate. The lowest concentration of the PA-2 without a colony growth was recorded as the MFC. PA-2 had higher antifungal activity than the tested antibiotic (Fluconazole).

15. Ignatova-Ivanova Ts, **Ibryamova S**., Ismailov I., Hasanov H., Ivanov R. Structural characterization of an exopolysaccharide produced by Lactobacillus plantarum Ts isolated from Bulgarian wheat and rye flour.International Journal of ecology and development,Volume 35, Year 2020, Issue 2,pp. 1-12. ISSN 09729984, SJR 0,173.Web of sciences.

An exopolysaccharide (EPS) was isolated from *Lactobacillus plantarum Ts* and purified by size exclusion chromatography train. L. plantarum Ts showed the highest production (7.4 ± 0.8 g/l) of EPS. The purified, homogeneous EPS by HPLS analisis had an average molecular weight of 9,03.104 Da The FTIR spectrum of the EPS from L. plantarum Ts showing the functional groups in the 4,000-400 cm-1 region. TLC analysis indicated that the EPS was a heteropolymer composed of fructose, and sucrose as monomeric constituent units. The strain *L. plantarum Ts* and pathogenic *E. coli 3398, St. aureus 745, B. subtilis 6633, S. Typhi. 3591, L. monocytogenes 863 and E. aerogenes 3691* were tested for their growth utilizing the EPS from L. plantarum Ts as the sole carbon source for its possible use as a prebiotic. *L. plantarum Ts* exhibited growth in the EPS supplied medium compared with glucose as carbon source, whereas the pathogenic strains did not grow in the EPS-supplied medium. In vitro evaluations showed that, like other reported polysaccharides, this EPS displayed significant prebiotics properties.

16. Ignatova-Ivanova Ts., **S. Ibryamova**, N. Chipev, R. Ivanov. 2019. Isolation, Identification, Morphological and Adhesion Properties of Microorganisms from Antarctic Soils. International Journal of ecology and development, vol 34, Issue 3, pp. 1-10, ISSN 09729984, SJR 0,226, Q4. Web of sciences.

ln the present study we present the resu/ts from the isolation and study of microorganisms from Antarctic sol/s. Ihe soil and lichen samples were gathered from the Livingston lstand, South Sheiland lstands. For the isolation of the different microorganism, different nutritious media were used. The isolated microorganisms were macro-morphologically and micro-morphologically studied. We also investigatect the adhesion properties of defined microorganisms on the surface of different metals (copper, aluminium, low carbon steel, and zinc) by using the SEM syslem JSM 5510. Our results demonstraied that the Antarctic continent is a habitat for a diversity of species of microorganisms desplte the harsh tiving conditions. Ihe microorganisms from the Antarctic continent represent a significant carbon pool. The implication for future studles of such icy environments is thal it is essentra/ to know how quickly they are accumulated (growth rate vs. input rate), i.e. whether the microorganisms identified are merely transient-organisms, establiihed but not dividing, established and dividing slowly or established and reproducing effectively.

17. Ermenlieva N., **Ibrjmova S**., Ignatova-Ivanova T., Todorova T., Tsankova G. (2018). Botulinum neurotoxin – clinical and cosmetic use. Research Journal of Pharmaceutical, Biological and Chemical Sciences, vol. 9 (1), pp. 466-471. IF 0.38.ISSN 0975-8585.Q3. Web of sciences.

Botulinum exotoxin (BoNT) is a neurotoxin produced by bacteria of the genus *Clostridium*, type *C. botulinum.* They cause botulism. The toxin causes inactivity of muscles or glands by blocking the release of acetylcholine from cholinergic nerve endings. the aim of the study is to present the clinical and cosmetic use of botulinum neurotoxin In the study has been used documentary method, with more than thirty scientific publications from medical journals from Europe, North America, Asia and others.

Botulinum neurotoxin is the strongest known biological poison, but in same time, is an effective therapeutic agent in many fields of medicine. Its adjustment action with higher efficiency is used in strabismus, dystonia, diseases of the urinary system, hyperhidrosis, migraine, multiple sclerosis, Parkinson's disease, cerebral palsy and others. The appearance of facial wrinkles is mainly due to skin aging but some wrinkles and unaesthetic facial expressions are a result of overactive facial muscles. Success in application of BoNT as a selective depressor of the activity of skeletal muscles leads to widespread use in smoothing wrinkles. On the world market there are a variety of products containing BoNT for cosmetic purposes, which received regulatory approval or are under development. According to several studies the application of BoNT is distinguished by high efficiency and safety. Side effects are rare and reversible.

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18. Ignatova-Ivanova Tsveteslava, **Sevginar Ibrjmova**, Elitsa Stanachkova, Radoslav Ivanov. 2018. Microbiological characteristic of microflora of (Mytilus galloprovincialis Lam.) in The Bulgarian Black Sea aquatory. Research Journal of Pharmaceutical, Biological and Chemical Sciences, vol. 9 (1), pp.199-205. IF 0.38. ISSN 0975-8585. Q3.Web of science

In the present study we present the results from the isolation and study of microorganisms from *M. galloprovincialis Lam.* from the Bulgarian Black Sea aquatory. The Black Sea mussel *(M. galloprovincialis Lam.)* is in fact the only marine species grown as aquaculture in the Bulgarian Black Sea aquatory. Mussels have an exceptional nutritional value, making them suitable for the human diet. The cultivation of sea products, in particular the Black Sea clam, is becoming an important part of the Western Black Sea industry. With increasing tourist pressure and construction activities on the Black Sea coast, maritime pollution increased in the last decades. These pollutants also include various pathogenic microorganisms - *Escherichia coli, Staphylococcus aureus, Salmonella thyphimurium, Hymeniacidon perlevis*, incl. the cholera cause *(Vibrioo cholera).* Such pathogenic microorganisms are often present in the mussels and can cause the spread of various diseases. We investigated for pathogens *M. galloprovincialis Lam.* gathered from northern part of The Bulgarian Black Sea aquatory. For the isolation of the various microorganisms, different nutritious media were used. The isolated microorganisms were macro-morphologically and micro-morphologically studied.

Sevginar Ibryamova