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The biotechnology and novel bio-module for utilization of crude oil and petroleum films from the surface of water areas

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With an increase in off shore oil, there is a significant increase in the intensity of maritime transport and the development of petrochemical industries. The problem of pollution of waters by oil and petroleum products becomes an urgent environmental theme. Formed at the emergency oil spills, oil film is detrimental to marine flora and fauna, negatively affects the climate and is harmful to the health of the coastal population. The disadvantages of known methods and units for bioremediation of oil spills are high cost, low efficiency, and unsuitability for the cleaning of open water areas in rough conditions. Our laboratory has developed a novel floating module for bio-utilization of crude oil and petroleum films from the surface of water areas. The module provides oil pollution cleaning by microbial strains with highly efficient rate of oil utilization (μ~0.05h^{-1}) contained in the bio-film (δ ~ 5 microns) on the well-developed surface of the module. We have developed and successfully tested a new laboratory and pilot-scale models and now we are currently designing a semi-industrial module with working volume 10m3. In continuous operation it will utilize about 3.3 m^3 of oil product during the 3 months. Our perspective industrial module (V~100 m3) will be capable of bioremediation about ~75000m2 / day of water surface from oil and petroleum film (thickness~10 microns). Our design & technology are patented Russian and international PCT application is currently pending. We are looking to establish beneficial relationships with partners interested in collaborative development and successful commercial exploitation of these novel industrial bio-modules.

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Molecular and genetic assessment of the lactic acid bacteria at long storage in the gene bank

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Molecular and genetic studying of lactic acid bacteria's (LAB) gene pool in depositaries is an important problem for the purpose of their wide use in the food industry. Thus control of genome stability in the course of storage is necessary. In research used 17 strains of the genes *Lactobacillus* and *Bifidobacterium* allocated from a grain, flour, milk and the dairy production, being stored in a gene bank in the lyophilic-dried-up look within 10 years. Specific identification of strains is carried out on the basis of PCR of 16 S RNA gene. The purpose of researches – to study molecular and genetic stability of bacterial cultures at long storage with use of 9 ISSR markers: M2-$(ac)_8$ctg, M3-$(ga)_8$(ct)c, M4-$(ag)_8$(ct)c, M5-$(at)_8$, M7-$(cag)_5$, M8-$(gtg)_5$, UBC 840-$(ga)_8$ayt, UBC 855–$(ac)_8$cyt, UBC 881 – ggg-tgg-ggt-ggg-gtg. Allele polymorphism of ISSR loci is studied, all is received 396 amplicones. It is established that after 10 years of storage at 4 strains of LAB were observed changes in a genome in size fragments of DNA from 700 to 2000 c.n. Biochemical researches showed that changes in DNA of LAB didn't mention the structural genes influencing, for example, on the one of phenotypic trait – activity of acidformation. All studied strains during ten years' storage kept the activity and a high titer of cages at one level.

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