Journal of Siberian Federal University. Biology 2017 10(2): 131-133
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УДК 57.088:602.4

Editorial: the International Conference "Biotechnology of New Materials – Environment – Quality of Life"

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От редактора: Международная конференция «Биотехнология новых материалов – окружающая среда – качество жизни»

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This special issue contains reviews and original experimental data presented at the International Conference "Biotechnology of New Materials – Environment – Quality of Life" held in the Siberian Federal University (Krasnoyarsk, Russia) on 10-14 October 2016.

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These three entities are closely interrelated: the environment directly influences the quality of life and health of the people, and results of human economic activities affect the environment. The active economic activity now poses a threat to all biotic and abiotic components of the environment. As the world population is growing, more and more chemical substances, primarily synthetic plastics and xenobiotics, are being produced and consumed. In many regions of the world, environmental pollution has reached critical levels. Pollution of the planet by waste and the high rates of consumption of natural resources lead to the failure of the biosphere's self-regulating mechanism, entailing unpredictable consequences. A necessary condition for the sustainability of the biosphere is the transition to new economy, including new materials, chemicals, and technologies. Biotechnologies, which are capable of fulfilling all needs of humans without causing adverse environmental effects, show enormous potential.

The main environmental issue is sustainability of the biosphere. This is the subject of the review written by Prof. S.I. Bartsev et al. "Stability of the biosphere and sustainable development: a challenge to biospherics", which discusses this problem, showing that human beings cannot live without the infrastructure that pollutes the environment, and the future generations will not be able to live without this environment. The authors analyze the reasons of the inevitable conflicts between humans and nature and give simple examples of overcoming them.

The main contributors to pollution of the biosphere are now various chemicals, which are used in great quantities to control pests, weeds, and diseases of crops. Pollution of the biosphere and food by pesticides and modern methods for detecting them are discussed in the papers by I. Katsikantami et al. "Advances on biomonitoring of organophosphorus and organochlorine pesticides" and R.Yu. Smirnov et al. "Household management of pesticides and chemical contaminants in fruits and vegetables". The innovative line of research is development of new-generation controlled-release formulations of pesticides embedded in biodegradable materials. This biotechnological approach is discussed in the review by Prof. T.G. Volova "Potential of biotechnology for protecting crops and decreasing yield losses", which shows the possibility of constructing effective slow-release targeted formulations based on new-generation biomaterials.

An increasingly important global environmental problem is accumulation of synthetic plastics in the biosphere. The annual production and consumption of these materials have exceeded 300 million tons. Therefore, development of new materials, which will be able to be completely degraded in the environment, joining the biosphere cycles, is among the priorities for critical technologies of the 21st century at the global level. The paper entitled "Degradation of polyhydroxyalkanoate (PHA): a review" by Su Yean Ong et al. addresses polyhydroxyalkanoates – a technical analog of synthetic polyolefins, produced by biotechnological synthesis. The authors analyze mechanisms and kinetics of biodegradation of polyhydroxyalkanoates.

Construction and investigation of new biocompatible materials necessary for modern reconstructive biomedical technologies is a major goal of biotechnology. Treatment efficacy and quality of life cannot be enhanced without introducing high technologies into practical reconstructive medicine and using highly functional and specific new materials, including systems capable of mimicking biological functions of the living organism. A number of

papers discuss promising polymeric materials of various origins (polycaprolactone, PHAs, bacterial cellulose) and products based on them in terms of medical materials science: “Microbial barrier property and blood compatibility studies of electrospun poly-ε-caprolactone/zinc oxide nanocomposite scaffolds” by R. Augustine et al., “Preparation and characterization of bacterial cellulose composites with silver nanoparticles” by I.P. Shidlovskiy et al., “Investigation of toxicological properties of P(3HB-co-4HB) electrospun membranes as experimental wound dressings” by E.I. Shishatskaya, etc. The review by Prof. L.A. Frank et al. “Genetically modified coelenterazine-dependent luciferases as reporters for *in vitro* assay” addresses promising methods of biotechnological assay and diagnosticums based on bioluminescent assays.

Papers published in the special issue will be useful for biologists, biotechnologists, ecologists, materials scientists, teachers and students of biological faculties of universities.