

EDITORIAL COMMENT

Dear readers,

The first issue of the English version of your favorite journal *Ecological Engineering and Environmental Protection* is in front of you and we are pleased to present its content. Within the traditional topics *Man and Biosphere*, *Environmental Biotechnologies*, *Bioautomatics and Biobioinformatics*, *Ecological and Sustainable Agriculture*, *Forest Ecology and Biology* are published 8 peer reviewed scientific articles from Bulgarian and foreign teams. A new topic *Closed Ecological Systems in Extreme Environments*, includes an article with comprehensive analysis of intriguing achievements of many research teams of Europe, incl. Bulgaria, reported during the virtual MELiSSA Conference in 2020.

In the first topic (*Man and Biosphere*) you will find an impressive investigation aiming to provide a scientific basis for the natural relationship between CO₂ concentration and atmospheric temperature change. For many years, an unbased and inaccurate assertion taught in primary and secondary scientific curricula has served as a fundamental truth in scientific investigation. The results from many of these investigations have provided direction for modern society to tackle climate change. By using two statistical approaches it was proved that the CO₂ concentration change does not have a history of naturally causing atmospheric temperature change. In fact, the opposite is true: CO₂ concentration lags temperature rise by approximately 1000 years but no conclusion can be drawn about human activity impact on temperature rise from this data. In a second article in the same topic is underlined the increased progress in the field of antisense technology during the last 20 years. Significant advances in the design of antisense oligonucleotides, as well as a deeper understanding of their mechanisms of action, have led to their successful clinical application in many RNA-targeted therapies. This technology has enormous potential for the specific targeting, imaging, and possible follow-up of antitumor therapy. Although there are still some obstacles to be tackled, the antisense imaging and treatment will continue to benefit from the constant development of antisense technology and in particular the improvements in the chemical modifications that will lead to the further optimization of this approach.

The second topic (*Closed Ecological Systems in Extreme Environments*) is quit new and presents the summarized activities during the MELiSSA conference which is becoming a unique international platform for exchange of knowledge encompassing 150 papers. The conference provided an excellent opportunity to listen again to life support representatives from the major space agencies: CNSA (China), ESA (Europe), JAXA (Japan), NASA (USA) and ROSCOSMOS (Russia), as well to worldwide life support actors from all technological-research levels. The latest achievements on the the plants & photosynthetic microorganisms used for life support in space, the simulation of planetary ecosystems as well as MELiSSA inspired circular economy, ground demonstration and analogue testing, photobioreactors and photosynthetic microorganisms characterization, modelling and systems design, organic wastes process and metabolome where a real breakthrough was observed as well as in human microbiome in closed environments aroused great interest among the participants. Scientists working on these and other similar topics had the opportunity to meet and discuss also the complex problematics: urine as a major source of nutrients, terrestrial synergies, and some physical, chemical and microbial contaminants linked to space research.

Two articles are placed in the topic *Environmental Biotechnologies*. In the first one, the patterns of methane fermentation of multi component organic waste are studied and the process for augmentation the efficiency of biomethane synthesis and waste decomposition is optimized. The fermentation parameters are calculated with the use of mathematical and statistical methods. The results will serve as a basis for the development of industrial biotechnology for utilization of organic waste to reduce the volume of existing landfills and production of methane energy. This will further allow bioremediation of contaminated areas and obtaining of an alternative to fossil fuel - biomethane. In the second article, the attractive biotechnology during the last years in the field of the renewable energy sources and biofuels is the anaerobic digestion of organic wastes. The nature of the raw materials used is a risk factor for infections due to the possible presence of pathogenic microorganisms resistant to one or more antibiotics. In a study on the anaerobic

digestion of wheat straw a pilot scale bioreactor completed with a computerized system for control and monitoring of various operational parameters (temperature, pH, biogas composition) has been applied. Experimental data on the cellulose degrading activity of some of the bacterial isolates, their pathogenic potential and antimicrobial resistance are presented and discussed.

In the fourth topic *Bioautomatics and Biobioinformatics*, is presented a study reexamining the experimental conditions (species used, conditions of experiments, mode of reactor functioning, measurement techniques) used in the respective experiments of Monod and Contois. The author make an attempt to understand the engines for a density-dependent phenomenon concerning the growth of microbial ecosystems. Recent experimental data show that density-dependent appeared as soon as the biomass is structured into flocs or in the presence of filamentous bacteria even at relatively low concentrations. Based on this historical review of data, it is shown that density-dependent kinetics is not systematically a question of biomass density but rather related to its structure within the medium and to the mobility of microbial cells

Several new developments of the problem in crop rotation are presented in the topic *Ecological and Sustainable Agriculture*. It is well known that the climate changes will undoubtedly lead to a reconsideration of the question of the necessary crop rotations on the territory of the individual continents and sub-regions. Diversifying cropping systems improves environmental health and has the potential to reduce risk from climate change-related threats, but empirical evidence remains sparse. Therefore, it is necessary to apply advanced mathematical-statistical methods and models for obtaining more precise estimates. The application of asymmetry analysis and Procrustes analysis in the evaluation of different crop rotations are presented in details. Related with the climate changes is the the distribution of invasive alien plant species on the territory of Lozenska Mountain in Bulgaria (*Forest Ecology and Biology*). In response to climate and other environmental changes, the alien plant species on the territory of the mountain are spread in two ways: by forming monodominant communities in extreme habitats or by integrating their populations into the local communities and gradually increasing their presence in them, accompanied by changing ecological conditions of the habitat. Four potentially invasive species have been identified and need to be implemented for population monitoring and control measures.

Additional and important information for the Seventh International Conference Ecological Engineering and Environment Protection (EEEP'2021) with Youth Scientific Session and MELiSSA Summer University (30 September -3 October 2021, Varna, Bulgaria) is also available in the recent issue.

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