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**EuroSciCon Joint Event On
Biotechnology , Biochemistry and Aquaculture**
August 08-09, 2019 | Paris, France

PRESENT AND NEW VISTAS IN BIOTECHNOLOGY

Following the definition of biotechnology, I shall delineate four areas of biotechnology which are undergoing an explosive growth: gene editing and delivery; nanoparticle delivery of drugs-prepared from natural polymers, low cost metallic nanoparticles, and cellular-derived nanoparticles-exosomes; modelling in biotechnology and systems biology and artificial intelligence; and immunotherapy, particularly of cancer. First, I will mention some classical gene delivery methods, then cover in some detail relatively new development, the CRISPR-Cas9 method, dealing with gene editing and delivery. Even though this method matured only in 2002, an exponential growth is noted. Some warning is mentioned because of flagrant use of this method in connection with human embryo. Second part will deal with nanoparticles, covering three subjects. First some polymeric nanoparticles will be introduced, followed by metallic-based nanoparticles prepared from bacteria, yeasts, algae and plants with help of reducing agents. Some examples of what these nanoparticles can do will be listed, particularly of oxidation of toxic agents. Then a special nanoparticle introduced from all kinds of cells will be discussed-exosomes. This area is largely unexplored and will perhaps play a significant role in biotechnology. The third section will deal with modelling in biotechnology, with an emphasis on systems biology and closed with an exposure to the artificial intelligence which is going to play in biotechnology (is already playing in automobile industry) significant growth in biotechnology once more molecular knowledge is accumulated. At last, the medical biotechnology/immunology will be (it is already) more significant in fighting cancer. Immunology is undergoing revolution only now as the accumulated knowledge is now coming to fruition. We only mention a small portion of this burgeoning field, checkpoint inhibitors which are becoming more effective compared to the rest of drugs, fighting cancer.

Biography

Aleš Prokop has completed his PhD in Microbiology in 1966 and DrSc in Biology at the Czechoslovak/Czech Academy of Sciences, Prague and postdoctoral studies from University of Pennsylvania, Philadelphia. He is retired from Vanderbilt University, Nashville, TN. He has published more than 122 papers in reputed journals and 39 reviews, and 18 patents. He has been serving in seven editorial boards. Initially, he worked in industrial microbiology, later moved to medical area, focusing on more general aspects of Biology and cancer.

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