BRAZILIAN JOURNAL OF MICROBIOLOGY

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Editorial

Celebration of 60th anniversary of Brazilian Society for Microbiology

On May 30th 1955 during the First Symposium on the Development of Microbiology in Brazil organized by Rio de Janeiro branch of Society of Americas Bacteriologists (current American Society for Microbiology) coordinated by Prof. Minton Thiago de Mello, held in Rio de Janeiro, was formally suggested the creation of the Brazilian Society for Microbiology (SBM) and a scientific journal under denomination of the Revista da Sociedade Brasileira de Microbiologia (Journal of Brazilian Society for Microbiology). As a result of this symposium, on 28th September 1956 a group of notorious microbiologists from Federal University of Rio de Janeiro (former University of Brazil) founded the Brazilian Society for Microbiology and in 1959 the first volume of Revista Brasileira de Microbiologia (current Brazilian Journal of Microbiology) was published. Since then, SBM has actively promoted the Microbiology in Brazil and Latin America, by holding of annual events, offering courses, publishing magazine, among other activities. After restatements to adapt to different moments in our history the Brazilian Journal of Microbiology make significant contributions to applied microbiology. Currently, the scope covers different areas as biotechnology and industrial microbiology, environmental microbiology, food microbiology and medical microbiology. As part of celebration of 60th anniversary of Brazilian Society for Microbiology we edit this special issue that comprises eight article reviews of significant interest selected from important universal subjects. We hope you enjoy and that the endeavors of this publication match the goals that are spreading the microbiology.

Issues

Medical Microbiology

Antimicrobial Resistance in Enterobacteriaceae in Brazil: Focus on β-Lactams and Polymyxins

During the last 30 years there has been a dissemination of plasmid-mediated β-lactamases in Enterobacteriaceae in Brazil. Extended spectrum β-lactamases (ESBL) are widely disseminated in the hospital setting and are detected in a lower frequency in the community setting. In this review, **Sampaio and Gales** report that KPC production is currently the most frequent resistance mechanism (96.2%) in carbapenem resistant *K. pneumoniae*. Polymyxin B resistance in KPC-2-producing *K. pneumoniae* has come to an alarming rate of 27.1% in 2015 in São Paulo, the largest city in Brazil.

Diarrheagenic *Escherichia coli*

E. coli strains involved in diarrheal diseases are one of the most important of the various etiological agents of diarrhea, where strains have evolved by the acquisition, through horizontal gene transfer, of a particular set of characteristics that have successfully persisted in the host. According to the group of virulence determinants acquired, specific combinations were formed determining the currently known *E. coli* pathotypes. Each of these pathotypes represents a group of clones that share specific virulence factors. Nevertheless, it should be pointed out that the plasticity of the *E. coli* genome has hindered the identification of certain *E. coli* isolates as a pathotype, because some isolates combine the main virulence characteristics of different pathotypes and are thus considered potentially more virulent hybrid pathogenic strains. In this review, **Gomes et al.** have gathered information on current definitions, serotypes, lineages, virulence mechanisms, epidemiology, and diagnosis of the major DEC pathotypes.

Mosquito-Transmitted Viruses – The Great Brazilian Challenge

Arboviruses pose a serious threat to public health worldwide, overloading the healthcare system and causing economic losses. In Brazil, the main arbovirus causing epidemics belongs to the families *Flaviviridae* and *Togaviridae*. In this review, **Mota et al.** show that in addition to the endemic arboviruses such as dengue virus (DENV), other neglected arboviruses also cause epidemics, such as Mayaro virus (MAYV); Chikungunya virus (CHIKV), and Zika virus (ZIKV).

Biotechnology and Industrial Microbiology

Ethanol Production in Brazil: A Bridge Between Science and Industry

In the last 40 years, several scientific and technological advances in microbiology of the fermentation have greatly contributed to evolution of the ethanol industry in Brazil. In this review, **Lopes et al.** report that new technologies are available to produce ethanol from sugarcane, corn and other feedstocks, reducing the off-season period. Better control of fermentation conditions can reduce the stress conditions for

yeast cells and contamination by bacteria and wild yeasts. However, building a bridge between science and industry requires investments in research, development and transfer of new technologies to the industry as well as specialized personnel to deal with new technological challenges.

Biopharmaceuticals from Microorganisms: From Production to Purification

Biopharmaceuticals are mostly therapeutic recombinant proteins obtained by biotechnological processes. They are derived from biological sources such as organs and tissues, microorganisms, animal fluids, or genetically modified cells and organisms. Although several different expression systems may be employed including mammalian cell lines, insects, and plants, new technological advancements are continuously being made to improve microorganism production of biopharmaceuticals. Bioprocessing is a crucial part of biotechnology. There is an anticipation that within the next five to ten years, up to 50% of all drugs in development will be biopharmaceuticals. In this review, **Jozala et al.** discuss the technology involved in the bioprocess and describe the available strategies and main advances in microbial fermentation and purification process to obtain biopharmaceuticals.

Current Applications and Different Approaches for Microbial L-Asparaginase Production

L-Asparaginase is an enzyme that catalysis mainly the asparagine hydrolysis in L-aspartic acid and ammonium. It can be used as important chemotherapeutic agent for the treatment of a variety of lymphoproliferative disorders and lymphomas (particularly acute lymphoblastic leukemia (ALL) and Hodgkin's lymphoma), and has been a pivotal agent in chemotherapy protocols from around 30 years. Also, other important application is in food industry, by using the properties of this enzyme to reduce acrylamide levels in commercial fried foods, maintaining their characteristics (color, flavor, texture, security, etc.). In this review, **Muso-Cachumba et al.** write about industrial L-asparaginase production challenges, such as the search for new microorganisms able to produce it with less adverse effects. Nowadays, industrial production is carried out using bacteria such as *Escherichia coli* and *Erwinia chrysanthemi*. However, the enzyme obtained from prokaryotic microorganisms usually presents some problems such as hypersensitivity and immune inactivation. Within this context, eukaryotic microorganisms such as filamentous fungi and yeasts have been investigated for this enzymes production, due to better compatibility with the human system.

Food Microbiology

Microbiology of Organic and Conventionally Grown Fresh Produce

Fresh produce is a generalized term for a group of farm-produced crops, including fruits and vegetables. Organic agriculture has been on the rise and attracting the attention of the food production sector, since it uses eco-agricultural principles that are ostensibly environmentally-friendly and provides products potentially free from the residues of agrochemicals. Organic farming practices such as the use of animal manure can however increase the risk of contamination by enteric pathogenic microorganisms and may consequently pose health risks. A number of scientific studies conducted in different countries have compared the microbiological quality of produce samples from organic and conventional production and results are contradictory. While some have reported greater microbial counts in fresh produce from organic production, other studies do not. **Maffei et al.** provide a brief review of the current knowledge and summarizes data on the occurrence of pathogenic microorganisms in vegetables from organic production.

Environmental Microbiology

Microbial Interactions: Ecology in a Molecular Perspective

The microorganism–microorganism or microorganism–host interactions are the key strategy to colonize and establish in a variety of different environments. Microbial interactions occur by the transference of molecular and genetic information, and many mechanisms can be involved in this Exchange. The ultimate unit of interaction is the gene expression of each organism in response to an environmental (biotic or abiotic) stimulus, which is responsible for the production of molecules involved in these interactions. In this review, **Braga et al.** focus on some molecular mechanisms involved in the microbial interaction, not only in microbial–host interaction, which has been exploited by other reviews, but also in the molecular strategy used by different microorganisms in the environment that can modulate the establishment and structuration of the microbial community.

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26 October 2016
Available online 2 November 2016

http://dx.doi.org/10.1016/j.bjm.2016.10.014