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IUMS 2011 - Meeting Report (International Congress of Bacteriology and Applied Microbiology 2011)

Amrita Kumari Panda and Satpal Singh Bisht*

Department of Biotechnology, Roland Institute of Pharmaceutical Sciences, Berhampur - 760 010, India.

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The 13th International Congress of Bacteriology and Applied Microbiology was organized by International Union of Microbiological Societies (IUMS) hosted by Federation of Microbiological Societies of Japan and Science Council of Japan held at Sapporo, Japan from 6th -10th September 2011. The congress started with a logo as "Unlimited World of Microbes" to emphasize on unlimited capabilities of microbes for the sustainability of this planet. The congress dealt with a broad range of issues and subjects from basic research to actual application in the fields of bacteriology and applied microbiology covering individual issues and addressing multi-disciplinary areas, areas of joint interest. The congress also addressed the matters of research and technology development that are required to ensure the better human health ,biosphere and supports harmonious development.

The Congress was basically focused on Bioactive Microbial Products and was divided into many parallel sessions with specific area of research i.e. Metabolic Engineering, Interfacial Microbial Engineering, Systems Microbiology, Metabolic Networks & White Biotechnology, Single cell genomics, Nano-Biotechnology, Environmental Conservation and Sustainable resource utilization by microbes, Extremophile, Diversity & Ecology, Biofuels and Comparative Genomics, Transcriptomics, Proteomics and Phenomics. The conference was attended by 3500 scientists from 60 countries of the world. Inaugurated with two Plenary Lectures delivered by Satoshi Omura who spoke on how to understand and exploit the capability of microbes to produce metabolites by complete genomic analysis and Rino Rappuoli who said on the current scenario of vaccination in the 21st century by taking care of the aging population, with new vaccines targeting the diseases typical to the elderly people and modulating immune system, to control emerging antibiotic resistance, preventing cancer, taking care of the diseases present only in countries affected by poverty and taking care of emerging diseases such as pandemic influenza.

Many parallel sessions were conducted everyday with Plenary Lectures and oral presentations. Takashi Horiuchi (Division of Genome Dynamics, National Institute for Basic Biology, Japan) delivered a talk on from circular (prokaryotic) genome to linear (eukaryotic) one. He explained the mechanism of evolutionary changes from the circular to the linear form of genome and shared that Borrelia-, Streptomyces have an actual linearizing mechanism converting from a prokaryotic circular genome into a eukaryotic linear genome under natural conditions. Simultaneous defects of a bacterial actin-like protein MreB and a penicillin-binding protein PBP1B cause cell lysis in *Escherichia coli* was delivered by Masaaki Wachi Department of

* To whom all correspondence should be addressed.
E-mail: sps.bisht@gmail.com

Bioengineering, Tokyo Institute of Technology, Japan. Carol A Gross spoke on use of system-approaches for assigning function of unknown genes, identifying novel characteristics of known biological processes-pathways, mapping the gene network architecture, and finding the molecular mechanism behind drug action and drug synergy.

There was a symposium on Bioactive Microbial Products organized by The Society for Actinomycetes Japan (SAJ) and Japan Antibiotics Research Association (JARA). William H Gerwick (Scripps Inst Oceanography and Skaggs School of Pharmacy, Univ California San Diego, USA) discussed about the exploration of diverse collections of marine Cyanobacteria which have yielded new and ultrapotent cancer cell cytotoxic peptide and lipopeptide natural products of both linear and cyclic structure. He spoke on a very unusual cyclic lipopeptide from the Palmyra Atoll collection of *Lyngbya bouillonii* with exceptional anticancer properties and a unique series of linear peptides with exceptionally potent anticancer activity from a Curaçao collection of the marine cyanobacterium *Lyngbya majuscula*. Jong Seog Ahn (Chemical Biology Research Center, Korea Research Institute of Bioscience and Biotechnology (KRIBB), Korea) presented about discovery of few novel bioactive fungal metabolites, fusarisetin A, protuboxepin and violaceol from soil or marine fugal isolates and discussed the biological activities of these compounds. FSA effectively inhibited the 3D-culture multi-aciniform and acini-colony of MDA-MB-231(human breast cancer cell) cells. Protuboxepins and violaceols from marine-derived fungus *Aspergilus* sp. SF-5044 which induced cell morphological changes without cytotoxicity.

Kenji Ueda (Life Science Research Center, College of Bioresource Sciences, Nihon University, Japan) briefly introduced three known substances Cobalamin (vitamin B12) cobalt-containing coenzyme, desferrioxamines ferric-chelating siderophore and monensin & related ionophores polyether antibiotics produced by *Streptomyces* and discussed about their primary roles in the microbial community structuring. Manabu Kawada (Institute of Microbial Chemistry, Numazu, Microbial Chemistry Research Foundation, Japan) delivered a talk on new type of antitumor drugs that indirectly inhibit tumor growth. He discussed about various screening systems and many active natural compounds from the cultured broth of actinomyces and fungi. NBRI123477 A and B; new atpenins that inhibit the growth of prostate cancer cells through the interaction of stromal cells. NBRI16716 A; a novel compound that shows anti-tumor effect in mouse xenograft models. NBRI17671; a weak inhibitor of tumor cell adhesion to some tumorigenic factors and the chemically modified NBRI17671 showed anti-tumor effect in vivo. Rubratoxin A; a specific inhibitor of protein phosphatase 2A that inhibits the tumor metastasis in mouse models through the augmentation of natural killer cells.

The hologenome theory of evolution and probiotics within the framework of the hologenome concept was presented by Eugene Rosenberg (Molecular Microbiology and Biotechnology, Tel Aviv University, Israel). He also emphasized that the stabilization and amplification of a probiotic depends on its interactions with the host, other associated microorganisms and possibly bacteriophage. The congress had a session on model system for bacterial infections in which Hirotaka Kanuka from Department of Tropical Medicine, Jikei University School of Medicine, Japan explained p38 MAP kinase-mediated tolerance to intracellular bacteria infection by taking *Drosophila* as a bacterial infection model and Kazuhisa Sekimizu from Department of Microbiology, Graduate School of Pharmaceutical Sciences, The University of Tokyo, Japan proposed the silkworms *Bombyx mori* as model animal for screening therapeutically effective of antibiotics as the use of mammals to examine the pharmacodynamics and toxicity of most drug candidates is costly and associated with ethical issues.

There was a workshop on *Helicobacter pylori* supported by the Japanese Society for Bacteriology. The workshop was inagurated by Keigo Shibayama from National Institute of Infectious Diseases, Japan who delivered a talk on patho-physiological role of *Helicobacter pylori* γ-glutamyltranspeptidase (GGT) and asparaginase. He explained that *H. pylori* cells were unable to take up extracellular glutamine and asparagine directly instead glutamate and aspartate

produced by the action of the GGT and asparaginase were transported into *H. pylori* cells, where they were utilized as substrates for metabolism. The cytotoxic activity of live *H. pylori* cells was significantly diminished by deletion of the asparaginase gene and GGT gene as the mutant strains significantly less capable of colonization. The congress also contained sessions on pathogenicity of *Clostridium* and *Enterococcus*, *Staphylo-Streptococcus* Diseases, Intracellular Parasitic Microbes: Rickettsiosis and Chlamydiosis, bacterial genome diversity, ROS signaling in Host-bacteria stress responses etc. Increasing prevalence of drug resistant bacteria is a universal problem for both community and hospital settings of developed and developing countries. However, its epidemiological picture varies by countries. Over the last decade, one of the most relevant findings in molecular epidemiology of drug resistant bacteria would be the recognition of 'global epidemic strain' which is usually defined by multi-locus sequence typing; *Escherichia coli* ST131, *Enterococcus faeciumCC17* and *Acinetobacter baumannii CC92*. Molecular epidemiology of drug resistant bacteria in Japan was discussed by Satowa Suzuki (National Institute of Infectious Diseases, Japan).

There was a session on Nano-Biotechnology in which mechanical response of living cells visualized by scanning probe microscopy was discussed by Kazushige Kawabata (Faculty of Advanced Life Science, Hokkaido University, Japan). He said that Scanning probe microscopy (SPM) is unique to visualize not only the surface topography but also spatial distribution of local viscoelasticity of living cells in culture medium. I-Ming Hsing (Department of Chemical and Biomolecular Engineering, Hong Kong University of Science and Technology, Hong Kong) reported a new immunoassay platform namely the yeast surface display based cell counting immunoassay (YSD-CCI), a staining-free gel electrophoresis based enzyme assay using DNA and peptide co-functionalized gold nanoparticles to determine the quantity of an antibody analyte. The authors Dr. Satpal Singh Bisht and Miss. Amrita Panda presented their research work on Production and purification of a new thermostable lipase from *Brevibacillus* sp. AK-P2 and 16S rRNA sequencing of few lipase producing thermophilic bacteria from Taptapani hot water spring, Orissa, India: a first hand report respectively.

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