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World Biotechnology Congress

July 16-17, 2018 Berlin, Germany

Scientific Tracks & Abstracts

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Reduced complexity, RCO: A leaf sculptor within the *Brassicaceae* family

Mohsen Hajheidari
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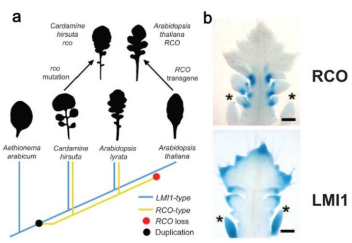

We are currently experiencing unprecedented climate change, which is a serious threat to our natural resources and food security at a time of rapid population increase. The sustainable food security requires a constant increase of genetic potential in crops. In order to increase the genetic potential of crops, exploring the genetic resources beyond major crops is a necessity. Leaf size and shape have an important effect on physiological processes such as photosynthesis and transpiration and thus on plant biomass. Therefore how morphological diversity of plant leaves is regulated constitutes an important branch of plant biology. In order to understand the genetic basis of morphological diversity in leaves, we have introduced a new model system *C. hirsuta*, which has dissected leaves with distinct leaflets, and it is a close relative of *A. thaliana*, which has simple leaves. Using comparative genetic approaches we discovered that a tandem duplication of the Late Meristem Identity 1 *(LMI1)* gene has given rise to two new copies in *C. hirsuta*. Diversification of the regulatory elements and coding sequence in one of the copies led to emergence of a novel transcription factor called reduced complexity, *RCO*. The *RCO* gene was lost in *A. thaliana*, contributing to leaf simplification in this species. In contrast to *LMI1*, which is expressed in the margins of leaflets, *RCO* is expressed at the base of leaflets and promotes leaflet formation through local growth regulation, at least in part by reprogramming the local phyto-hormone homeostasis. *RCO* expression is limited to leaves and its function is independent of shoot apical meristem development. Our data demonstrated that *RCO* is capable of improving photosynthetic efficiency, suggesting its contribution to adaptive evolution of leaf morphology. *RCO* studies could provide a basis for improvement of photosynthetic efficiency in crops.

Biography

Mohsen Hajheidari has obtained his Master's degree in Plant Breeding at the University of Razi, Iran. Before undertaking his PhD in the group of Csaba Koncz in the Department of Plant Developmental Biology at the Max Planck Institute for Plant Breeding Research (MPIPZ), he was a Scientific Member at the Agricultural Biotechnology Research Institute of Iran. He has completed his PhD in Genetics in 2010 at the University of Cologne as an International Max Planck Research School (IMPRS) student. Following a Postdoctoral study in the group of Csaba Koncz, he joined the group of Miltos Tsiantis in the Department of Comparative Development and Genetics in 2013. He is currently using comparative genetic approaches to uncover the genetic bases of leaf morphological complexity in plants. His goal is to combine evolutionary and computational approaches with comparative genetics and molecular physiology to further decipher plant-environment interaction.

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Biological effects of plasma rich in growth factors in tissue regeneration: Benefits and easy use of biotechnologies in the daily practice of health practitioners

Olga Onyshchenko
BTI Biotechnology Institute, Ukraine

Based on the expertise in anti-age dentistry and working with the biotechnology of the largest scientific background in regenerative medicine, which is plasma rich in growth factors, in the lecture will be presented the range of properties of this biological therapy for individualized medicine. It was proven to be effective in regeneration of tissues differentiated from the mesenchymal stem cells (cells composing muscular-skeletal system, like osteoblasts, adipocytes and chondrocytes as well as myocytes and neurons), the capacity of which ones to proliferate and differentiate is known to decrease with the age of the patient. The lecture will present the data of scientific studies of different levels to prove the regenerative potential of patient's own blood proteins (growth factors) to perform the safe and high-quality treatment in different areas of medicine while reducing the possibilities of side effects and performing less- or non-invasive procedures to our patients. Additionally, will be presented the set of clinical cases illustrating the theoretical part of the lecture and how easy it is to introduce such biotechnologies into the daily practice of the professionals in dental, surgical, dermatological, traumatological, ophthalmological spheres, as well as sports medicine and focusing on own clinical results in esthetic and anti-age medicine.

Biography

Olga Onyshchenko is an Anti-age Dentist, Aesthetic Injectionist, Specialist in Tissue Regeneration and she is working as Representative at BTI Biotechnology Institute. Her research area of interest includes tissue regeneration, biomaterials, dentistry and biotechnology.

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Nanoparticles based bacterial identification kit

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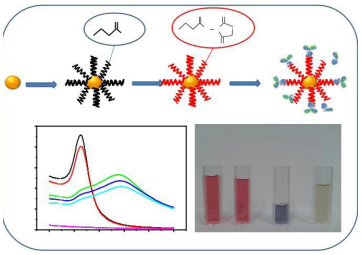

Brazil is the second largest ethanol producer in the world, using yeast fermentation by sugarcane. Brazil produces 26 billion liters per year, which means a market of 20 billion dollars. Bacterial contamination is a relevant factor in the industrial process, as this can cause damage to the transformation of raw material fermentation in other undesirable substances or consuming part of ethanol, which leads to losses in fermentation yield, causing financial loss. Methods used today to measure bacterial contamination are microscopic counting, plating techniques and MC kit. The problems of these methods are very high response time (one to five days) and the lack of bacteria identification due to measure of sub-products. Our solution aims at the production of a kit for rapid monitoring and identification of contaminant microorganisms based on immune-sensor colorimetric change. Biosensors based on gold nanoparticles can be bio conjugated with various ligands such as nucleic acids and antibodies. After the bio conjugation, they start forming aggregates, which shifts the absorption band to CA. 600-800 nm. This change can be observed by the naked eye or measured quantitatively with an ultraviolet-visible spectrophotometer. Measure will be carried out in half an hour, in this way alcohol industry will be able to have more timely interventions to stop contamination and use less antibiotics in controlling contaminants. Our experiment indicates that bacteria can be detected quickly and accurately without any amplification or enrichment in around 100 cfu/mL level with excellent discrimination against any other bacteria. In this work we have demonstrated a universal method for detection bacteria using gold nanoparticles. This proves to be a quick, simple and clean way to detect bacteria in real time.

Biography

Débora Colombi is a Brazilian entrepreneur who founded two companies: Genotyping and BPI. She has degree in Biomedicine from UNIFESP and a Masters' and PhD degree in Biochemistry and Molecular Biology from USP and a post doctorate in Genetics from UNESP. The objective of her actual project is the development of a kit for the detection of bacterial contaminants present in the fermentation tanks of sugarcane industries. The company is already expanding the kit to other markets to facilitate the identification of contaminants in loco. Her companies offer genomic solutions for researchers and other companies, in addition to human genetic diagnoses.

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De novo transcriptome assembly for gene identification and molecular marker discovery in *Capsicum annuum* L. exposed at high-intensity UV-B irradiation

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Statement of the Problem: Exposure to high-intensity UV-B irradiation induces the expression of many genes normally involved in defense, wounding, or general stress responses. However detailed processes of the linkage between light UV-B signaling and the up-regulation of gene expression remain unclear. Therefore, the mechanism by which UV-B stress triggers the intracellular defense signaling pathway remains poorly understood. Moreover, according to our knowledge, no studies have analyzed the overall changes in global gene expression in bell pepper leaves exposed to UV-B. Molecular biological analyses have allowed us to draw a picture of UV stress responses in plants, and determination of the transcriptome has had a significant impact on this research field.

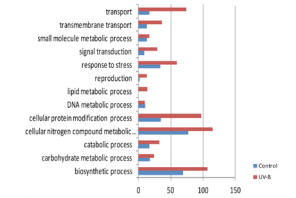

Figure 1. Gene Ontology classification. Transcriptome of UV-B irradiated Capsicum plants and control condition are classified according to biological

Methodology & Theoretical Orientation: Deep sequencing, transcriptome assembly, and differential expression analysis were performed to investigate the regulatory mechanisms of *Capsicum annuum* in response to UV-B exposure. A global transcriptome analysis of the response to high-intensity UV-B irradiation was conducted and target genes regulated by UV-B were identified.

Findings: We conducted a high-throughput screening analysis. After 1 hour, 273 genes showed significantly different expression between control and treated plants, among these 111 were up-regulated and 162 were down-regulated; these were involved in several putative metabolic pathways related to biotic stress. After gene annotation and gene ontology enrichment analysis it was possible to determine that the UV-B radiation induced the expression of genes with functions in UV protection, including antioxidant enzymes, G proteins, primary and secondary metabolism and transcription factors.

Conclusion & Significance: Transcriptome profiling highlights possible signaling pathways and molecules for future research. These results opened ways of exploring the molecular mechanisms underlying the effects of UV-B irradiation on capsicum and have great implications for further studies.

Biography

Luis Lightbourn is the President of the Instituto de Investigación Lightbourn, Mexico. He is an expert in plant biotechnology, genomics and cell biology and has over 30 years of experience in plant biochemistry and molecular biology. Throughout his research career he has focused on how light regulates plant growth and development. In particular, he has made a major contribution to understanding the molecular responses of plants to ultraviolet radiation. He has a range of expertise that has attracted invitations to contribute to a wide range of activities, including assessment of research strategy, industry consultation and government advice.

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Characterization of anaerobic biotransformation of β-hexachlorocyclohexane

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Hexachlorocyclohexane (HCH) is a contaminant of concern worldwide. HCH has four main isomers α, β, δ, and γ-HCH. Since only γ-HCH (Lindane) has a specific pesticide activity, the purification of Lindane resulted in the production of other waste residues. β-HCH is the most persistent one, has relatively low water solubility and is considered highly carcinogenic and health hazardous. A large amount of β-HCH produced as a by-product which was dumped at landfill sites has caused heavy contamination in soil, groundwater and atmosphere. In this study, we focused on the anaerobic degradation of β-HCH. Thus far, only one anaerobic, *Dehalobacter* sp. containing, a culture was reported in the literature. Contaminated soil was collected from a highly contaminated site in China and anaerobic microcosms were set up to enrich β-HCH degrading microorganisms. The degradation potential was evaluated by measuring the concentration of the products benzene and Mono Chlorobenzene (MCB). At the same time, cell growth was monitored by fluorescent microscopy. Illumina sequencing was done for the first and second generation and bacteria belonging to the *Firmicutes*, including *Dehalobacter, Gelria* and *Gracilibacter*, were dominant. Additionally, the genomic DNA from an active, fourth generation, the β-HCH degrading culture was isolated and a 16s-rRNA clone library was prepared for subsequent sequencing to analyze the overall microbial diversity. Furthermore, compound-specific Carbon Stable Isotope Analysis (CSIA) will be applied to investigate the transformation pathway.

Biography

Mohammad Numan Ibne Asad has recently completed his MS from JLU Giessen on Biotechnology. Especially his MS expertise focused in applied microbiology, biotransformation, microbial ecology and bioengineering.

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Anti-tumor activity of functionalized biomimetic magnetite nanoparticles produced in the presence of MamC protein of *Magnetococcus marinus* MC-1

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Magnetite Nanoparticles (MNPs) find many applications, including biotechnology, as they can be manipulated by an external magnetic field and functionalized with different molecules. Magnetotactic bacteria bio-mineralize magnetosomes (membrane-enveloped magnetites), which are the ideal magnetic particle. However, scaling-up magnetosome production is still challenging, so bio-mimetics, i.e. *in vitro* magnetite synthesis mediated by magnetosome-associated proteins is being explored. Our group is working with MamC from *Magnetococcus marinus* MC-1 that controls the morphology and size of the crystals, producing well faceted Biomimetic Magnetic Nanoparticles (BMNPs) of ~40 nm, which are paramagnetic at room and body temperature while having a large magnetic moment per particle under an external magnetic field. These BMNPs were cytocompatible and biocompatible in vivo. BMNPs were functionalized (isothermal adsorption) with a monoclonal antibody (mAb) recognizing the ectodomain of the human Met/HGF receptor (overexpressed in many cancers) and the chemotherapeutic Doxorubicin (DOXO). The functionalized BMNPs present hyperthermia and were stable at physiological pH, while releasing the adsorbed DOXO at acidic pH. mAb functionalization of BMNPs favored their interaction with cells expressing the Met/HGFR and cellular DOXO uptake and toxicity, which was enhanced upon cell exposition to a continuous magnetic field. Real-time cytotoxicity of the BMNPs showed that DOXO-mAb-BMNPs were significantly more toxic than DOXO-BMNPs on Met/HGFR expressing cells, while no differential toxicity was observed on cells not expressing this receptor. When DOXO-BMNPs were injected intravenously in tumor bearing mice and an external magnetic field was applied there, a higher amount of BMNPs accumulated in the tumor and tumor growth was decreased in comparison to mice in which no magnetic field was applied. These BMNPs could thus represent effective nano-carriers for targeted drug delivery and might be combined with hyperthermia to increase efficiency, resulting in a targeted local treatment of tumors with a decrease in the deleterious systemic side effects.

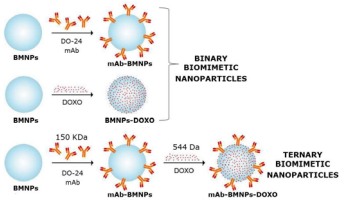

Figure 1. Functionalization of MamC biomimetic nanoparticles (BMNPs), with the DO-24 monoclonal antibody (mAb) and the chemotherapy drug doxorubicin (DOXO), for targeted anti-tumor treatment.

Biography

Ana Peigneux has his expertise in Molecular Biology focused on protein purification for biotechnological applications. Currently, she is pursuing PhD at the University of Granada, Spain. The main goal of her thesis is the study and the purification of magnetosome-associated proteins to synthesize magnetosome-like nanoparticles with improved magnetic properties. Moreover, she got two grants to do an Internship in Dr. Prat lab (Italy), where she applied these biomimetic magnetite nanoparticles as carriers for drug delivery.

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