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Phosphoproteome analysis of *Trichoderma reesei* reveals a post translation regulation of secreted glycosyl hydrolases

Liliane FC Ribeiro, Wellington Pedersoli, Renato P Graciano, Amanda CC Antonieto, Maira P Martins, Fausto Almeida, Rafael Silva-Rocha, Antonio Rossi Filho, and Roberto N Silva
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*T*richoderma reesei is the major producer of cellulases and hemicellulases and the regulation of these enzymes expression is not fully understood. Phosphorylation events are known to be involved in the regulation of various cellular processes, including metabolism, transcription, translation regulation, protein degradation, homeostasis, signaling, and protein secretion, among others. In *T. reesei*, protein phosphorylation pattern changes in a carbon dependent way. In order to have a broad understanding of the phosphorylation events and how it affects different cellular functions, once T. reesei is grown in sugarcane bagasse, the main biomass for bioethanol production in Brazil, we conducted an experiment in which we identified phosphorylated proteins by LC-MS/MS. CBHI was identified as a phosphorylated protein in the intracellular protein extract, with five phosphorylation sites. In order to test the importance of the phosphorylation for this enzyme, CBHI was purified from the secretome of *T. reesei* and dephosphorylated in order to detect any enzymatic activity difference caused by phosphorylation. CBHI activity was about 60% less after dephosphorylation. The broad phosphorylation pattern that happens in *T. reesei* when it is cultivated in sugarcane bagasse provides novel information about several proteins and phosphosites not previously described. This work shows for the first time that some secreted glycosyl hydrolases are phosphorylated in the condition tested and suggests that CBHI activity is modulated by phosphorylation.

Biography

Liliane Ribeiro has completed her PhD at the age of 30 years from University of Sao Paulo and Postdoctoral studies from University of Maryland working with identification of new targets of kinases. Currently she is a Post-doc fellow at University of Sao Paulo, where she studies phosphorylation events related to the carbon source offered to the fungus. She has published 12 papers in reputed journals in the microbiology field so far.

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The environmental monitoring at the «Andreevskaya valley» MSW landfill, in the Chechen Republic, Russia

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The article presents the results of the environmental monitoring from 2016 to 2018 at the «Andreevskaya Valley» MSW landfill in the Chechen Republic, Russia. The monitoring includes assessment of the spread of pollutants in the atmosphere and temperature distribution in the topsoil, biomonitoring of trees on different (experimental and control) sites, especially by the asymmetry indexes of leaves. First, the computer models particularly by the geographical coordinates and the height of the «Andreevskaya Valley» MSW landfill have been constructed. Second, two experimental and one control areas have been identified. Third, seven asymmetry indexes (As1, As2, As3... As7) and the total asymmetry index (Astotal) in these areas have been calculated. Fourth, statistic distribution of the Astotal index especially by the mean (mode (Mo) and median (Me)) has been described. Fifth, the computer models of the spread of pollutants (CO, NO2, SO2 and HsS) in the atmosphere and the temperature distribution in the topsoil of the landfill have been constructed. In addition, the areas of mass concentration of pollutants with a high temperature in the landfill have been identified. As a result, the effect of spread of pollution on the 18 morphological parameters of leaves of the trees growing in the experimental and control areas has been assessed.

Biography

Mamadzhanov Roman Khasanovich has his expertise in evaluation and passion in improving the environmental monitoring and landfill reclamation, particularly MSW landfill. He graduated from the Peoples' Friendship University of Russia (RUDN), Moscow in 2013 as an Ecologist. After that he finished his PhD program in 2016. Now a days he works as a Senior Lecturer at the Ecological department of RUDN. He improved the list of the plant species which are resistant to exposure to MSW landfill especially in the Chechen Republic. From 2012-2013 he was also working at the Department of Housing and Public Utilities. He designed a computer model of the MSW landfill in the Moscow Region and the Chechen Republic by geographical coordinates, pollutants, temperature. He also created a new method of the plant life assessment by the 18 morphological parameters and seven asymmetry indexes of leaves. In addition, at the Ecological Department he started the program of the environmental monitoring of the campus of

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RUDN including assessment of the soil and the atmosphere conditions. Our new research is focused on identifying sampling sites, measuring the pollutants, temperature and the morphological parameters of leaves, creating the computer model of pollutants spreading, revealing the life conditions of plants growing near the landfill by seven asymmetry indexes and the total asymmetry index. The author's research topics are particularly relevant and practically significant both for the particular region and for the country as a whole.

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Exploiting oilfield site microbes for diverse applications: A North East Indian perspective

Tapas Medhi, Saurav Haloi and **Dhruba Jyoti Sarma**
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This paper reports the microorganisms isolated from crude oil contaminating sites of North East Indian petroleum fields about our contribution towards their laboratory and field scale applications for biosensing, bioremediation and enhanced oil recovery in technological perspectives. The work was carried out under a program supported by Oil and Natural Gas Commission Ltd (ONGCL) India. Out of 150 bacterial strains isolated so far bacterial strains capable of producing biosurfactant suitable for enhanced recovery of crude oil (EOR) have been developed. Two promising biosurfactant producing bacterial strains identified and screened as *Achromobacter* sp. TMB1 [NCBI accession no. KX661383]

Pseudomonas sp. TMB2 [NCBI accession no KX661384] after 16s rDNA sequencing was found to have physiochemical properties useful for operational and remedial activity in petroleum production Redox enzymes such as cytochrome P450 monooxygenase has been induced for their use as recognition element in biosensor design. Cytochrome P450 enzyme isolated from an extremophile Bacillus *Stratosphericus sp.* was used as the recognition element for an ion-sensitive field effect transistor (ISFET)-based biosensor microbial consortium has been developed for bioremediation of crude oil contaminated site which includes species of *Achromobacter* and Bordetella. The isolation and morphological characterization of the bacterial strains includes from crude oil contaminated soil and Formation water collected from the GGSs of Khoraghat and Merapani ONGCL, India, indicated the presence of multiple bacterial species which can utilize hydrocarbon as a nutritional source and could be

potential agents for effective remediation of crude oil contamination.

Biography

Tapas Medhi is currently working as Assistant Professor, Tezpur University. He has received his Doctoral degree on 25 August, 2004 from the Indian Institute of Technology, Kharagpur, India. He has completed his Masters of Science in Agriculture from the Assam Agricultural University, India. He then worked at the Institute of Biochemistry, Leipzig University, Germany as Postdoctoral Fellow in a DFG funded project for two years and as Assistant Professor at Tezpur University in India since 2006. He has authored several publications in various journals. His publications reflect his research interests in Cytochrome P450 Biochemistry, biopesticides and bioremediation of crude oil contaminated soil. He is currently in charge of two ongoing scholarly projects on Phytoremediation and Microbial enhanced oil recovery.

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Assessement of heavy metals in urban aerosol samples in Sebele, Botswana

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Bush fires and dust in the dry winter months establish moderately high background levels of aerosols. Emissions into the atmosphere by copper mines, coal mines, and vehicular emissions are all possible sources of air pollution with heavy metals. Although there has been assessment and monitoring of heavy metals and their air pollution in other countries such as Brazil, Europe, and America, there is little documentation about the concentration of heavy metals in aerosols in Botswana. A total of 63 Aerosol samples were collected at the Botswana College of Agriculture and were analyzed for concentrations of Al, Co, Cu, Fe, Pb, Mn, Ni, and Zn infiltrate using a Flame Atomic Absorption Spectrometer (Varian SpectrAA 220 FS). Statistical receptor models were applied to investigate potential sources of the studied metals. Data exhibits enhanced enrichments of Zn (EFg=76), Al (EFg=14391), Co (EFg=19), Cu (EFg=5), Pb (EFg=3) and Ni (EFg=2), which was attributed to contributions from non-crustal sources, whereas Mn and Fe (EFg < 2) were attributed to crustal origin, such as airborne dust. Data were subjected to factor analysis (FA) twice. From FA-1, two Principal Components (PC) were revealed. PC-1 showed high positive loadings of Pb, Zn, Ni, and Al, whereas PC-2 had loadings for Fe and Mn. On the other hand, FA-2 had three principal components. PC-1 from FA-2 showed strong loadings for Cu, Fe, and Mn. FA-2 had strong loadings of Pb, Al, and Zn, whereas loadings for PC-3 were comprised of Ni and Co. The difference between loadings of FA-1 and FA-2 suggested possibilities of mixed origins of the studied metals. Finally, air mass back-trajectory analysis showed that during the sampling period, there were only 5 cluster groups that represented significantly different transport pathways of aerosol samples, where only Zn and Ni mean concentrations revealed a dependence on the geographical origin of aerosol samples. Results of the analyzed concentrations of Al, Co, Cu, Fe, Pb, Mn, Ni and Zn in aerosol samples showed that the presence of Fe and Mn in the atmosphere in the ambient air of Sebele is mainly due to contributions from lithogenic sources. Pb, Ni, Co, Al, and Zn exist because of anthropogenic sources, whereas, Cu, exist because

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of mixed origins. Trajectory analysis further shows that the anthropogenic Zn and Ni could also be present in the air sampled due to air mass transportation from distant sources.

Biography

Sello A Likuku has completed his PhD at the age of 38 years from University of Edinburgh, Scotland and his Research Fellowship in 2016, under the Matsumae International Foundation from the University of Tsukuba, Japan. He is curretly acting Head of Department (Department of Basic Sciences) at the Botswana University of Agriculture and Natural Resources and also serving as an Editor of the Botswana Journal of Agriculture and Applied Sciences. He has published 12 papers in vrarious journals.

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Assessement of the nest and feeding ecology of the sympatric cross river gorilla and nigeria cameroon chimpanzee in tofala hill wildlife sanctuary

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Preliminary studies of Cross River gorilla (Gorilla gorilla diehli) and Nigeria-Cameroon Chimpanzee (Pan troglodytes ellioti) have been going on in Tofala area since 2004. These studies were mostly focused on determining the distribution of these two great apes species in the area. Reliable information on the ecology of wild Cross River gorilla and Nigeria Cameroon chimpanzee is still scarce. Such information can provide insights into great ape cognition and evolution and can provide valuable data to guide conservation efforts for remaining populations. The aim of this study was to make an assessment of the nesting and feeding ecology of Cross River gorilla and Nigeria Cameroon chimpanzee in Tofala Hill Wildlife Sanctuary. This study was conducted from November 2015 to August 2016. 55 kilometers reconnaissance (recce) walks and twelve camera traps functioning for1242 trap days (November 2015 to April 2016) were used to determine the nesting and feeding ecology of these great apes species. The study area was randomly stratified into 1km by 1km grids with laid down recce of different lengths in the center of the grids, and camera traps planted along animal trails in the grids. The following data were collected; GPS coordinate of great apes nest, vegetation type, species, slope, canopy type, food type, nest sites, nest type, undergrowth of vegetation and elevation and photos of great apes from camera traps. Data were analyzed using Microsoft Excel. Results revealed that slope, vegetation and canopy cover have great influence on the ecology of great apes. 55.06% of nests and 60% of feeding signs for chimpanzee and, 61.5% of nests and 65.6% of feeding signs for gorilla were distributed across steep slopes. 56.2% of chimpanzee and 38.5% of gorilla nest were constructed in undergrowth made of small trees and lianas respectively. 40% of chimpanzee and 79.9% of gorilla feeding signs were distributed in bushes of secondary forest. 56.2% of chimpanzee nest sites were constructed in very close canopy cover and 40% of feeding signs were distributed in open canopy cover. Similarly, the majority of gorilla nest (76.9%) were constructed under very close canopy and feeding signs (51.1%) were found in open canopy. Aframomum sp was the most frequently encountered food remains for both chimpanzee and gorilla and can be considered as the most stable diet for great apes in the area. Chimpanzee fed on giant snails, mongoose, and porcupine. Though this study presents foundational research on the nesting and

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feeding ecology of Cross River gorilla and Nigeria Cameroon Chimpanzee it is limited in some important way, the entire area of the sanctuary was not surveyed, and fecal analyses were not conducted to determine the diversity of great apes diet. However, this information obtained can be used in the long-term conservation of Cross River gorillas and Nigeria-Cameroon Chimpanzee in the Tofala Hill Wildlife Sanctuary.

Biography

Enokenwa Allen Tabi was born on the 4th of December 1982 in Mamfe, South West Region of Cameroon. He studied in the University of Dschang, Cameroon where he obtained his Master Degree in Ecology and Wildlife Management. He has been working with the Environment and Rural Development Foundation (ERuDeF) since 2011, where he has amassed seven years' experience in the domain of wildlife conservation. His work in wildlife has contributed in the creation of the first protected area (Tofala Hill Wildlife Sanctuary) and in the process of creating the second protected area (Mak-Betchou Wildlife Sanctuary) in the Lebialem Highlands. He currently holds the position of the Deputy Chief of Programs in ERuDeF.

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Rapid changes and loss of freshwater springs and fish communities of the Arabian Peninsula

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During summer 2018, 132 springs from Saudi Arabia, Oman and Jordan were surveyed for water chemistry and fish communities. Although most springs in Oman are reasonably intact, only 14 of 46 springs flowing in Saudi Arabia in 1990 exist, and all springs visited in Jordan were heavily polluted from direct human contact. In addition, the electrical conductivity of the remaining Saudi springs has increased profoundly during this period. Fish were sampled at each spring boil, if present, using a dip net, identified to species, photographed and returned to the location where collected. Five native species were found in the springs of Saudi Arabia and Oman, but all springs in Jordan lacked fish. In addition, two introduced Tilapia species were found in some Oman springs. Garra tibanica was found only in Saudi Arabian springs, while Cyprinion watsoni was restricted to a single spring in Oman. The general distributions of species in the Arabian Peninsula were compared with earlier surveys, and the relationship of each species to electrical conductivity was analyzed to assess whether increased conductivity levels in springs since 1990 as a result of over pumping of groundwater has or will have an impact on fish tolerance and distribution. Aphanius dispar is limited to low conductivity springs, Cyprinion mhalensis and Gara tibanica to low-moderately high conductivity, while Garra tibanica can tolerate extremely high conductivity. Continued over extraction of groundwater will lead to loss of additional springs and the likely extirpation of species due to increased conductivity. This is a major conservation issue facing the Arabian Peninsula.

Biography
Kamal is a PhD Candidate from University of South Florida, USA.

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Antibacterial activity of essential oils and antibiotics on bacterial strains isolated from infected urinary tract

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Alexandria University, Egypt

In this study, the antibacterial activity of some traditional herbal oils and antibiotics against infected urinary tract bacterial isolates was investigated. Oil discs with the minimum inhibitory concentration MIC of each were impregnated. After culturing and incubation the results showed that Dill oil is the most effective oil that inhibited 61% of E. coli, 56% of Gram (+) cocci, and 33% of Gram (-) bacilli. Generally, it inhibited 48% of all isolates. Parsley and Celery oils inhibited 56% of Gram (+) cocci, followed by Gram (-) bacilli that showed 48% and 41% inhibition, respectively. Their effects on E. coli was much less inhibiting 29% and 21%, respectively. Generally, they inhibited 41% and 34% of local urinary tract bacterial pathogens. Thyme's oil showed effect only on Gram (-) bacilli and *coccobacilli* reaching 37% and 21%, respectively. It had no effect on Gram (+) cocci. It's generally inhibited only 25% of isolates. Chamomile's oil was the weakest tested oil. It affected only the Gram (-) bacilli while it had no effect on Gram (+) cocci generally inhibited only 5% of all isolates. In this study, the antibiotics tested were Amoxicillin/clavulanate, piperacillin/tazobactam, cefotaxime, imipenem, amikacin, norfloxacin, trimethoprim/sulfamethoxazole (oxoid®). Two Strains of Gram (+) cocci were representative for VITEK® system identification as antibiotic sensitivity pattern was done. One was sensitive to all tested antibiotics except imipenem and amikacin and it was *Enterococcus faecalis*, the second was resistant to all the tested antibiotics and it was *Staphylococcus aureus*. 50% of all Gram (-) *coccobacilli* strains were submitted for VITEK®, and they were all found to belong to E. coli. Gram (-) bacilli were divided into clusters and the representatives were identified as *Morganella morganii, Pseudomonas aeruginosa, Pseudomonas fluorescens, Proteus mirabilis,* and *Klebsiella pneumoniae*.

Biography

Marwa M. Elmaghrabi is currently a permanent researcher of stem cells and tissue culture labs at Faculty of Medicine Alexandria University. Quality and infection control advisor at Canadian Academy for Science, ISO 9001:2015 lead auditor, PhD (Scholar), M.SC (Microbiology,2012). She accumulated 9-Years of experience in Health Care Organization in Quality and Infection Control sector.She participated in a number of international and regional microbiology conferences as a speaker and moderator. She contributed to PAN-African and electronic network project as broadcasting lecture. She served as member of Arab QOSH of Safety professional's experts.

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UPLC-HRMS based untargeted metabolic profiling reveals changes in chickpea (*cicer arietinum*) metabolome treated with PGR and PGPR

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Genetic improvement for drought tolerance in chickpea requires a solid understanding of biochemical processes involved with different physiological mechanisms. The objective of this study is to demonstrate physiological changes and altered metabolic levels in chickpea varieties (tolerant and sensitive) treated with PGPR and PGRs and grown under contrasting water regimes. Ultrahigh performance liquid chromatography-high resolution mass spectrometry (UPLC-HRMS) analyses was carried out to classify metabolites associated with drought tolerance in chickpea. The seeds of two chickpea genotypes (Punjab Noor-2009 and 93127) differing in sensitivity to drought were soaked for 2-3 h prior to sowing in 24 h old cultures of isolates. The salicylic acid (SA) and putrescine (Put) were sprayed (150 mg/L), on 25 days old seedlings of chickpea. The result showed that plants treated with consortium of PGPR and PGRS significantly enhanced the chlorophyll, protein and sugar contents. Highly significant increases were recorded for relative water content in PGPR and PGRs treated plants. Leaf proline content, lipid peroxidation and activities of antioxidant enzymes (CAT, APOX, POD and SOD) were increased in response to drought stress but decreased due to PGPR. Grain weight, number of nodules, pod weight and total biomass were higher in PGPR and PGR treated plants grown in sandy soil. Proline, L-arginine, L-histidine, L-isoleucine and tryptophan were accumulated in the leaves of chickpea exposed to drought stress. Consortium of PGPR and PGRs induced significant accumulation of riboflavin, L-asparagine, aspartate, glycerol, nicotinamide, and 3-hydroxy-3-methyglutarate in leaves of chickpea. Sensitive genotype showed significant accumulation of nicotinamide and 4-hydroxy-methylglycine in PGPR and PGR treated plants at both time points (44 and 60 days) as compared to non-inoculated drought plants. Arginine accumulation was also enhanced in the leaves of sensitive genotype under drought condition. Metabolic changes in light of drought condition and in presence of PGPR and

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PGRs highlighted pools of metabolites that affect the metabolic and physiological adjustment in chickpea that reduced drought impacts. Therefore, the integrative use of consortia of PGPR and SA could be an effective eco-friendly approach to induce drought tolerance in crop plants.

Biography

Naeem Khan has his expertise in the field of Plant-Microbe Interactions and Plant Sciences. His scientific interest includes the study of Plant-Microbe Interactions, Abiotic stresses, Phytoremediation and Metabolic responses of Plants to environmental stresses. He employed a non-targeted global ultrahigh performance liquid chromatography-high resolution mass spectrometry (UPLC–HRMS) analysis to identify metabolites from the leaf tissue of irrigated and drought-stressed chickpea plants inoculated with PGPRs. He has published many papers in well reputed international journals related to plant-microbe interactions, plant metabolites and role of PGPR in phytoremediation.

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Effects of industrial paint effluents on water quality and fungi associated with *Clarias gariepinus*

Orimoloye Adedolapo Mary
Federal University of Technology, Nigeria

Paints effluents contain a complex mixture of chemicals which may have potential threats to biota. The present study was carried out to assess the potential impacts of paint effluents entering the aquatic environment. The paint effluents were collected directly from a paint industry in Lagos from the releasing tank into a sterile bottle. The heavy metals present in the paint effluent include lead (0.34±0.01ppm) and zinc (1.20±0.01ppm). Twenty liters of water was used in the aquaria and concentration of the toxicant varied from 1.25ml/l to 6.25mls/l in the separate tanks containing the *Clarias gariepinus* fish. Differences were observed in pH and the biochemical oxygen demand of water which were monitored for 96 hours. There were increases in the fungal population with an increase in the treatments of the pollutant. Fungi were isolated from the polluted fish aquaria and parts of the harvested fish. The fungi isolated were *Penicillium italicum, Aspergillus niger, Aureobasidium pullulans, Articolospora inflata, Trichosporon sp, Mucor mucedo, Rhodotorula rubra, Rhizopus stolonifer and Candida albicans*. The paint effluent affects the pH, biochemical oxygen demand, fungal types and loads, leads to bioaccumulation of heavy metals in catfish. It can be concluded that discharging the effluent paint into water bodies could lead to bioaccumulation of heavy metals in catfish which could be detrimental to human health when consumed.

Biography
Orimoloye Adedolapo Mary a Nigerian from West Africa have just been offered Admission into her PhD Research program into the Department of Microbiology of The Federal University of Technology Akure. She completed her Master's and Undergraduate studies from the same Department and University. She completed her Master's Degree in 2015. She is currently working on her research work as a student. Have published 2 papers in reputed journals.

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