Prof. Rajapakse *graduated from the University of Peradeniya obtaining a B.Sc. Special Degree in Chemistry with First Class (Honours). He completed his PhD in 1988 at the Department of Chemistry, Imperial College of Science, Technology and Medicine, University of London. He has worked as a Postdoctoral Research Scientist at Imperial College, UMIST, University of Bath, University of Central Lancashire and University of Liverpool, UK and The Max Planck Institute for Polymer Research, Germany. He was a Visiting Senior Scientist at the University of Texas at Arlington and the University of Mississippi, USA, and a Regular Visiting Professor at the Research Institute of Electronics, Shizuoka University, Japan and a JSPS Fellow at the Faculty of Engineering, Shizuoka University, Japan. His research interests include electronically conducting polymers, photodynamic therapy, environmental pollution abatement, gas sensors, conversion of local minerals to value added nanomaterials, custom-made prostheses for orthopaedic transplants, solar cells, fuel cells, supercapacitors, lithium ion batteries and flow batteries, targeted delivery of anticancer drugs, photon up-conversion based hydrogen generation from water photo-splitting, mosquito larvae control, advanced and intelligent textiles. Prof. Rajapakse has over 125 indexed publications and over 200 journal publications in total, together with over 200 conference proceedings and 10 Patent Local Applications and 1 World Patent Application. He has won over 20 awards including the CVCD Award for Best Research in Physical Science and Presidential Awards for Research Publications. Since 1990, he has been attached to the Department of Chemistry, University of Peradeniya, and currently serves as a Senior Professor in Chemistry.*

Theme Seminar

Natural Products – A Sustainable Source of Therapeutics and Nutraceuticals

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Sciences at the interface of chemistry and biology have led to increased opportunities for the identification of lead molecules against various therapeutic targets. For centuries, natural products have served as key sources of therapeutic agents, and still many of current drugs are derived from medicinal plants. However, synthesis of natural products is still a challenging task due to various reasons, including structural and stereochemical complexities. These problems can circumvent with the help of biocatalysis and combinatorial biosynthesis, as enzymes have high selectivity and specificity and they can work under mild conditions in both organic and aqueous media.

During the last four decades, our research has been focused on the discovery of chemical constituents from medicinal plants used in traditional medicines, as well as identifying new biotransformed products with therapeutic potential. This has resulted in the identification of several novel lead molecules against various therapeutic targets. Emphasis has been on the discovery of natural products and their analogs against chronic disorders, including, cardiovascular, cancer, diabetes, inflammatory Alzheimer's and Parkinson's diseases.

Novel analogues of existing drugs such as tibolones (postmenopausal osteoporosis), exemestane (anti-cancer drug), medrysone (anti-inflammatory agent) and many others were synthesized using biotransformation tools. Thus, potent anti-inflammatory, and anti-cancer agents were identified as lead molecules. Furthermore, inhibitors of key enzymes related to several diseases were also identified.

Diabetes is a chronic disease that occurs when pancreatic beta-cells do not produce enough insulin (Type 1), or when the body cannot effectively use the insulin it produces (Type 2). Loss of β-cell mass and function underlies much of the pathology of diabetes. Current treatments for diabetes are unable to halt the decline in functional β-cell mass. Therefore, strategies to prevent β-cell apoptosis are urgently required. Over 1,500 fully characterized synthetic and natural compounds were evaluated for their ability to increase β-cell mass and function in the presence of cytokines (IL-1β, TNF-α, and IFN-γ). The most promising natural compounds, include silymarin, bergenin, cinnamic acid, vanillin, and

kaempferol. These compounds were found to suppress increased cytokines and cellular ATP levels, decreased caspase-3 activity, decreased cellular nitrite production, and increased glucose-stimulated insulin secretion (GSIS).

During this presentation, some recent examples of our studies highlighting the translational potential of bioactive natural products, and biotransformation against non-communicable chronic diseases will be presented.

Prof. Choudhary *earned his B. Sc. Degree in Chemistry, Biochemistry and Botany in 1980, and his M. Sc. Degree in Organic Chemistry in 1983, from the University of Karachi, Pakistan. He completed his PhD in Organic Chemistry at the H. E. J. Research Institute of Chemistry, University of Karachi in 1987 and was awarded a D.Sc. by Al-Farabi Kazakh National University, Kazakhstan in 2019. He has served as a visiting professor in universities worldwide including the University of Rhode Island, USA, the School of Healthcare Sciences at Manchester Metropolitan University, UK, and University Kebangsaan Malaysia (UKM). Prof. Choudhary has, since 1990, been among the world leaders in the field of natural product chemistry, and has made pioneering contributions in the discovery of novel natural products, which have been recognized by prestigious national and international awards and honors, and fellowships of several academies of science. He is the recipient of 3 civil awards awarded by the President of Pakistan. He has 1,154 publications (citations 29,850, h index 70) in the fields of organic and bioorganic chemistry, along with 74 international patents (56 US Patents), 87 books and 40 book chapters. Prof. Choudhary is currently serving as the Director and Professor of Bioorganic and Natural Product Chemistry at the International Center for Chemical and Biological Sciences (H. E. J. Research Institute of Chemistry and Dr. Panjwani Center for Molecular Medicine and Drug Research), University of Karachi and Coordinator General COMSTECH (Organization of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation).*

Prof. Rahman *received his B.Sc (Hons.) in Chemistry in 1963, followed by M.Sc in Organic Chemistry from the University of Karachi, Pakistan. He obtained his Ph.D. in Organic Chemistry from the University of Cambridge, UK in 1968. He was subsequently awarded a Doctorate of Science by University of Cambridge in 1987, a Doctorate of Education by Coventry University in 2007, a Doctorate of Science by Bradford University in 2010, and a Doctor of Philosophy by Asian Institute of Technology, Thailand in 2010. His research interests include isolation and structure elucidation of bioactive substances from medicinal plants as well as marine plants and animals, development of novel methods for structure elucidation and synthetic transformations of biologically and biosynthetically interesting compounds. He is the author of 1232 publications in several fields of organic chemistry, including 771 research publications, 45 international patents, 70 chapters in books, and 341 books published largely by major US and European presses. He is the Editor-in-Chief of eight European Chemistry journals. Prof. Rahman is one of the most decorated scientists of Pakistan having being honored and recognized globally for his scientific contributions. He currently serves as the Patron-in-Chief of the International Center for Chemical and Biological Sciences (H. E. J. Research Institute of Chemistry and Dr. Panjwani Center for Molecular Medicine and Drug Research), University of Karachi.*