

## PREFACE

BITS Pilani, K K Birla Goa Campus hosted the prestigious 92<sup>nd</sup> Annual Meeting of the Society of Biological Chemists, SBC(I) themed “Biological Chemistry: Opportunities, Challenges and the Way Forward”, from December 18-20, 2023 in the 20<sup>th</sup> year of its glorious sojourn. The Department of Biological Sciences of the institute orchestrated it along with the Departments of Chemistry, Chemical Engineering, Mechanical Engineering and Computer Science. The sister campuses of BITS Pilani, at Pilani and Hyderabad also contributed to this effort. The organization of the conference led by female faculty members promoted equity and inclusivity in research and all the multiple committees were headed by a women faculty. The conference witnessed the participation of close to 900 delegates with a male: female ratio of 5:7. The meeting hosted about 80 speakers of which 44% were female speakers.

Like many other disciplines, Biological Chemistry is at the crossroads. On the one side we have the responsibility of knowledge creation, making forays into fundamental discoveries, addressing those burning questions with regard to biological processes that sustain life, with clues to mechanistic understanding of human, animal or plant diseases and their development. On the other hand, is the need and pressure to translate the existing knowledge and innovate new therapies, diagnosis or prognosis for humans or advanced agricultural technologies. These domains need to be delicately balanced in a large and diverse country like India. We still need affordable Healthcare. The country is now projecting converting Biological knowledge into Bio-economy. Biomufacturing is the current focus for one. There have been success stories with India being the hub of generic medicine and vaccine generation, but much more to be achieved. We believe that Biological Chemistry can play a major role in the process and the conference reflected the same.

The meeting at BITS Pilani Goa Campus had delegates representing more than 100 Institutions from different corners of the country, with good spread from North, South, East and West, including representations from the North East and Kashmir. This mega event included Bhatnagar Awardees, Fellows of National Academies, DBT India Alliance-Wellcome Trust Awardees, Infosys Awardees, JC Bose Fellows, National Biosciences Awardees, Directors of premier Institutes and many other exceptionally accomplished scientists among the delegates.

The Presidential address during the inaugural session was delivered by Dr. D N Rao, IISc, Bangalore, who spoke on *Helicobacter pylori*, an organism which inhabits one of the most inhospitable and dynamic environments of the human stomach, as a goldmine for DNA methyl transferases. His inimitable oration and exceptional findings gave the meeting a rousing beginning. This was followed by a keynote address by the 2021 Wolf Prize Awardee, Dr. Lynne Maquat, from the University of Rochester, USA on Nonsense-mediated mRNA decay in human health and disease. In her talk, Prof. Maquat highlighted the role of NMD as a quality-control pathway that degrades mRNAs having the potential to produce toxic truncated proteins, using the examples of  $\beta$  thalassemia and Fragile X syndrome. The other keynote speakers included the dynamic scientists Dr. Maneesha S. Inamdar, Director, InSTEM and Dr Gangandee Kang, first Indian woman FRS and erstwhile Director of THSTI. Dr Inamdar enthralled the audience by her talk on “*Energy metabolic control of stem cells in development and aging*. Dr Kang inspired the audience with her talk titled *Birth cohorts, Nutrition and the need for collaborative science*.

There were 628 poster presenters of which 110 were faculties. The invited talks, short talks and poster presentations during the conference were in the thematic areas of Molecular Modeling, Protein Structure & Folding, Structural Biology & Biophysics, Genomics & Gene Regulation, Infectious Diseases & Antimicrobial Resistance, Molecular Oncology, Plant Biology, Nucleic Acid Biochemistry, Infection & Immunity, Cellular Biochemistry, Stem Cell & Regenerative Medicine, Cancer Biology, Bio- and Metabolic Engineering, Biophysical Chemistry, Cancer & Epigenetics, Biochemical Engineering, Immunology, Communicable & Non-Communicable Diseases, representing the width and depth of Biological Chemistry in India. The inclusion of newer and emerging themes, and emphasis on poster presentations by faculty, electronic showcasing of

speakers, brief quizzes at the end of each technical session for students, and flash talks by students was applauded by a large number of delegates and presented SBC 2023 in a comprehensive and progressive light. The special panel discussion on “Equity for Women in STEM – is India there yet?” attracted the active participation and deliberation by male and female scientists alike. The panel discussed various aspects such as the importance of mentoring and the need to change mindset towards only women grant or special hiring of women scientists. The need to provide confidence and support to women scientists to curb biases and harassment was deliberated. The dominant question that reverberated the panel discussion was the meagre 14% representation of women in academies although 43% women study STEM. The very low women representation in non-labor intensive fields was highlighted. The panel wondered whether a change in the newer generation can be expected. Scientists in decision making positions in the audience shared experiences about bringing equity in hiring. The audience actively participated in the discussions.

Guest Editing the Special Issue of Indian Journal of Biochemistry and Biophysics in view of the 92<sup>nd</sup> Annual Meeting of SBC(I) has been an honor. This issue contains 10 articles, of which 9 are reviews. The contributions to this special issue are by distinguished invited speakers of the conference and span across various research domains including disease biology like cancer and tuberculosis and mechanistic understanding of antibiotic resistance, proteostasis, differentiation of stem cells and fungal metabolism.

The first three are review articles in the area of cancer biology. The first article in this set of three highlights the role of cAMP-Phosphodiesterase 4 in cancer progression and its potential as a therapeutic target. The subsequent article reviews the repurposing of anti-diabetic drugs for the amelioration of betel-nut induced carcinogenesis and discusses the mechanisms of carcinogenesis which overlap with pathogenesis of diabetes mellitus. The third article on ‘Chromatin higher order structure and possible therapeutic target’ provides an overview of higher order chromatin structure particularly focused on G- quadruplex, outlining a mechanistic view on the structure-function relation of non-canonical forms of DNA and their identification as potential therapeutic target for cancer and other genetic diseases.

The fourth and fifth articles focus on the debilitating disease of tuberculosis, a health burden in India for decades. The article ‘From 2D to 3D: decoding tuberculosis pathobiology and drug development with *ex vivo* disease models’ highlights the development and transformative impact of *ex vivo* models on TB research, promising accelerated discovery of new therapeutic strategies. The review on ‘Transport mediated Antibiotic Resistance in *Mycobacterium tuberculosis* presents the state-of-art knowledge about transporters that help the bacteria maintain nutrient uptake from the host and extrude toxic compounds, including antibiotics. The article discusses how these transporters could serve as potential targets to shorten the treatment regimen for drug susceptible TB, and be used in developing treatments for drug resistant infections.

Antibiotic resistance has been a global challenge in recent times and has attracted significant attention from the scientific community as well as the government and policy makers. This indeed is a major challenge for biological chemistry. The sixth article is a review on phenotypic antibiotic resistance and discusses the mechanisms used by bacteria to transiently adapt to survival in the presence of antibiotics. It also highlights the recent discoveries of compounds that induce phenotypic resistance and novel detection methods.

While the major health burdens like infectious and lifestyle diseases demand translational research for diagnostic and therapeutic interventions, mechanistic understanding of life processes is at the core of such endeavors. This special issue focuses on such mechanistic understanding of biochemical processes, the challenges thereof and opportunities in the next three articles. The seventh article is a comprehensive review on ‘Response Pathways for Protection of Mitochondria from Protein Misfolding Stress’, highlighting the importance of the multiple stress response pathways in coping with proteotoxic stress for the maintenance of healthy mitochondrial proteome and thereby cellular survival. The eighth article outlines the recent advances in the understanding of mechanistic aspects of myogenic differentiation of stem cells along with cutting-edge technologies such as real-time imaging, metabolic imaging, gene editing tools, and organoid cultures to study the dynamic changes at the cellular and subcellular levels. The ninth article of this special issue titled ‘A biased

view from the C and N interface' elucidates the underlying biochemical mechanisms of acidogenesis in the major citric acid producer *Aspergillus niger* highlighting the importance of classical biochemistry in understanding life processes.

The last article entitled 'Camptothecin exerts anti-cancer effects through FoxM1 Inhibition' is an experimental report on the alternate mechanism by which Camptothecin interacts with the critical transcription factor FoxM1 involved in cancer progression, expanding its therapeutic potential beyond topoisomerase I inhibition.

This special issue gives us an overview of the current trends and advances in research in the domain of biological chemistry. The significant scientific contributions by the authors, timely review by experts, support from Indian Journal of Biochemistry and Biophysics and BITS Pilani, and the opportunity to curate and edit this special issue by the Society of Biological Chemistry (India) are highly appreciated.

Meenal Kowshik and Suman Kundu  
Professor,  
Department of Biological Sciences  
BITS- Birla Institute of Technology & Science,  
Pilani, K K Birla Goa Campus,  
Goa-403 726, India