
Report on “International Seminar on Application of Microbes in Synthetic Biology and Allied Sciences”

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A BRIEF REPORT ON “INTERNATIONAL SEMINAR ON APPLICATION OF MICROBES IN SYNTHETIC BIOLOGY AND ALLIED SCIENCES” HELD ON 18TH SEPTEMBER, 2023

A one-day International Seminar On Application of Microbes in Synthetic Biology and Allied Sciences was organized on 18th September, 2023 by the Department of Biosciences, Integral University, Lucknow.

The main aim of the Seminar was to create awareness and sensitizing young students, scholars and faculty members regarding the emerging role of Synthetic Biology as an interdisciplinary field in engineering living bacterial cells through artificial genetic circuit modification that can be used for numerous applications such as enhanced yield of natural products, discovery of novel drug compounds, increased production of cell metabolites.

The theme of the seminar was well covered by the five invited speakers who were eminent scientists from prominent institutions for delivering the talks. These invited speakers were **Dr. Uttam Kumar Sarkar, Director, ICAR-NBFGR, Lucknow; Prof. Pawan Kumar Dhar, Professor and Dean, SBT, JNU, New Delhi; Prof. Natesan Manickam, Chief Scientist, CSIR-IITR, Lucknow; Dr. Kinshuk Srivastava, Sr. Scientist, Division of Medicinal and Process Chemistry; Dr. Sivakumar S. Moni, Assistant Professor at the Department of Pharmaceutics, College of Pharmacy, Jazan University, Jazan, Kingdom of Saudi Arabia.**

The International Seminar was attended by **478** participants which included Professors, Associate Professors, Assistant Professors, Research scholars and students of undergraduate and postgraduate programs.

The International Seminar commenced with the welcome address by the Dean, Faculty of Sciences who emphasized the importance of microbes as building blocks in synthetic biology and their exploration as environmental barriers and to harness and provide solutions to various challenges related to climate and agriculture sustainability. He further added that this event is a great opportunity to build a platform for networking, collaboration, exchanging ideas and building partnerships.

Prof. Aqeel Ahmad, the Advisor to Chancellor congratulated the team for organizing the seminar that would sensitize and motivate the students as well as the faculty members in rejuvenating their minds for building a better future. He also talked about the creation and implementation of new ideas. He encouraged the students for their overwhelming participation.

Prof. Mohd. Haris Siddiqui, Registrar, Integral University, Lucknow welcomed the audience and briefed the audience regarding the genesis of Integral University which included its various phases of development, the accomplishments, and achievement of new heights throughout this period ever

since its year of establishment (2004). He highlighted the various grants offered by the State and Government Universities. The University welcomed various dignitaries such as Vice President, Chief Ministers and Governors of several states and got recognition with scientific and research organization under the Ministry of Science and Technology, Govt. of India. Moreover, the University acts as a host and a hub of knowledge and education to more than 40 countries from around the globe. He further acclaimed the University for getting A+ accreditation as the first private University in Lucknow. Dr. Mohd. Haris Siddiqui further pointed out the main aim of the seminar by emphasizing on two aspects: the tremendous potential of the microbes for utilizing them in solving complex problems and the use of synthetic biology. He insisted on building lot of collaborations and MoUs for making this University a Centre of Excellence in Academics and Research.

This was followed by the Video message of Guest of Honor, Dr. Uttam Kumar Sarkar, Director, ICAR-NBFGR, Lucknow who stated the importance and growing role of microbes in synthetic biology and related disciplines as a much needed topic of discussion in the field of microbiology. He further emphasized on the significant role the microbes play in climatic change mitigations and for fisheries and agricultural growth. He appreciated the Department for its efforts in organizing this event and advancing in this field of science.

Further, the inaugural session was presided over by the Hon'ble Vice-chancellor, Prof. Javed Musarrat, who holds vast proficiency and skill in the field of Microbiology. He enlightened the audience and the young minds by his meticulous and inspirational talk. He defined "synthetic biology" in simple words as the study that deals with tailoring designer microbes by altering their metabolic profile and genetic circuit to develop an organism that can be used for different purposes. In short, it's the reprogramming of living cells through artificial genetic circuit modification. He informed the audience that synthetic biology is not only a field of science but it integrates engineering and other branches together with the application of engineering tools and philosophy to develop an engineered microorganism.

Moreover, he enlisted the numerous applications and potentialities of microbes that are found ubiquitously. He talked about the power of microbes in revolutionizing various sectors of science, their role in phytoremediation, and wastewater treatment and the immense potential of synthetic microbes as therapeutics, biocontrol agents, use in cancer therapy and gastro-intestinal health. He further acquainted the students regarding the latest advancements in science and technology and the emergence of novel genome editing technique called "NICER", the evolution of "Biological computers" which includes use of biologically derived molecules to perform computational calculations and the emerging field of "Artificial intelligence" which integrates with science to enhance and accelerate research along with interpretation of large databases.

Lastly, he ended his interaction by appreciating the event as a platform for creating curiosity among the students as well as faculty members, building fruitful collaborations, exchanging new ideas and propelling research to new heights.

The welcome address was followed by a memento presentation to the dignitaries **Prof. Natesan Manickam** and **Dr. Kinshuk Srivastava**.

Vote of thanks was delivered by Dr. Snober S. Mir to Hon'ble Chancellor sir, Prof. S.W. Akhtar; Pro-Chancellor, Dr. Syed Nadeem Akhtar, Hon'ble Vice-Chancellor, Prof. Javed Musarrat for giving constructive suggestions. Mr. Yahya for gracing the occasion and the leading experts for taking out their valuable time, sharing work, innovative ideas, experiences and encouraging the students towards taking the lead as bio-entrepreneurs. She also thanked Prof. Aqeel Ahmad, Advisor to Chancellor, and Registrar, Dr. Mohd. Haris Siddiqui for their guidance and encouragement.

Session 1

The session 1 was based on the theme “**Advances in Synthetic Biology**”. The session started in online mode by the inspirational talk given by **Prof. Pawan K Dhar**, Professor and Dean, SBT, JNU, New Delhi on ‘**Synthetic Biology: Fundamental concepts to applications**’. Prof. Dhar discussed the necessity for the emergence of a new field, its underpinning principles, methods, tools and industrial applications. Prof. Dhar talked about reductionism which has been a traditional approach to science leading to discoveries and the development of technologies. He emphasized that with the arrival of high throughput data, integration and modeling has become the vital pursuits. He then defined the concept of ‘Synthetic biology’ which is a study that includes a rational design and construction of biological components leading to useful applications. He briefed the audience regarding his work on the dark matter of the genome explaining the existence of three kinds of functional DNA sequences namely protein-encoding, non-encoding and non-transcribing where protein-encoding genes have always gathered attention of the people. Moreover, the non-coding RNA biology has taken the center stage over the last two decades. He further focused on the subject of non-expressing genome and its potential applications.

Prof. Natesan Manickam talked on the topic ‘**Biotechnological tools in designing microbial communities for bioremediation of priority pollutants**’. He highlighted the importance of microbes/bacteria in the degradation of the pollutants. He aroused the interests of the students by encouraging them for training in various areas of R&D of CSIR-IITR like Systems Toxicology, Food, Drug & Chemical Toxicology, Environmental Toxicology, Translational Research, Nanomaterial toxicology and ‘**Computational Predictive Toxicology**’ which is a key feature of the Synthetic Biology. He further described the methods to screen the microorganisms for Biodegradation of pollutants emphasizing culture-dependent and culture-independent molecular-based techniques. His lecture acquainted the audience with the detection of biodegradative bacteria based on known genes by southern blot analysis amplified by PCR using labeled probes. He also focused on the workflow of Metagenomics studies which includes sample collection, DNA isolation, sequencing, gene annotation, and bioinformatics analysis. He elaborated on AMR profiling which consisted of the collection of samples from sewage water treatment plant which was further bifurcated into analysis of sewage water samples and isolation of antibiotic resistance bacteria. Lastly, he summarized his talk by defining the term “Biodegradation/bioremediation” more appropriately as an economic, eco-friendly option to treat contaminated habitats and the usefulness of biotechnology tools in enabling to study from single bacteria to mixed microbial communities with the evolving role of Synthetic biology in enhancing activities, construction of newer transformation pathways.

Dr. Kinshuk Srivastava presented his talk on topic ‘**Synthetic biology in Drug discovery and Development**’ briefly by defining Synthetic biology “as an interdisciplinary field that applies the principles of engineering to the living machines nature has provided for solving various problems”. He also highlighted the main objective of this field as designing and constructing new biological entities or functions, such as enzymes, genetic circuits, and drugs. Moreover, the repurposed cells can serve as powerful biopharmaceutical production pathways. He dealt with the necessary criteria needed to engineer an organism which includes optimization of spatial parameters crucial for maximizing the metabolic fluxes. He focused on the point that Synthetic biology is not only a field of Biology but it’s a fusion of computer science, chemistry and biology. He further gave several examples where synthetic biology finds numerous applications such as in the biosynthesis of natural products based on drug for the treatment of neurological disorders which are mainly psychoactive natural products. He also discussed the futuristic possibilities of discovering novel bioactive

compounds by combinatorial engineering of biosynthetic pathways. Moreover, his talk also made the audience aware of reprogramming or engineering the *E. coli* cells for the production of prenylated cyclic dipeptides, isoprenoid, Cannabinoid & its validation.

Session 2

The second session was based on the “Industrial Application of the Microbes”. The session started with a talk by Dr. Sivakumar S. Soni in an online mode. The topic for his talk was “**Molecular & Biochemical Profiling of Soil Isolates and Fermentation for Pharmaceutical significances**”.

Dr. Soni explained well how the bacteria have become resistant to antibiotics worldwide. He explained the need for search of new antibiotics or drug molecules. In his talk he discussed his current study in a very simple and explanatory manner. He elaborated how a fermented product of soil isolates, new antibiotics and anti-cancer molecules can be developed. He explained that the unexplored lands of Saudi Arabia were rich in recourses and could be promising drugs for combating various disorders. Dr. Soni has collected various soil samples from Rijal Alma region of Saudi Arabia and then isolated the Actinomycetes. He then designed the fermentation media and after characterization studied the Anti-Bacterial effects. Lastly, he summed up that such studies could create a platform for the researchers to develop novel drug molecules.

After the lecture, two parallel sessions of Flash presentation and poster presentation were conducted. The judges for Flash presentation were Dr. Andleeb Khan, Associate Professor (Biosciences), Dr Salman Akhtar (Bioengineering), Dr Arena Hoda Siddiqui (HOD Medical Microbiology). The poster presentation was judged by Dr. Mohmmad Rumman and Dr. Mohammad Ikram Ansari. There was a tough competition and three winners were announced for both competitions.

The winners were as follows:

For Flash Presentation:

1st Prize: Nidhi Singh

2nd Prize: Sana Parveen

3rd Prize: Smita Rai

For poster presentation:

1st Prize: Gyan Prakash Srivastava

2nd Prize: Sandeepika Dubey

3rd Prize: Mushfa Khatoon

The event was concluded by the distribution of the awards and certificates to the winners. The Seminar ended by concluding remarks delivered by the HoD to maintain the enthusiasm and curiosity of the students in the cutting-edge field of research.

INTERNATIONAL SEMINAR

ON

APPLICATION OF MICROBES IN SYNTHETIC BIOLOGY AND ALLIED SCIENCES

18th SEPTEMBER 2023

ORGANISED BY

DEPARTMENT OF BIOSCIENCES
 INTEGRAL UNIVERSITY, LUCKNOW
 VENUE: CENTRAL AUDITORIUM

CHIEF-PATRON		PATRONS	
 Prof. S. W. ANWAR FOUNDER & CHANCELLOR Integral University, Lucknow	 Dr. SYED NAZEEM AKHTAR PROV. CHANCELLOR Integral University, Lucknow	 Prof. IQBAL HUSSAIN VICE CHANCELLOR Integral University, Lucknow	
CO-PATRONS			
 Prof. M. FAISAL ANWAR Dean, Biosciences Deptt., Integral University, Lucknow	 Prof. ANWAR AKHTAR Assoc. Prof. (Biochem), Integral University, Lucknow	 Prof. MUNEER HOSSAIN Assoc. Professor, Integral University, Lucknow	 Prof. ABDUL WAHID KHAN Vice-Chancellor of Integral University, Lucknow
CHIEF GUEST		SPEAKERS	
 Dr. ANAM KHATUN Associate Professor	 Prof. ANWARUL KARIM Professor, Department of Microbiology, Integral University, Lucknow	 Prof. ANWARUL KARIM Professor, Department of Microbiology, Integral University, Lucknow	 Prof. ANWARUL KARIM Professor, Department of Microbiology, Integral University, Lucknow
 Prof. ANWARUL KARIM Associate Professor, Integral University, Lucknow	 Dr. ANWARUL KARIM Associate Professor, Integral University, Lucknow	 Dr. ANWARUL KARIM Associate Professor, Integral University, Lucknow	 Dr. ANWARUL KARIM Associate Professor, Integral University, Lucknow

REGISTRATION INFORMATION

Registration of participants in attending Early Bird registration form must reach to the Organizing Secretary, Department of Biosciences, Integral University, Lucknow on or before 30th September 2023. Registration Form (with fee) will be available till 10th September 2023.

For Faculty/Industry: INR 5000/-

For Students: INR 3000/-

On Spot Registration: INR 5000/-

Registration Dates: 07th September 2023
Link date of Abstract Submission: 10th September 2023

WHO SHOULD ATTEND

- Researchers and scientists in the field of synthetic biology.
- Academicians and students pursuing microbiology, biotechnology, and related disciplines.
- Industry professionals interested in exploring the applications of synthetic biology.
- Policy-makers and individuals involved in the ethical and regulatory aspects of synthetic biology.
- Anyone passionate about the intersection of microbes, biology, and technology.





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Glimpses of different session by invited speakers **Dr. Uttam Kumar Sarkar, Prof. Pawan K Dhar, Prof. Natesan Manickam, Dr. Kinshuk Srivastava, Dr. Sivakumar S. Moni.**



Best Regards,
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