**Acharya Narendra Dev College, University of Delhi (UoD)**

**in association with**

**Gargi College, UoD; IMiLI-SAC & PhixGen Pvt. Ltd.**
**organized a one day workshop on**

# Quantitative microbial ecology: Opportunities and Way-ahead

**on February 4, 2023**

**under the aegis of DBT STAR College scheme**

**sponsored by**

**International Society for Microbial Ecology (ISME)**


One day Workshop on
Quantitative Microbial Ecology:
Opportunities and Way-ahead
February 4, 2023
organized by
ACHARYA NARENDRA DEV COLLEGE
University of Delhi
Under the aegis of DBT STAR COLLEGE SCHEME & IOAC
In association with
Gargi College
IMILI-SAC
PhixGen Pvt. Ltd.


Art of Scientific Writing, Communication and Basics of Computational Biology
ISME
The International Society for Microbial Ecology
PROF. RUP LAL
ISME


The Microbiome
GPS Map Camera
New Delhi, Delhi, India
Acharya Narendra Dev College, Kalkaji, New Delhi, Delhi 110019, India
Lat 28.539788°
Long 77.264686°
04/02/23 10:49 AM GMT +05:30
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Conclusions
The manuscript is under revision in the journal


Global Initiative of Crop Microbiome and Sustainable Agriculture
Journal

**The workshop started with an introduction to International Society for Microbial Ecology. The students were familiarized with ISME and its goals. Dr. Jasvinder Kaur informed students about the ISME events and its two scientific publications: The prestigious ISME Journal and ISME Communications.**

## 09:45-10:30 am- Keynote Lecture 1: Scaling-up and integrating system-based approaches in environmental microbiome to advance ecosystem services

### Prof Brijesh Singh, Director-Global Centre for Land-Based Innovations; Distinguished Professor, Australia

Prof. Singh familiarized the students with the idea of scaling up microbiome research to national and global scales. He identified factors that determine direct and indirect impacts of microbiome on key ecosystem functions and demonstrated how eco-evolutionary theories, and system based approaches can be combined to harness new knowledge for the development of effective solutions to improve agriculture productivity, climate adaptation and environmental sustainability.

## 10:30-11:10 am- Keynote Lecture 2: Microbiome: Human Health, Environment, and Societal Perspective

**Prof Rup Lal, INSA Senior Scientist, Acharya Narendra Dev College, University of Delhi andSenior Advisor IMiLI**

Prof. Lal presented the recent developments in understanding microbial diversity that by using computational tools have brought a revolution in the field of microbiome research particularly in the understanding human gut microbiome. He shed light upon researches that have revealed that microorganisms play a very significant role in maintaining human health, clean environment and provide several benefits at the community and global levels. Our experience in involvement in understanding the role ofmicrobes and our efforts to take it to the society and children was presented.

## 11:30-11:50 am- Invited Lecture: Monkey Pox Virus (MPXV): Phylogenomic, Host-Pathogen Interactome,and Mutational Cascade

**Dr Roshan Kumar,** PG Department of Zoology, Magadh University

While the world is still managing to recover from Covid-19 pandemic, Monkey Pox awaits to bring in another global outbreak as a challenge to the entire mankind.

However, Covid-19 pandemic have taught us lessons to move fast in viral genomic research to implement prevention and treatment strategies. One of the important aspects in Monkeypox virus should be immediately taken up is to gather insights of its evolutionary lineage based on the genomic studies. Dr. Kumar presented his research on the genome sequences of Monkeypox isolates, involving phylogenomics, host-pathogen interactions, mutation prevalence and evolutionary dynamics. We collected high-quality 628 MPXV isolates from various locations including Germany, the United States, the United Kingdom, Brazil, Peru, Spain, the Netherlands, and the Democratic Republic of Congo. Phylogenetic analysis revealed that the MPXV strains included in the study represented multiple clades and subclades as assigned by the GISAID phylogeny.

He described how the study identified a large number of mutations within the newly outbreak isolates. He also reflected that we need to move fast with the genomic analysis of the newly detected strains from around the world to develop better prevention and treatment methods.

## Hands-on Sessions

### 11:50-11:50 am- DNA around you: Isolation of DNA from Onion

**Dr Gauri Garg and Dr Utkarsh Sood, Kirorimal College, University of Delhi**

The principle behind this experiment is to isolate DNA from onion cells using household detergents. The onion cells were used to release the DNA and separate it from other cellular components using detergent, ethanol, or isopropanol, and washing it to obtain a pure DNA sample. It's worth mentioning that this protocol is a simple method and can be used as a demonstration of DNA isolation, but due to the impurities that may exist in household detergent, it's not recommended to use it for research purposes.

## 02:00-02:40 pm- To study diversity of bacteriophages in soil

**Ms Ritu Arora, Ms Kanika Nadar, Prof Urmi Bajpai,**
**Department of Biomedical Science, Acharya Narendra Dev College, University of Delhi**

Information on the role of phages in impacting the microbial system in the terrestrial ecosystem is limited and how they influence the dynamics and functioning of soil bacterial communities is less known. However, the rate of phage infection is estimated to be more due to the higher frequency of physical encounters between phages and bacteria in the soil. Phages control host population size by lytic infections and promote microbial biomass turnover over time by releasing nutrients trapped in microbial biomass. The lysogenic presence of phage DNA can shape the evolution of microbial metabolic pathways and also affect biogeochemical cycles.

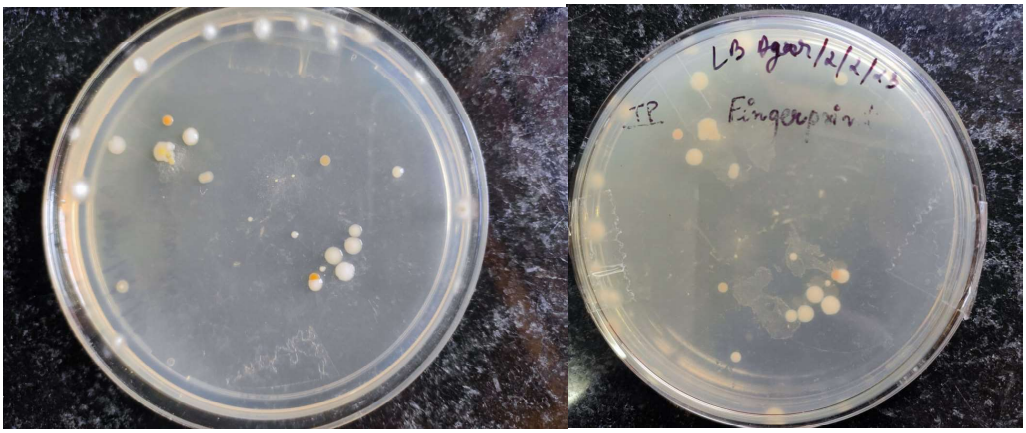
Estimates based on direct counts indicate that soils can contain a high number of phage (up to ~ $10^{10}$ per gram of soil, whose abundance is affected by land use as well as soil moisture and temperature. Phages for soil bacteria can be isolated, enumerated and characterized. Currently, there is a rise in the investigation of the potential of the phages as important antibacterial agents to be developed as therapeutics in treating antibiotic-resistant bacterial infections and as biocontrol agents.

## 02:40-03:10 pm- Culture your own micro-organisms

**Dr Jasvinder kaur[1], Dr Princy Hira[2]**
**[1]Gargi College, University of Delhi**
**[2]Maitreyi College, UoD**

Microbes are very tiny living creatures. They are so small in fact, that they cannot be seen with the naked eye. Fungi and bacteria are microbes, for example. Maybe you have heard of bacteria and fungi before. Maybe you have even come across some of them before. For example, on an old loaf of bread that is covered with green mold.

In this test, microbes were made visible in another way! Culturing microbes makes it possible for them to multiply. As a result, a great many microbes will grow together and form groups. These groups of microbes can be seen with the naked eye. In this way, you can indeed make 'the invisible' visible without the use of expensive devices. What, for instance, grows on the door knob, your finger or a keyboard?



**03:10-03:40 pm- To study ciliate diversity in different soil ecotypes**

**Prof Seema Makhija[1], Prof Ravi Toteja[1], ,Prof Renu Gupta[2], Ms Swati Maurya[1], Ms JyotiDagar[1], Mr Sandeep Antil[1]**

**[1]Acharya Narendra Dev College, UoD**

**[2]Maitreyi College, UoD**

Soil samples were collected from various locations. The temperature and pH of soil was recorded at the time of collection. Samples were stored in sterile plastic bags, brought to the laboratory, and processed immediately to record the presence of ciliate fauna. Soil samples were analyzed with the non-flooded Petri Dish method. Two to three milliliters of run-offs were drawn from the Petri dishes after 24, 48, and 72 h, and ciliates that excyst are isolated for raising clones.

To raise **clonal cultures** of ciliates, single cells were isolated in cavity blocks from the freshwater samples by using micropipettes. The clonal cultures were grown in Pringsheim's medium (Chapman-Andersen, 1958) and the temperature was maintained at 22º–23ºC in BOD incubator. Also, small pieces of boiled cabbage were added in the medium to promote the growthof bacteria which served as the primary food source for the ciliates.

## 03:40-04:00 pm- Isolation of insect-borne fungi

**Dr Anupama Shukla[1] Dr Anita Narang[2], Dr Sumit Sahini[1], Dr Vineet K Singh, Department of Botany, Acharya Narendra Dev College, UoD**

The aim was to screen various soil insects for the presence of the fungi belonging to the *Laboulbeniomycetes*. Hosts were carefully screened for Laboulbeniales using a stereo microscope at 20- 45x. A microscopic slide is then prepared by placing a very tiny droplet (around 3-4 m.m.) of Hoyer's medium on the slide. The host is blocked with fine forceps and the thalli are removed by pushingthe tip of a needle against the foot of the fungus.

A coverslip is placed and observations made under a compound microscope. For this study, the soil ants and common cockroaches were collected. On observing them they were found to be infested with numerous fungal thalli. The thalli were on the antenna and elytra of the cockroaches and legs of ants.

Most of the insects collected were found to be infested with the fungi. The fungi lack a mycelium but are multicellular thalloid in nature. They are anchored to the insect by a small foot above which a cylindrical thallus can be seen. In mature thalli the perithecium can be seen whichfunction as the reproductive organ.

**The workshop concluded with a vote of thanks to ISME and Prof. Rup Lal. This was followed by certificate and prize distribution.**