

*Report*

**ONLINE SUMMER SCHOOL**

*Techniques in Recent Advances in  
Molecular Biology and  
Bio-Informatics*

*23.06.2025 to 26.06.2025*



Organized by  
Department of Zoology,  
Dr. Harisingh Gour Vishwavidyalaya  
(A Central University),  
Sagar, M.P.



Prof. Neelima Gupta  
**PATRON**  
Hon'ble Vice-Chancellor



Prof. Versha Sharma  
**DEAN**  
School of Biological  
Sciences



Prof. Shweta Yadav  
**CONVENER**  
Head, Dept. of Zoology

## ORGANIZING COMMITTEE



Dr. Somenath Ghosh  
Coordinator



Dr. Kashmeera N.A.  
Co-coordinator



# Introduction

In the era of rapid technological transformation, the field of biological sciences is witnessing unprecedented advancements through the integration of artificial intelligence, robotics, and modern instrumentation. To equip budding researchers and students with the knowledge of these techniques, the Department of Zoology, Dr. Harisingh Gour Vishwavidyalaya, Sagar (M.P.), successfully organized an Online Summer School from 23rd to 26th June 2025.

The four-day event was conducted under the convenership of Prof. Shweta Yadav (Head, Department of Zoology), with Dr. Somenath Ghosh serving as the Coordinator and Dr. Kashmeera N. A. as the Co-Coordinator. The programme brought together a distinguished panel of academicians, researchers, and experts who shared their insights into modern biological tools and research methodologies.



## Day 1: Monday, 23rd June 2025

### Inaugural Session

The Summer School was inaugurated on 23rd June 2025 at 10.00 AM via Google Meet. The virtual gathering witnessed the participation of faculty members, research scholars, and students from across the country.

The proceedings commenced with a welcome address by Dr. Somenath Ghosh, who introduced the objectives of the Summer School. He emphasized the need for young scholars to stay updated with the latest technological innovations and laboratory techniques in order to excel in interdisciplinary research.

This was followed by opening remarks by Prof. Shweta Yadav, who highlighted the department's commitment to promoting skill development and collaborative learning. She appreciated the enthusiastic participation of students and acknowledged the efforts of the organizing committee in shaping the programme.

The Dean of the School of Biological Sciences, Prof. Versha Sharma, then addressed the gathering, stressing the importance of merging classical biological knowledge with cutting-edge research technologies to address modern scientific challenges.

The highlight of the inauguration was the address by the Chief Guest, Dr. Neeraj Kumar, Former Executive Secretary, National Academy of Sciences, India (NASI), Prayagraj. Dr. Kumar delivered an engaging lecture on "*A System Biology and Functional Medicine Approach to Solve the Mystery of Longevity*." He elaborated on the interconnections between functional medicine, cellular pathways, and the biological processes of aging, presenting compelling experimental evidence to show how these approaches could contribute to enhanced longevity.

The inaugural session concluded with a vote of thanks by Dr. Kashmeera N. A., who expressed gratitude to the dignitaries, speakers, and participants for their presence and support.

### Technical Session

The first technical session was delivered by Dr. Raj Kumar Koiri (Cancer Research Lab, Dept. of Zoology, DHGV) on "*Western Blotting*." Dr. Koiri meticulously explained the theory behind the technique and demonstrated the step-by-step protocol through a virtual presentation. His talk not only clarified the fundamental principles but also provided practical guidance for young researchers.

The session was chaired by Dr. Deepali Jat, while Dr. Shashwat Singh served as the rapporteur.

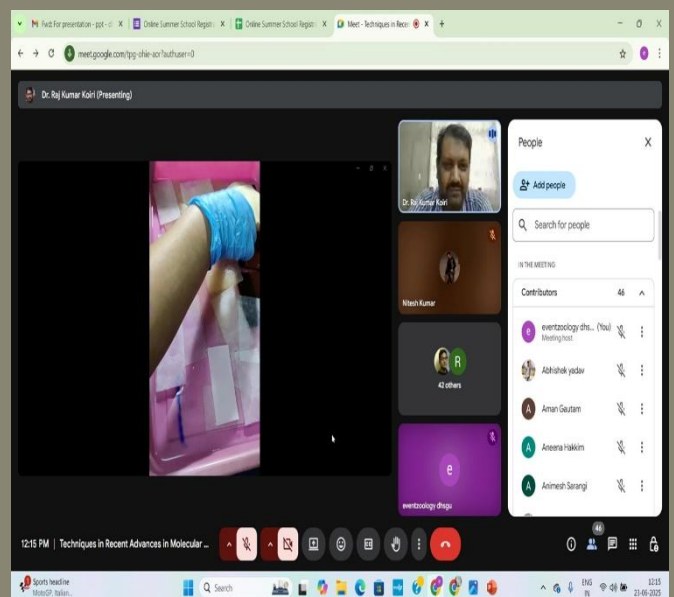
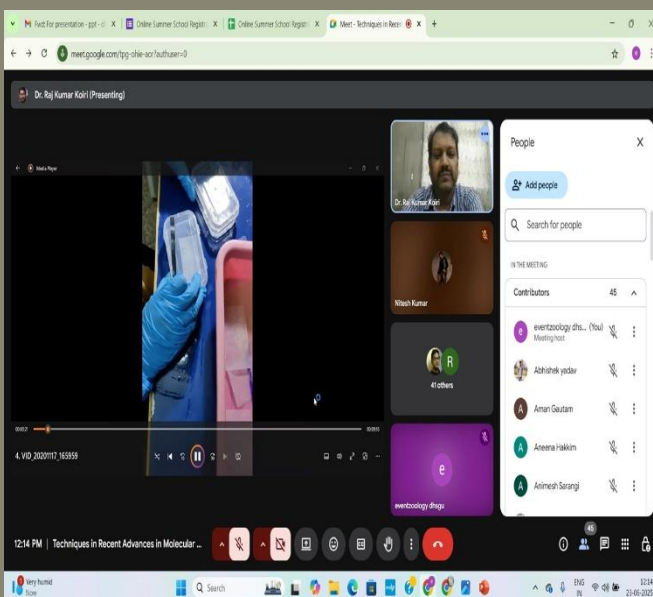
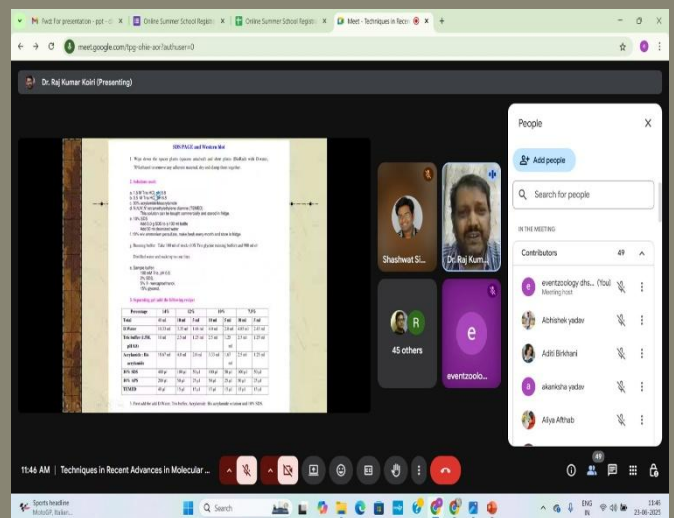
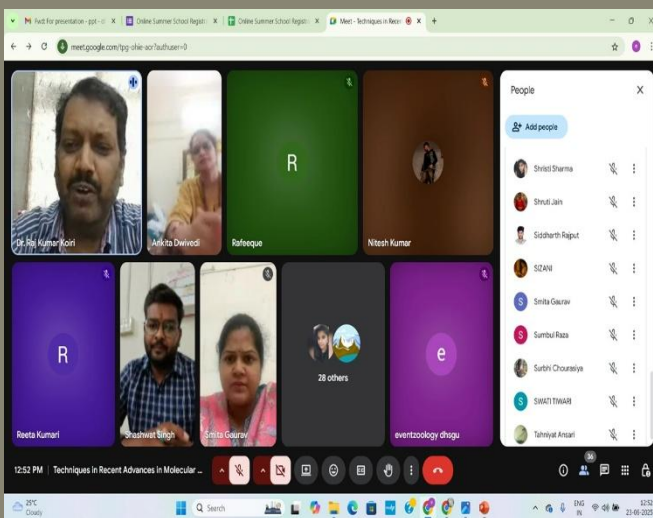
# A System Biology and Functional Medicine Approach to solve the Mystery of Longevity

**Dr. Niraj Kumar**

**MD (AM); D.Phil., F.I.A.Sc., F.S.L.Sc., F.R.H.S**

**The Institute of Applied Sciences, Prayagraj;**

**Formerly at The National Academy of Sciences, India; Bioethics Expert (GEObs) - UNESCO**



## Day 2: Tuesday, 24th June 2025

The second day commenced with a formal welcome of the distinguished guests at **10.00 AM**.

### Technical Sessions

The first lecture of the day was delivered by Dr. Sumit Kumar Hira (Immune Research Lab., University of Burdwan, West Bengal) on “*Decoding the Immune Landscape: Flow Cytometry in Cancer and Infection Research.*” Dr. Hira explained how flow cytometry has revolutionized immunological studies by enabling real-time monitoring of cellular interactions, immune responses, and disease progression. He highlighted its applications in cancer diagnostics, vaccine development, and infectious disease research.

The second session featured Dr. Brajesh Kumar Maurya (Asst. Prof., Dept. of Zoology, DHGV, Sagar), who presented on “*Immunohistochemistry (IHC) and Immunocytochemistry (ICC).*” His lecture provided participants with a comprehensive overview of the techniques used for localizing proteins and antigens within tissues and cells. He discussed the protocols, limitations, and wide-ranging biomedical applications of these methods.

The sessions were chaired by Prof. Shweta Yadav and Dr. Payal Mahobia, with Dr. Raj Kumar Koiri and Dr. Deepali Jat serving as rapporteurs.

Meet - Techniques in Recen... Online Summer School Regis...

meet.google.com/tpg-ohie-aor?authuser=0

Open in app

Sumit Kumar Hira (Presenting)

# FLOW CYTOMETRY

Measuring properties of cell as they flow in a fluid suspension across an illuminated light path

6/24/2025

Cellular Immunology Laboratory, UoB

10:11 AM | Techniques in Recent Advances in Molecular ...

38 others

eventzoology dhsgu

1 cm of rain Wednesday

Search

ENG IN

10:11 24-06-2025

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Sumit Kumar Hira (Presenting)

Studying the immune landscape is critically important for understanding

- Reveals Cellular Heterogeneity
- Improves Cancer Immunotherapy
- Guides Personalized Medicine
- Illuminates Infection and Vaccine Response
- Deciphers Immune Regulation in Autoimmunity
- Enables Spatial and Temporal Understanding

6/24/2025

Cellular Immunology Laboratory, UoB

10:10 AM | Techniques in Recent Advances in Molecular ...

35 others

eventzoology dhsgu

1 cm of rain Wednesday

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10:10 24-06-2025

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Sumit Kumar Hira (Presenting)

## Why FSC & SSC?

Study of FSC and SSC allows us to know the differentiation of different types of cells

6/24/2025

Cellular Immunology Laboratory, UoB

10:18 AM | Techniques in Recent Advances in Molecular ...

40 others

eventzoology dhsgu

23°C Cloudy

Search

ENG IN

10:18 24-06-2025

Meet - Techniques in Recen... Online Summer School Regis...

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Sandeep Kumar (Presenting)

## Immunohistochemistry & Immunocytochemistry

Dr. Brajesh Kumar Maurya  
Assistant Professor  
Department of Zoology  
Dr. Bhabendra Nath Vaidya Mahavidyalaya, Tugue, M.P. India  
AA Central University

11:07 AM | Techniques in Recent Advances in Molecular ...

47 others

eventzoology dhsgu

23°C Cloudy

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ENG IN

11:07 24-06-2025

Meet - Techniques in Recen... Online Summer School Regis...

meet.google.com/tpg-ohie-aor?authuser=0

Open in app

Sandeep Kumar (Presenting)

## Deparaffinization and Rehydration

Xylene 100% 90% 70% 50% 30% DW

11:38 AM | Techniques in Recent Advances in Molecular ...

40 others

eventzoology dhsgu

23°C Cloudy

Search

ENG IN

11:38 24-06-2025

## Day 3: Wednesday, 25th June 2025

The third day of the Summer School opened with a welcome session at 10.00 AM.

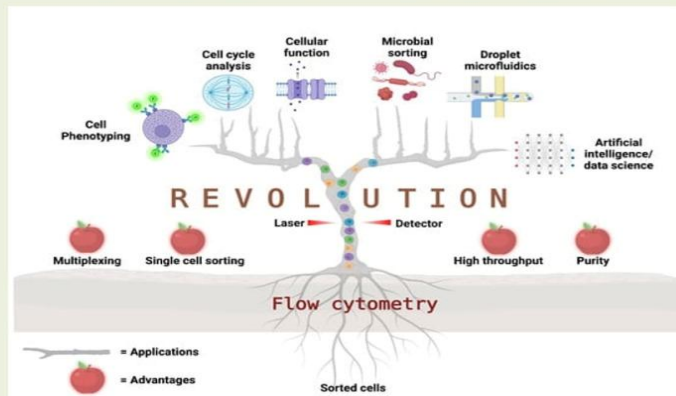
### Technical Sessions

The keynote lecture of the day was delivered by Dr. Vijay Paramanik (Head, Dept. of Zoology, Indira Gandhi National Tribal University, Amarkantak, M.P.) on “*Lighting the Way: Fluorescence and the Future of Cell Sorting.*” Dr. Paramanik provided a fascinating account of the advancements in fluorescence technologies and their growing significance in cell sorting, imaging, and diagnostics. He emphasized how these techniques are paving the way for innovations in both basic and applied research.

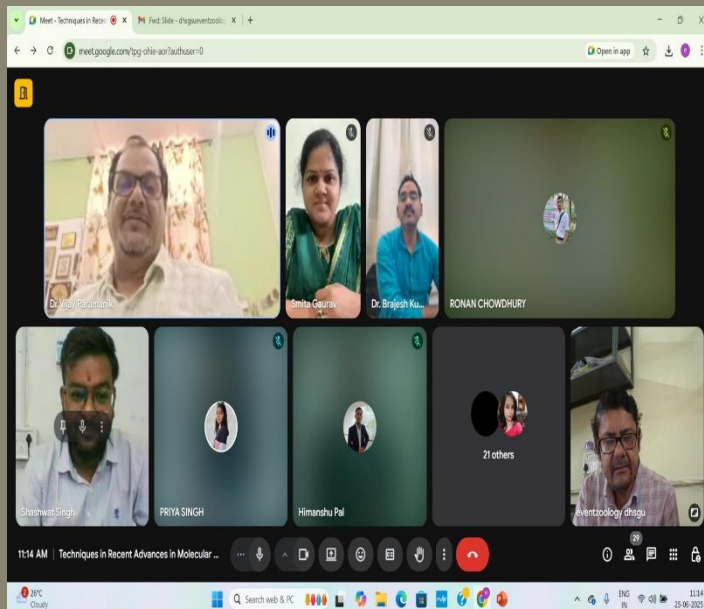
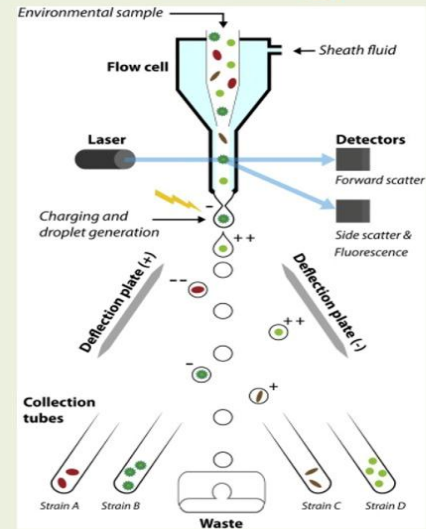
This was followed by a lecture by Dr. Priyoneel Basu (Asst. Prof., Dept. of Zoology, DHGV, Sagar) on “*Introduction to Bioinformatics.*” Dr. Basu introduced participants to the concepts of computational biology, sequence analysis, and the use of databases. He explained how bioinformatics has become an indispensable tool in genomics, proteomics, and drug discovery.

The sessions were chaired by Dr. Shashwat Singh and Dr. Brajesh Kumar Maurya, with Dr. Smita Shukla and Dr. Sandeep Kumar serving as rapporteurs.

# Lighting the Way: Fluorescence and the Future of Cell Sorting

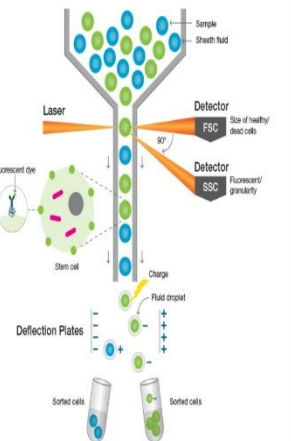


Dr Vijay Paramanik, PhD, MNASc  
Department of Zoology  
Indira Gandhi National Tribal University  
Amarkantak, Madhya Pradesh, India  
Email: vijayparamanik@gmail.com



## FACS

- # Sorting Mechanism
- Physically separates cells based on fluorescence
- Charging plates-apply electrostatic charges to the droplet containing target cells
- Deflection plates- deflect charged particles into the collective tubes
- Sorter nozzles break fluids stream into droplets



**What is Bioinformatics?**

- Definition: Bioinformatics is an interdisciplinary field combining biology, computer science, and statistics to analyze and interpret biological data.
- Enables analysis of genetic, genomic, and ecological data to understand animal diversity, and conservation.

16 others

**Support Systems for Bioinformatics and Associated Scientific Disciplines**

Support system for bioinformatics:

- Information technology
- Database management systems
- Computational resources
- Computer science

Scientific disciplines linked to bioinformatics:

- Molecular biology
- Genetics
- Biochemistry and biophysics
- Evolutionary biology
- Agricultural sciences
- Mathematical and statistical sciences
- Pharmaceutical sciences
- Omics

22 others

## Day 4: Thursday, 26th June 2025

The final day of the Summer School began with the welcome of guests at 10.00 AM.

### Technical Sessions

The first session of the day featured Dr. Nafin K. S. (Biologist, Periyar Tiger Reserve, Idukki, Kerala), who delivered a lecture on *“Advances in Biological Microscopy: From Optical to Electron Techniques.”* Dr. Nafin explained the historical development of microscopy, progressing from traditional light-based systems to modern scanning and transmission electron microscopy. He also highlighted applications of these advanced tools in wildlife biology, cell biology, and structural studies.

The concluding invited talk was given by Dr. Shyam Babu Prasad (Asst. Prof., Dept. of Zoology, Mahatma Gandhi Central University, Motihari, Bihar) on *“Animal Cell Culture Techniques: A Potential Research Tool.”* His lecture emphasized the role of cell culture methodologies as essential platforms for studying cell biology, testing drugs, and developing biomedical products.

The sessions were chaired by Dr. Smita Shukla and Dr. Malavika Sikdar, with Dr. Sandeep Kumar and Dr. Raj Kumar Koiri as rapporteurs.

### Valedictory Session

The Summer School concluded with a valedictory session on 26th June 2025. In her address, Prof. Shweta Yadav (Convener and Head, Dept. of Zoology) expressed her gratitude to all the invited speakers, chairpersons, and participants. She highlighted the success of the event in bridging theoretical knowledge with practical skills, particularly through the virtual demonstrations that made the learning experience more interactive.

Dr. Somenath Ghosh (Coordinator) provided a detailed summary of the proceedings, noting how each day contributed to building a comprehensive understanding of modern biological techniques—from immunological tools to microscopy and bioinformatics.

The session concluded with a vote of thanks by Dr. Kashmeera N. A. (Co-Coordinator), who acknowledged the dedication of the organizing committee, the cooperation of faculty members, and the enthusiastic participation of students and researchers.

Meet - Techniques in Recen... x +

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Nafin KS (Presenting)



## Dark Field Microscopy

- Makes **unstained, transparent specimens** appear **bright against a dark background**, using **scattered light** instead of transmitted light.
- A special **dark field condenser** blocks direct light.
- Only **light scattered by the specimen** enters the objective lens.
- This makes **small or transparent specimens** visible without staining.
- Contrast very high - ideal for thin or tiny structures
- **Bacteria**, protozoa, spirochetes (e.g., *Treponema pallidum*), Aquatic microorganisms, Thin blood films (to observe motility)

■ *Amphipod Gammarus sp* using dark-field microscopy 25X (Motic)

10:19 AM | Techniques in Recent Advances in Molecular ...

Light rain  
In the afternoon

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ENG IN

10:19  
26-06-2025

Participants: Nafin KS, Tahniyat Ans..., MADHURI SI..., PRIYA SINGH, Himanshu Pal, Dr. Raj Kumar..., 14 others, eventzoology dhsgu

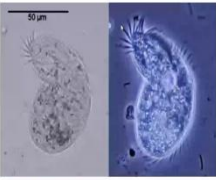
Meet - Techniques in Recen... x +

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Nafin KS (Presenting)

### Paramecium under Bright field and Phase Contrast



Comparison: Bright Field vs Phase-Contrast Microscopy

| Bright Field (Left)                    | Phase-Contrast (Right)                         |
|----------------------------------------|------------------------------------------------|
| Low contrast, gray and flat            | High contrast, glowing edges                   |
| Hard to distinguish without staining   | Internal organelles and cilia clearly visible  |
| Background Bright                      | Slightly darker with enhanced outline contrast |
| Staining usually yes                   | No - works well with live, unstained specimens |
| General cell shape and stained tissues | Live-cell imaging and transparent specimens    |
| Fewer artifacts                        | Possible halo artifacts                        |

Unique Components

- **Annular Diaphragm (in condenser)** - Creates a ring-shaped beam of light that passes through the specimen.
- **Phase Plate (in objective lens)** - Alters the phase of undiffracted (background) light to create contrast.

10:18 AM | Techniques in Recent Advances in Molecular ...

Breaking news  
Some countries...

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ENG IN

10:18  
26-06-2025

Participants: Nafin KS, Tahniyat Ans..., MADHURI SI..., PRIYA SINGH, Himanshu Pal, Dr. Raj Kumar..., 15 others, eventzoology dhsgu

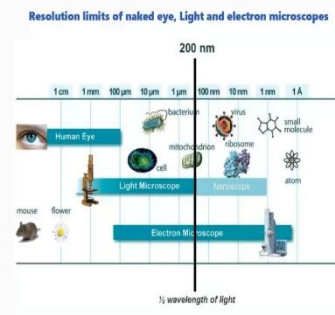
Meet - Techniques in Recen... x +

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Nafin KS (Presenting)

### Resolution limits of naked eye, Light and electron microscopes



200 nm

1 cm 1 mm 100 μm 10 μm 1 μm 100 nm 10 nm 1 nm 1 Å

Human Eye, mouse, flower, Light Microscope, Electron Microscope, 1/2 wavelength of light

10:05 AM | Techniques in Recent Advances in Molecular ...

Rainy days ahead  
27°C

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ENG IN

10:05  
26-06-2025

Participants: Nafin KS, Smita Gaurav, Arvind Kumar, PRIYA SINGH, Himanshu Pal, Divya Kumari, 15 others, eventzoology dhsgu

Meet - Techniques in Recen... x +

meet.google.com/tpg-ohie-aor?authuser=0

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Shyambabu Prasad (Presenting)

### Online Summer School from 23/06/2025 to 26/06/2025 on "Techniques in Recent Advances in Molecular Biology and Bio-Informatics"

#### Animal Cell culture techniques: A potential Research tools

Organized by  
Department of Zoology  
Dr. Harisingh Gour Central University  
Sagar - 476003 (MP), India



Dr. Shyambabu Prasad  
Department of Zoology  
School of Life Sciences  
Motihari, Bihar

11:23 AM | Techniques in Recent Advances in Molecular ...

Rainy days ahead  
27°C

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ENG IN

11:23  
26-06-2025

Participants: Shyambabu Prasad, Pradeep Verma, Dr. Raj..., PRIYA SINGH, SIZANI, Dr. Raj..., 22 others, eventzoology dhsgu

Meet - Techniques in Recen... x +

meet.google.com/tpg-ohie-aor?authuser=0

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Shyambabu Prasad (Presenting)



12:17 PM | Techniques in Recent Advances in Molecular ...

27°C  
Mostly cloudy

Search web & PC

ENG IN

12:17  
26-06-2025

Participants: Shyambabu Prasad, Dr. Raj..., Dr. Raj..., Dr. Sandeep Kumar, Pradeep Verma, Shyambabu Prasad, Praveen Verma, 16 others, eventzoology dhsgu



# ONLINE SUMMER SCHOOL



## Techniques in Recent Advances in Molecular Biology and Bio-Informatics



Pr of. Versha Sharma  
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23/06/2025 to 26/06/2025

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Dr. Harisingh Gour Vishwavidyalaya  
(A Central University),  
Sagar, M.P.



Dr. Samanath Ghosh  
Coordinator



Prof. Shweta Yadav  
Convener  
Head, Dept. of Zoology



Prof. Neelima Gupta  
Patron  
Hon'ble Vice-Chancellor  
Dr. Harisingh Gour Vishwavidyalaya



Dr. Kashmeera N. A.  
Co-coordinator

### OBJECTIVES

- Understand principles behind biological techniques.
- Learn SOPs of delicate and modern apparatus.
- Develop in silico research skills.
- Understand Bio-Safety protocols.

### JOIN NOW



#### Contact Us

+919936439419



#### Our E-mail

dhgsueventzoology@gmail.com

### ACTIVITIES

- Lectures  
By distinguished experts and invited guests.
- Virtual Demonstration  
of advanced molecular  
biology instruments.

No Registration fees

Last date for registration : 22.06.2025

Link for Registration: <https://forms.gle/6dZUuQxSsIzeLVw6>