



The Oxford College of Science

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Supported by DST GoI under FIST program, Supported by DBT GoI under DBT-STAR College

DBT-STAR Scheme 2025

REPORT

DEPARTMENT: ZOOLOGY AND GENETICS

TITLE	Karyotype analysis
ACTIVITY TYPE	Faculty Development Program- Day 4
DATE OF EVENT	12 th March 2026
VENUE	518 5 th floor
ORGANISED BY	Department of Zoology and genetics
RESOURCE PERSON (with designation and affiliation)	Mr. Pomar Harshavardhan Assistant Manager Cytogenetics life cell international Pvt Ltd Bengaluru
FACULTY INCHARGE/EVENT COORDINATOR	Mrs. Pavana Kamath P (associate professor and HOD)
TARGET AUDIENCE	Faculties and Pg students
NUMBER OF BENEFICIARIES	

The Objectives of the Programme:

The primary objective of was to bring the gap close between theoretical cytogenetics and its real-world clinical application and its problems. This programme aimed to provide a comprehensive understating of chromosome analysis, tracing it from its historical roots to modern diagnostic techniques. To understand the key methodologies of karyotyping and fluorescence in situ hybridization (FISH). It emphasizing the precise steps required for the sample preparation such as peripheral blood and bone marrow culturing. the goal it was to illustrate to how these fundamental genetic tools are actively used to identify the chromosomal abbreviation/abnormalities, diagnose genetic syndromes and how its help in the treatment in oncology.

Highlights of the Programme:

This session is open with a fascinating look back at the history of cytogenetics, especially the pivotal 1956 discovery by Tjio and Levan that finally established the correct human chromosome count to 46 instead of 48 the previous accepted number. building on this historical foundation, the lecture moved on to practical mechanics of chromosome analysis. And the speaker emphasized with the metaphase is the ideal cell division stage that provide a good window for both traditional karyotyping and FISH analysis. We were taken step-by-step through the workflows for the peripheral blood lymphocyte (PBL)and bone marrow culturing, exploring the specific diagnostic proposes behind each method. A major highlight of the workshop was the detailed breakdown of chromosome morphology (size, band, centromere). the speaker

explain the classification of chromosome from groups from A to G and share the visual criteria to accurately identify them .the discussion extend from normal karyotype into structural abnormality like isochromosome (lose of either p or q arm) .the lecture provide deep dive into FISH methodology and explained the different type of probe is utilized to bind with the exact molecular mechanisms for the target DNA sequences and specific clinical indications for FISH over normal karyotyping for the molecules understanding . The speaker detailed about how cytogenetics analysis is heavily dependent on the cell lineage and discussed about how to identify specific genetic syndromes. We can explore the distinct cytogenetic profiles of solid tumours as well as a range of haematological malignancies, with a specific focus on myelodysplastic syndromes (MDS) and leukaemia's, including AML, CLL and CML.

The Outcome of the Programme:

Ultimately this programme successfully transformed the complex genetic concepts into practical, diagnostic knowledge which help in the clinically helpful to determine the cause early. By this we can get enough understanding of the meticulous workflow require for the cell culturing in a clinical laboratory setting. We Developed a strong foundational ability to identify and classify the chromosome and recognizing its mechanisms behind structural variation. And most importantly, the workshop provides a profound appreciation for how these specialized cytogenetics techniques are directly applied to diagnose complex genetic condition and classify specific cancer, giving us a higher practical perspective on the clinical genetics.

PHOTOS



Interactive discussion with speaker



Speaker talked about Cell cycle stages



Faculty group photo session



Lecture on Cytogenetic testing

Head of the Department

DBT-STAR Coordinator

Vice Principal

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REPORT

DEPARTMENT: ZOOLOGY AND GENETICS

TITLE	<i>“Tools and Methodological Approaches in Cytogenetic Karyotype Analysis”</i>
ACTIVITY TYPE	Faculty Development Program – Day1
DATE OF EVENT	7 th March 2026
VENUE	Room no 221
ORGANISED BY	Department of Zoology and genetics
RESOURCE PERSON (with designation and affiliation)	Pavana Kamath P.
FACULTY INCHARGE/EVENT COORDINATOR	Mrs. Pavana Kamath P (Associate professor and HOD)
TARGET AUDIENCE	Faculties and PG students
NUMBER OF BENEFICIARIES	Life science faculty

The Objectives of the Programme:

A 5 days Faculty Development Program (FDP) on **HUMAN CYTOGENETICS** was Organized by the department of Zoology and Genetics for the faculty of Lifescience Department. The Day 1 session was on *“Tools and Methodological Approaches in Cytogenetic Karyotype Analysis”* was conducted by Ms. Pavana Kamath P., Associate Professor and Head, Department of Zoology & Genetics, The Oxford College of Science. The program aimed to enhance the knowledge and technical competence of faculty members and researchers in the field of cytogenetics, with a specific focus on karyotype analysis techniques and their applications in modern biological research.

Highlights of the Programme:

The session began with an introduction to cytogenetics, emphasizing its significance in understanding chromosomal structure, function, and abnormalities. Ms. Pavana Kamath highlighted the role of cytogenetic analysis in diagnosing genetic disorders, studying evolutionary biology, and supporting clinical research. She explained how karyotyping serves as a foundational tool for identifying chromosomal anomalies such as deletions, duplications, translocations, and aneuploidy.

The program provided a comprehensive overview of the tools used in cytogenetic analysis. Participants were introduced to laboratory instruments such as microscopes equipped with digital imaging systems, karyotyping software, and staining techniques. Special emphasis was placed on G-banding, a widely used staining method that produces distinct banding patterns on chromosomes, allowing for precise identification and comparison. The

importance of maintaining laboratory standards, sample preparation, and slide quality was also discussed in detail.

Ms. Pavana Kamath elaborated on the methodological approaches involved in karyotype analysis. The process begins with cell culture, where actively dividing cells are selected to obtain metaphase chromosomes. This is followed by arresting cells in metaphase using mitotic inhibitors, harvesting, and preparing chromosome spreads on slides. The staining process enhances the visibility of chromosome structures, after which images are captured using advanced imaging systems.

The session also covered the step-by-step procedure for arranging chromosomes into a standard karyotype format. Participants learned how chromosomes are paired based on size, centromere position, and banding patterns. The classification into autosomes and sex chromosomes was explained, along with the identification of structural and numerical abnormalities. Practical insights into interpreting karyotypes were provided, enabling participants to differentiate between normal and abnormal chromosomal patterns.

In addition to traditional techniques, the FDP introduced advanced molecular cytogenetic tools such as Fluorescence In Situ Hybridization (FISH) and Comparative Genomic Hybridization (CGH). These techniques offer higher resolution and allow for the detection of subtle genetic changes that may not be visible through conventional karyotyping. The integration of digital tools and software for automated karyotype analysis was also discussed, highlighting their role in improving accuracy and efficiency.

The program included interactive discussions and case studies that encouraged participants to apply their knowledge to real-world scenarios. Common chromosomal disorders such as Down syndrome, Turner syndrome, and Klinefelter syndrome were used as examples to demonstrate the practical relevance of karyotype analysis. Participants were given the opportunity to analyze sample karyotypes and interpret the findings under expert guidance.

Ms. Pavana Kamath also addressed the challenges faced in cytogenetic analysis, including technical limitations, sample quality issues, and interpretation errors. She emphasized the need for continuous skill development, proper training, and adherence to standard protocols to overcome these challenges. The importance of interdisciplinary collaboration in advancing cytogenetic research was also highlighted.

Outcome of the Programme:

The Faculty Development Program proved to be highly informative and beneficial for all attendees. It provided a balanced combination of theoretical knowledge and practical insights, equipping participants with the necessary skills to carry out cytogenetic analysis effectively. The session concluded with a question-and-answer segment, where participants clarified their doubts and discussed potential applications of the techniques in their respective fields.

In conclusion, the FDP on *“Tools and Methodological Approaches in Cytogenetic Karyotype Analysis”* successfully enhanced the participants’ understanding of cytogenetic principles and practices. The expertise and clarity of presentation by Ms. Pavana Kamath P. made the session engaging and impactful. Such initiatives play a crucial role in strengthening academic and research capabilities, ultimately contributing to advancements in the field of life sciences.

PHOTOS



Head of the Department

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REPORT

DEPARTMENT: ZOOLOGY AND GENETICS

TITLE	Clinical and Molecular Cytogenetics
ACTIVITY TYPE	Faculty Development Programme- Day 2
DATE OF EVENT	09/03/2026
VENUE	Room No. 218
ORGANISED BY	Department of Zoology and Genetics
RESOURCE PERSON (with designation and affiliation)	Dr. Jayarama S. Kadandale Professor and David A Hungeford Chair Centre for Human Genetics Biotech Park, Electronic City Phase 1, Bengaluru
FACULTY INCHARGE/EVENT COORDINATOR	Ms. Pavana Kamath P, Associate Profeesor and Head
TARGET AUDIENCE	Faculty and Students
NUMBER OF BENEFICIARIES	Lifescience Faculty and Students

The Objectives of the Programme:

The Faculty Development Program on Clinical and Molecular Cytogenetics was designed to provide comprehensive knowledge of cytogenetic principles and their clinical applications. It enhanced participants' understanding of chromosomal abnormalities and their association with genetic disorders, while introducing advanced techniques such as karyotyping and fluorescence in situ hybridization (FISH).

Highlights of the Programme:

The program featured an expert lecture by a resource person in human genetics and cytogenetics. Key topics included numerical and structural chromosomal aberrations and their clinical significance. Advanced techniques were explained in terms of principles, procedures, and diagnostic relevance. Case

studies helped participants connect theory with practical applications, while recent advancements in molecular cytogenetics provided updated knowledge. The interactive format encouraged active participation and discussion.

The Outcome of the Programme:

Overall, the program strengthened understanding of cytogenetics, improved skills in interpreting chromosomal abnormalities, and increased awareness of modern diagnostic methods and research opportunities, contributing to academic and professional development.

PHOTOS



Introduction of the Resource Person



Expert lecture on Hybridization Technique



Interactive Discussion with Resource Person



FISH Technique Session by Resource Person



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DEPARTMENT: ZOOLOGY AND GENETICS

TITLE	Dermatoglyphics- Tool for Genetic Disease Diagnostics
ACTIVITY TYPE	Faculty Development Program- Day 5
DATE OF EVENT	16 th March 2026
VENUE	Zoology Lab
ORGANISED BY	Department of Zoology and Genetics
RESOURCE PERSON (with designation and affiliation)	Dr. Geetha Vishwanathan Former UGC Professor and Head of Department St. Joseph's College, Bengaluru
FACULTY INCHARGE/EVENT COORDINATOR	Mrs.Pavana Kamath P (Associate Professor and HOD)
TARGET AUDIENCE	Faculty and PG Students
NUMBER OF BENEFICIARIES	

The objectives of the Programme:

The Day 5 of Faculty development Program was entitled **Dermatoglyphics- Tool for Genetic Disease Diagnostics**. Dermatoglyphics is the scientific study of epidermal ridge patterns on fingers, palms, and soles, which are genetically determined and remain unchanged throughout life. The session aimed to enhance faculty knowledge on the emerging role of dermatoglyphics in medical, forensics, and genetic diagnostics. The session dealt with introducing participants to the fundamentals of dermatoglyphics, its genetic basis and developmental significance, its application in diagnosing genetic and systemic disorders, and to encourage interdisciplinary research and clinical application.

Highlights of the Programme:

The programme included an interactive hands-on training session led by an expert, where students learned

to identify and classify different fingerprint patterns, performed finger-wise analysis, and discussed the significance of dermatoglyphics in understanding personality traits and cognitive abilities in a supportive learning environment.

The outcome of the programme:

. The Faculty Development Program on “**Dermatoglyphics – Tool for Genetic Disease Diagnostics**” provided valuable insights into a rapidly evolving field. The session by **Dr. Geetha Vishwanathan** emphasized the importance of integrating traditional biological markers with modern diagnostic approaches. Dermatoglyphics, being a simple yet powerful tool, holds significant potential in early disease detection and genetic research.

PHOTOS



Interactive dermatoglyphic session demonstrating fingerprint pattern identification and analysis by student



Resource person along with faculty and students

Head of the Department

DBT-STAR Coordinator

Vice Principal

Principal