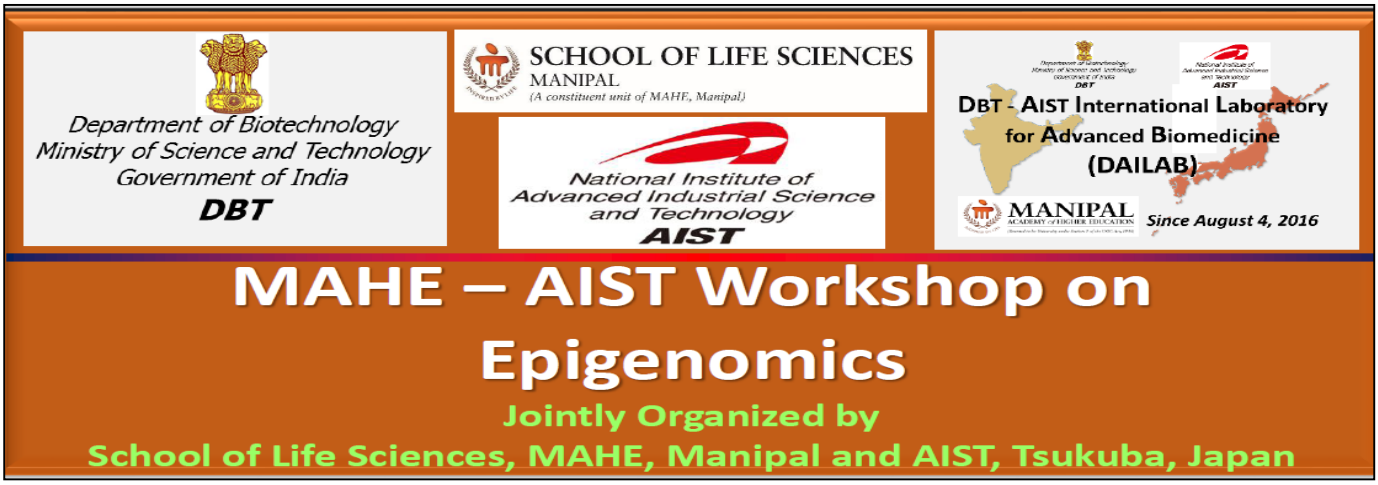


The three days' workshop on Epigenomics was jointly organised by School of Life Sciences, MAHE, Manipal and National Institute of Advanced Industrial Science and Technology, Tsukuba, Japan from 20.02.2019 to 22.02.2019. The objective of the workshop was to provide the hands on training on various laboratory experiments on epigenomics and data analysis. A total of seventeen delegates of various institutions from different parts of the country including Sister DAILABs at IIT Guwahati and University of Sri Jayewardenepura, Sri Lanka were participated. The programme was inaugurated by Dr. K. Satyamoorthy, Director, School of Life Sciences, MAHE Manipal. The welcome address was given by Ms. Priyanka. Research scholar of the School of Life Sciences. Dr. K. Satyamoorthy introduced the concepts of epigenomics and gave a brief description about the epigenetic alterations in human genome and its effect on gene expressions and their regulation. The morning session began with lecture delivered by Dr. Shama Prasada K, Associate Professor, School of Life Sciences on DNA methylation, mechanism and analysis method. He emphasized on epigenetics, alteration of gene expression and the role of miRNA and and long non-coding RNA in the epigenetic regulation of gene expression. He also discussed the different types of technology to detect methylation patterns and their correlation with the different disease conditions including cancer. The webinar lecture was given by Dr. Yoshiaki Onishi Deputy Director, Biomedical Research Institute, AIST and Dr. Renu Wadhwa, Prime Senior Scientist and (AP) Labo Leader, DAILAB, Biomedical Research Institute, AIST, Japan. Dr. Yoshiaki Onishi gave a talk on epigenetic regulation of circadian clock. He explained about the mechanism of transcription, epigenetic regulation and the diseases which can occur due to circadian rhythm disturbances such as sleep wake rhythm disorder, infantile autism, schizophrenia, senile dementia and bipolar disorders. The circadian rhythm can control cell proliferation, DNA damage response, cellular senescence, metabolic homeostasis and inflammatory response. He focused on correlation of methylation of one of the clock genes i.e. *Bmal1* with cancer. Dr. Renu Wadhwa, explained about Epigenetic regulation of tumor suppressor microRNAs. She explained that the miR-335 and miR-451 are the tumor suppressor miRNAs which can potentially target CARF (Collaborator of ARF). CARF was upregulated in stress induced senescent cells and contributed to carcinogenesis. She summarised her talk by concluding CARF as a potential target and has dual role in senescence and carcinogenesis and its silencing caused strong tumor suppression *in vivo*. The participants visited various facilities of the School including Next Generation Sequencing and Micro array facility. The afternoon session began with hands on training on Primer designing and *in silico* validation using Methyl Primer Express and BiSearch respectively. The participants were exposed to and had hands on experience on bisulfite conversion using EZ DNA methylation kit (Zymo research) followed by the Polymerase Chain Reaction (PCR) and sequence data analysis on bisulfite sequence results.

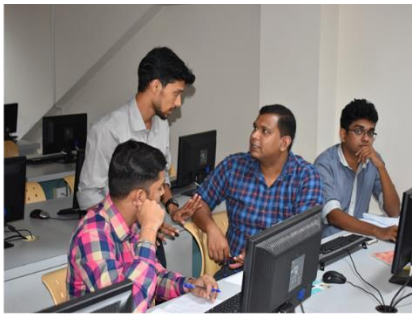
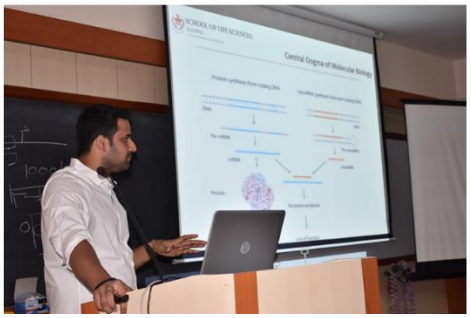
The second day started with the discussion of overall activities performed on the first day of workshop followed by the lecture on MicroRNA: Concepts and principles by Mr. Vaibhav. He discussed about the biogenesis and regulation of miRNA by methylation and transcription factors in relation to cancer. He also emphasized on isomers, cluster miRNAs, arm switching, and nomenclature of miRNAs. He also discussed about analysis for target prediction, SNPs, miRNA-lncRNA interaction, association of miRNA to different

diseased conditions. He also highlighted the features for novel miRNA prediction and how small RNA sequencing data can be utilized to achieve the same. This was followed by session on sequencing platforms. Mr. Dinesh gave detailed information about different types of sequencing platform such as Illumina and ion torrent. He emphasized on principles, workflow and the applications of semiconductor based Next Generation Sequencing followed by the detailed protocol of small RNA sequencing. Afternoon session of the second day began with the hands on experience on Quantitative real time PCR and data analysis which includes RNA isolation, cDNA conversion and RTPCR protocol and how to analyse data using 7500 Fast software. The parallel session also focused on the small RNA Next Generation Sequencing where the participants learned the library preparation, quality control, emulsion PCR, enrichment, sequencing and data interpretation.

The third day started with the recap of previous day activities and data analysis of qRT-PCR and small RNA sequencing. Mr. Ankit and Mr. Pradyumna, School of Life Sciences, conducted the sessions on Introduction to R Bioconductor in which delegates learnt about the basic commands used to analyse data and how this software can be utilized in the relevant field of research. They introduced briefly about the packages used with the tool. The later sessions were planned for the data analysis on methylation and miRNA using bioinformatics tools. Mr. Sandeep Mallya, Senior Grade Lecturer, Department of Bioinformatics, School of Life Sciences, gave descriptive information about Limma package and how it can be used to normalize and assessing quality of the data obtained. He explained about the different plots including MA plot, Density plot and the importance of fold change value. Dr. Bobby Paul, Department of Bioinformatics, School of Life Sciences took over the afternoon session and introduced about the DESeq package and data visualization. He introduced delegates about the available software packages for reference based assembly such as BWA, Bowtie2, MIRA, TopHAT and the software for visualization like Velvet, IGV. He also gave a brief detail about the whole workflow of the data analysis obtained from small RNA sequencing.

The program was concluded with a valedictory note and the participants provided their feedback on the workshop. The certificates were presented by Dr. K. Satyamoorthy to the participants. Overall the workshop had a complete understanding on different aspects of Epigenetics.

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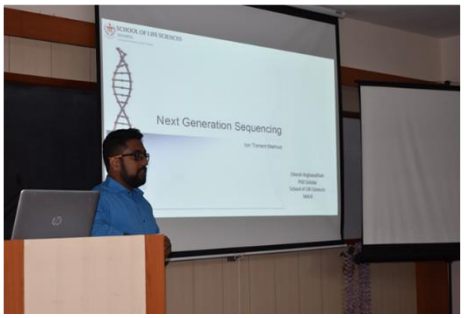
Next Generation Sequencing



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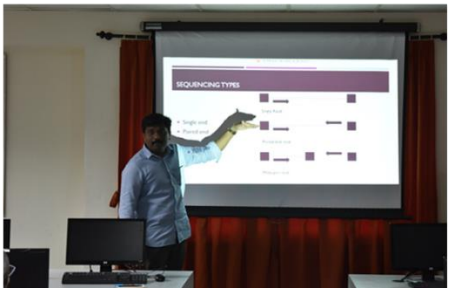
SEQUENCING TYPES

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