Department of Biotechnology, University of Calicut

Resources & Facilities

M.Sc. General Laboratories

These labs are furnished with adequate facilities that are open to students to carry out experiments and tests. The general lab provides different types of equipment which include microscopes, shakers, incubators, hot air oven, Double distillation unit, pH meter, weighing balance, colourimeter, autoclaves, and magnetic stirrers- to name a few. Students are made familiar with their projects. Access to online Internet services are also available.

Equipment Rooms

These labs are mainly utilised by PG Students, Staff and Research scholars. It is equipped with sophisticated Laboratory instruments for purposes of studies and research. The laboratories have all amenities for conducting biochemical & molecular biological experiments. Specialized instruments like lyophilizer, UV-VIS Spectrophotometer, Gel Electrophoresis Apparatus, Laminar Flow Cabinet and CO_2 incubators are made available.

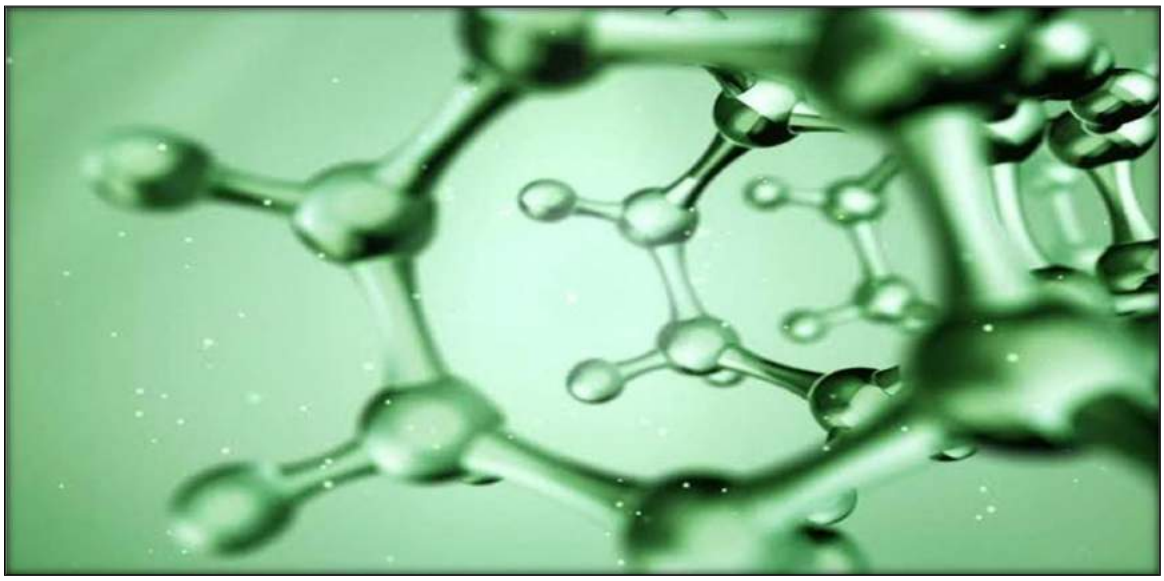
Bioprocess Laboratory

The laboratory is interested in cost effective bio-pesticide production to control mosquitoes; cost effective process development for biogas production from agro-wastes; biogas production from chicken / poultry wastes by two phase anaerobic digestion process; cost effective production of oyster mushrooms using solid state fermentation technology.

Recombinant DNA Technology Laboratory, Cell & Molecular Biology

The major research interests of the laboratory include (i) molecular biology of cell cycle regulation - G2/M arrest, G2 abrogation and apoptotic pathways employing aseptic cultures of the lower eukaryote, *Physarum polycephalum*, human peripheral blood lymphocytes and human cancer cell lines (ii) phytochemical analysis, screening for anti-proliferative, anti-cancerous and cell cycle blocking agents (iii) studies on multi drug resistant strains of clinical bacterial isolates – genome and plasmid based gene characterization and molecular typing and (iv) cloning and characterization of cell cycle related genes, expression profiling studies in human cancers. Studies are also being planned on molecular systematics of insect pests and parasitoids.

Metabolomics and Molecular Neurobiology Laboratory



The laboratory led by Dr. Anu investigates molecular mechanisms of lifestyle/metabolic disorders and neurodegenerative diseases. Basic research on the alterations in the signal transduction during pre-diabetic hyperinsulinemia leading to diabetes and cardiovascular damage is explored in this lab. The laboratory aims on conducting epigenetic and genomic analysis on hyper-insulinemic animal models to identify the molecules that play a crucial role in conferring atherosclerotic resistant properties for the management of cardiovascular diseases. The research group studies the stress signaling pathway thereby identifying the genes that contribute to the development of diabetes and other metabolic disorders.

The team is also keen on understanding the Epigenomics of Neurodegenerative diseases, mouse behavioural genetics, and learning & memory using transgenic animal models. For the management of neurodegenerative diseases, the lab is working on stem cell-based tissue regenerative studies.

The lab is involved in developing molecular diagnostic kits using lateral flow assay technology for the early detection of diseases.

IMMUNOTECHNOLOGY LABORATORY

The major focus of the laboratory is on identification, isolation and characterisation of bioactive molecules especially phytochemical having immuno-modulatory and *in vitro* cytotoxic activity against cancers (mouse and human). *In vivo* anti-tumour studies are carried out employing mouse models. In silico screening of compounds and docking studies are also being pursued actively. Other lab interests include immunological aspects related to *Helicobacter pylori* as well as monoclonal antibody production for therapeutic applications.

Molecular Oncology Laboratory

Pioneering research into new avenues for cancer treatment and management is undertaken in this lab exploring molecular-level dynamics of the disease and its response to chemotherapeutics. Cancer remains one of the most dreaded diseases afflicting mankind across space and time. Despite tremendous advances in medical science, it remains a major clinical challenge. As opposed to the use of general cytotoxics, the new trend in cancer drug development is to target the exact molecular cause of individual cancer and its progression. This is based on the understanding of the underlying processes involved in the development of cancer. A general outline of the research work undertaken in this Lab is to understand these processes and to identify key proteins that can

be intervened therapeutically. Another aspect is to analyse the signaling pathways activated in response to conventional as well as new targeted therapeutic agents in the cancer cells so as to identify and find the solution for the factors that limit the success of both the first and second generation of therapeutic agents. One another aspect of the research undertaken in this lab is to explore the vast natural resources that have yet not been fully tapped, to find out bioactive compounds with the anticancer activity that could represent novel lead structures, for drug development either directly or indirectly, in that they serve as lead compounds for the synthesis of new drugs.

Bioinformatics

Bioinformatics Laboratory is a large research group at the Faculty of Computer and Information Science, which performs research in data science. We like to combine machine learning and data visualization, and craft techniques for exploratory data analysis and explainable artificial intelligence.

Our aim is to design intuitive, useful, and visually appealing approaches for both data scientists and domain experts. We apply these methods to diverse application areas that include:

- Molecular Biology And Biomedicine,
- Anthropology, Psychology
- Spectroscopy,
- Image And Network Analytics

- Business Analytics

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