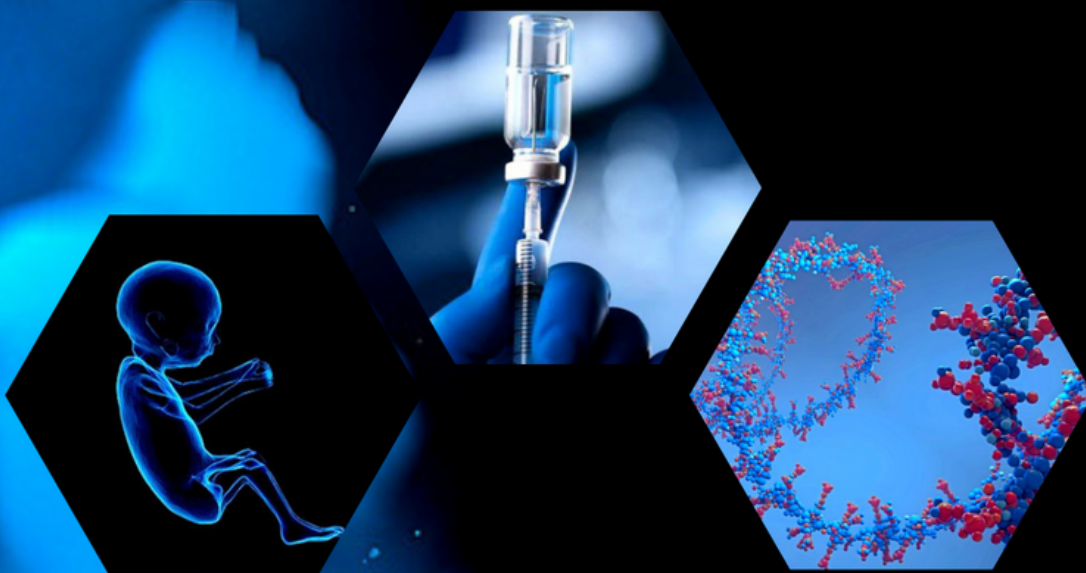


The BIOscope

A Quarterly Newsletter

March, 2023 Issue 3

Department of Biosciences
Integral University, Lucknow



Recent Scientific Developments

Articles covering
recent
breakthroughs in
science

Students' Zone

Creative-Scientific
Writings,
Student -
Accomplishments

Departmental Activities

DST STUTI Programme,
Educational Tour Report

Interview Reports

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1.1 In China, a 1-year-old child had her unborn twin removed from her brain.

The sister, who was one year old, had the twin's embryo removed from her brain.

It was estimated that the foetus was roughly four inches long. The physicians noted that it had formed upper limbs, bones, and even fingernails, indicating that it had probably continued to develop for months while inside its sibling in the womb.

When the parents brought the one-year-old child to the hospital for her larger head and motor skill issues, it was revealed that she was pregnant.

When twins combine in the womb and one develops physically inside the other, the process is known as foetus in fetu.

Identical twins, which are created when one egg separates, fail to completely separate, which is why it occurs.

Around 200 cases of fetus in fetu have been recorded in medical history, with just 18 happening inside the skull.

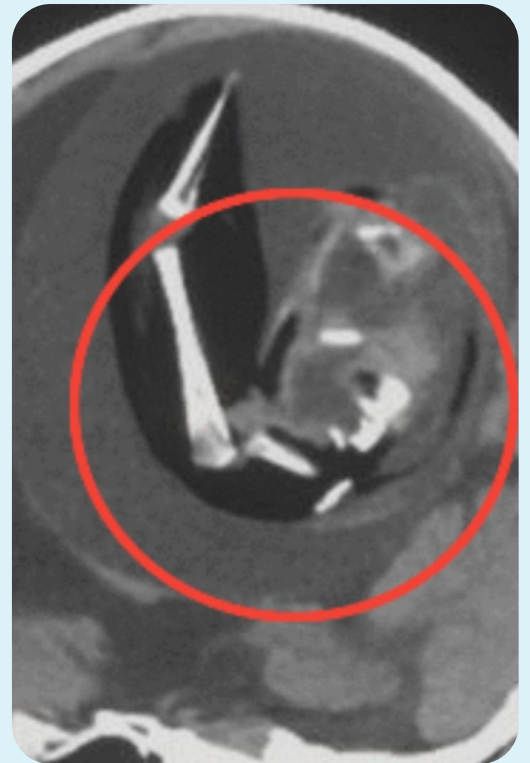
Unborn twins have also been detected in the pelvis, mouth, intestines and even the scrotum.

The case was reported in the American Academy of Neurology's journal Neurology in December.

CT scans revealed the one-year-old girl's unborn sibling was pressed against her brain.

She also had hydrocephalus, the build-up of fluid deep within the brain that can cause an enlarged head, extreme sleepiness and seizures.

The unborn sibling continued to survive a year after birth because it shared a blood supply with its sibling, the doctors said. It is not clear if the surviving twin will suffer long-term damage.



1.2 Serum institute's cervical cancer vaccine

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According to government sources, this month will see the release of the made-in-India CERVAVAC vaccine

against cervical cancer, which has an MRP of Rs 2,000 per vial of two doses.

On January 24, in the presence of Serum Institute of India (SII) CEO Adar Poonawalla and its Director of

Government and Regulatory Affairs Prakash Kumar Singh, Union Home Minister Amit Shah announced the

availability of the country's first indigenous human papillomavirus (HPV) vaccine.

The price of Singh's HPV vaccination for the private market will be Rs 2,000 per vial of two doses, which is

significantly less than the price of other HPV vaccines on the market, according to an official source. Singh has

also addressed a letter to the Union Health Ministry.

For HPV vaccines, the nation is currently entirely dependent on foreign producers.

Only one HPV vaccination is now offered in the private market in a single-dose pre-filled syringe form, and it

costs Rs 10,850. That vaccine is Gardasil, made by American multinational Merck.

For the national immunisation scheme for girls aged 9 to 14 years, the Union Health Ministry plans to

introduce the HPV vaccine against cervical cancer in June. A global tender is scheduled to be published for this

programme in April.

A quarter of all cervical cancer incidences and close to a third of all cervical cancer fatalities worldwide occur

in India, which is home to around 16% of the world's women. The lifetime cumulative risk of cervical cancer in

Indian women is 1.6%.

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published for this initiative in April.

A quarter of all cervical cancer incidences and close to a third of all cervical cancer fatalities worldwide occur

in India, which is home to around 16% of the world's women. According to officials, there is a 1.6% lifetime

cumulative risk for Indian women to get cervical cancer and a 1% lifetime cumulative risk for cervical cancer

death.

Nearly 80,000 women in India are diagnosed with cervical cancer each year, and 35,000 of them pass away as

a result, according to some recent estimates.



1.3 Shape-Shifting Enzyme Keeps RNA "In Check"

Cancer and developmental issues can be caused by RNA problems. Our cells contain molecular "machines" that keep RNA "in check" and get rid of RNAs when it's appropriate. Most have a "motor" to produce the power required to separate RNA molecules. Dis3L2, however, is an enzyme that can independently unwind and eliminate RNA molecules. This procedure is not entirely understood, though. Cold Spring Harbour Laboratory (CSHL) researchers claim to have revealed Dis3L2's secret at this time.

RNA turnover pathways ensure appropriate gene expression levels by eliminating unwanted transcripts," wrote the researchers. "Dis3-like 2 (Dis3L2) is a 3'-5'

exoribonuclease that plays a critical role in human development. Dis3L2

independently degrades structured substrates, including coding and noncoding 3'

uridylated RNAs. While the basis for Dis3L2's substrate recognition has been well

characterized, the mechanism of structured RNA degradation by this family of

enzymes is unknown. We characterized the discrete steps of the degradation cycle

by determining cryogenic electron microscopy structures representing snapshots

along the RNA turnover pathway and measuring kinetic parameters for RNA

processing."

Using molecular imaging technology, CSHL professor and HHMI investigator

Leemor Joshua-Tor, PhD, and her team captured Dis3L2 at work. They fed the

molecular machine hairpin snippets of RNA and imaged it getting "eaten" at

various stages. After the machine had chewed up the tip of the RNA, it swung open

a big arm of its body to peel apart the hairpin and finish the job.



1.4 A new genetic relationship between cancer and deadly muscle wasting disease has been found

One in every 5,000 boys born suffers from the crippling muscle-wasting disease DMD, which is known to be caused by mutations of the dystrophins gene. Typically, those who have the condition only live into their 20s or 30s.

Several types of malignant tissues, including those from patients with gastrointestinal, ovarian, and breast cancer, were examined by a group of international researchers.

In 80% of these malignancies, the DMD gene expression was downregulated. A more advanced stage of cancer and decreased survival across various malignancies were linked to this low expression of dystrophins.

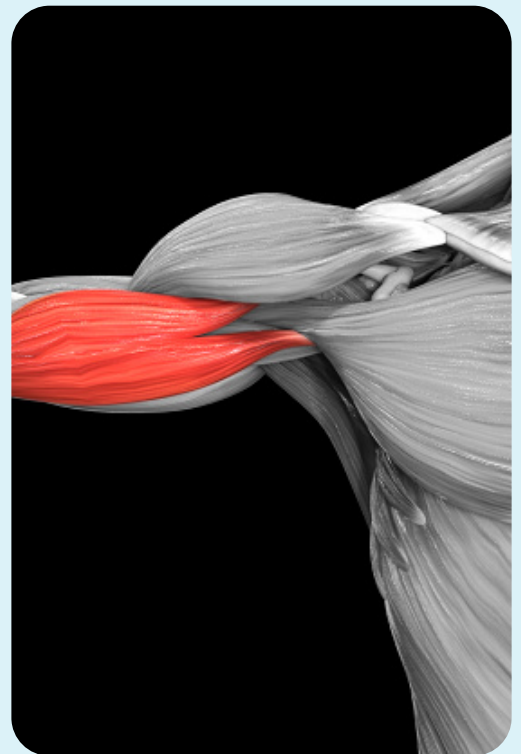
"The findings that the DMD gene has a role in tumours, expands the growing evidence of its significance beyond Duchenne muscular dystrophy," said senior author Professor Darek Gorecki of the University of Portsmouth's School of Pharmacy and Biological Sciences. The role of DMD in malignancies and how it might be used to track the development and effectiveness of cancer treatments still require more research.

Most boys with DMD are identified between the ages of two and five, when severe physical harm has already been done to them.

The delay in diagnosing the disorder might be impeding treatment approaches that could assist slow, if not stop, disease progression, according to Professor Gorecki, who thinks these new findings should be taken into mind.

He stated, "The function of DMD, the biggest human gene known, is significantly more complex than previously understood.

If we're going to develop therapies for illnesses brought on by its mutations, we need to understand it better.



1.5 Stem cells must take out the trash to prevent ageing

The science keeps pointing to stem cells in humanity's endless search for the "elixir of life." Keeping stem cells clean and organised is a crucial step, according to recent research, which suggests that maintaining stem cell fitness promotes a high life expectancy.

In a study that was published on March 21, 2023 in *Cell Stem Cell*, scientists from the University of California San Diego School of Medicine discovered that blood stem cells have an unusual process they employ to get rid of their misfolded proteins, and that this pathway's activity declines with ageing. According to the scientists, improving this specialised rubbish disposal system could aid in preventing age-related disorders.

The cells in our bone marrow that continuously manufacture new blood and immune cells were the subject of the study, known as hematopoietic stem cells (HSCs). Anaemia, blood clotting, and cancer

can result from the loss or weakening of these cells' ability to operate,

which also affects the immune system.

The preservation of protein homeostasis is essential for the well-being

of stem cells. Research from the past has demonstrated that stem cells, including HSCs, synthesise proteins far more slowly than other cell types, valuing quality above quantity. As a result, they are able to

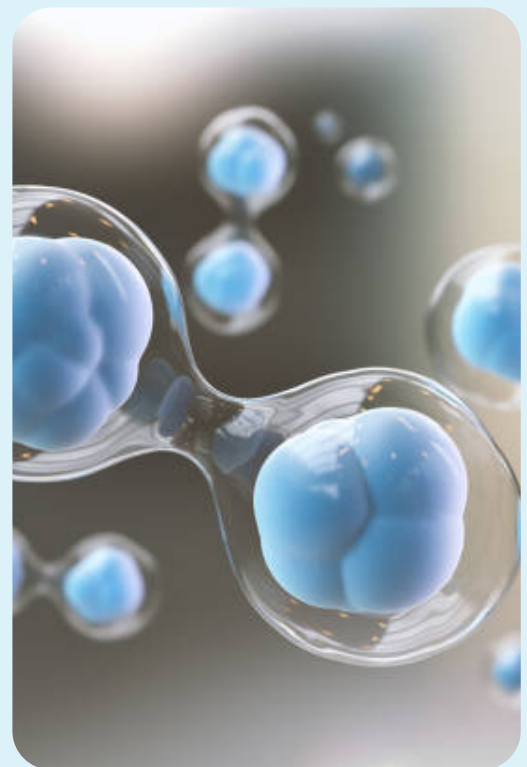
complete the process with fewer errors because improperly folded proteins can accumulate and become hazardous to cells.

Even still, errors or protein degradation are sometimes unavoidable, therefore the researchers set out to discover how stem cells make sure damaged proteins are correctly removed.

Most cells designate each broken or improperly folded protein for elimination. The proteasome, a mobile protein-destroyer, then locates the marked proteins and disassembles them into their constituent amino acids. However, in the new study, the researchers discovered that HSC proteasome activity was particularly low.

To maintain greater stem cell fitness over ageing and lessen blood and

immunological problems, we aim to enhance stem cells' capacity to sustain the aggrephagy pathway, said Signer.



2.1 Student Accomplishments (Department of Biosciences)

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Placement and other achievements



Congratulations to Ms. Wareesha Farooqui, student of B.Sc. ZBC 3rd year for getting placed at Wipro as a HR through campus placement drive

Congratulations to Mr. Affan Rais, student of B.Sc. Biotechnology 3rd year for getting his paper published in the Journal "The International Journal of Analytical and Modal analysis"





Congratulations to Ms. Yasmeen, student of M.Sc. Microbiology 1st year for runners up in self composed poetry.



Congratulations to Mr. Mohd Danish Khan, student of B.Sc. Life Science 3rd year for securing the 1st position in the Digital Poster Making Competition.

National Science Day 2023

The winners of various events are as follows:

Poster Making Competition

NAME	COURSE	POSITION
Zehra Asif Husain	BSc Biotechnology (1st Year)	1st
Mohd Danish Khan	BSc Life Science (3rd Year)	2nd
Mantasha Zafar	BSc ZBC (2nd Year)	3rd

Slogan Writing Competition

NAME	COURSE	POSITION
Wareesha Farooqui	BSc ZBC (3rd Year)	1st

Quiz Competition

NAME	COURSE	POSITION
Mohd Danish Khan	BSc Life Science (3rd Year)	1st
Sundus Fatima	BSc Biotechnology (1st Year)	2nd

Student Accomplishments (Department of Biosciences)

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**Congratulations to Mr. Sudhanshu Srivastava,
student of M.Sc. Biochemistry IIInd year for
securing the AIR 887 in GATE Exam.**

**Congratulations to Mr. Nalin Rai, student of M.Sc.
Biochemistry IIInd year for securing the AIR 1083 in
GATE Exam**



Global Science for Global Well-being



“Even weeds can fulfill our needs

Even useless can get success

That's the power of Science”.

This slogan explains that the things which were once considered useless are now of extreme importance. For example, through techniques like Soxhlet extraction, the weed plants which are normally called “unwanted/ harmful plants” are able to cure tumors, asthma, bronchitis, etc. and obviously the credit goes to Science.

Another example is that of Flax seeds which appears to have been domesticated from the plants of wild species have potential health benefits such as in reduction of cardiovascular disease, osteoporosis, etc. Mentioning the case of humans, where a lady sees herself feeling as a mother, there Science helps her out through techniques like In-vitro fertilization which helps her become a successful mother.

So, what's that which is making it all possible?

“Science and Technology” -Isn't it?

I believe that Science is such a powerful and interesting tool, that we all are blessed with, that we can experiment and learn anything we get curious about. It is actually something that forces us to ask ourselves Why? and How? So, Science is a list of endless questions and the best thing is that each question is answerable and the bestest part is that it helps in the development of the society.

HOLD ON

Pushed on the ground by a wave of fate,
Rummaging through corners to find your own place
But how much you do is never enough,
You cover your wounds in haste.
Every word cuts into you a wound so deep
You aren't who you wish you could be
You hurt too much to even cry
Your demons haunt you in your sleep.
But hold on now
'Cause nothing is ever bigger, or more important
Than YOU.
Doesn't matter what they said, or what you started,
You're more important, YOU
Don't let it all go, don't do that now
You've always been worth so much more
Wipe away the tears you made up in your head
Be the person you always were before.
No, it isn't over quite yet,
YOU'RE the spark who lights the flame
You're never quite alone In your fight,
Empathy hides beyond your window pane.
So hold on now
'Cause nothing is ever bigger, or more important
Than YOU
Doesn't matter what they said, or what you started,
You're more important, YOU
If you'll move out of your own way, you will find
That the whisper within your soul is your guiding light.
HOLD ON

SECRETS OF THE CITY



Whenever there are clouds all over the city, city becomes a secret.

A secret no one told about. a secret possessed by not a single person. who knows the worth of that secret? what if it's a roadmap to conquer the world!

What if the victory resembles the darkness! who knows what lies beyond the beautiful eyes of that beggar roaming in the city!

Who knows what those tiny birds evoking by their voices? these beggars, those birds are free...but I'm caged....within myself... I want to leave this place!

As janab jalaluddin rumi said, "if you could get rid of yourself just once, the secrets of secrets would open to you."

अब बदल गए लोग

थे जो दिल में कभी,
दूर नज़रों से,
अब जाने लगे लोग।
भाईचारे की फिक्र नहीं,
मजहब के नाम पर खून,
अब बहाने लगे लोग।
दूरियां अपनों से हर पल,
अब बढ़ाने लगे लोग।
रिश्ते कम, सियासत ज्यादा,
अब निभाने लगे लोग।
सपने कम, हुस्न को ज्यादा,
अब सजाने लगे लोग।
वक्त कम, रकम ज्यादा,
अब बचाने लगे लोग।
नज़रों से मेरी,
अब गिर जाने लगे लोग।

3.1 Virus Division at CSIR-CDRI progressing approaches towards Pathogenesis and Therapeutics of Flavivirus

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**Dr. Rahul Shukla,
Scientist, Assistant Professor, ACSIR**

After the SARS-CoV-2 pandemic and intermittent epidemics of monkeypox virus in the last few years, the world is looking forward to various virus-related research and a fully developed arsenal to fight back against non-living but hazardous particles, i.e., viruses. In pursuit of the same, Dr. Rahul Shukla, a scientist at CSIR-CDRI, and his team have been continuously working on elucidating the mechanisms and treatments of different viruses of the Flavivirus family.

Flaviviruses are a class of RNA viruses and are also considered arboviruses that spread through the bites of insects. They include viruses like Zika, Dengue, Chikngunya, Japanese Encephalitis, West Nile, and many more. These viruses mostly have similar structures, including both structural and non-structural proteins. The functional similarity of non-structural proteins provides an advantage in drug development as any targeted protein can act similarly in other viruses. Therefore, a single efficient drug can be helpful in curing all Flaviviruses. On the other hand, the structural similarity poses a great challenge in the development of vaccines against such viruses. It imposes a high chance of cross-reactivity with other viruses as well as the development of antibody-dependent enhancement of any Flavivirus.

Dr. Rahul Shukla and his team are primarily focusing on translational research. Dr. Shukla's previous significant works, as reported, include the development and efficiency studies of different subunit-based vaccines against Dengue and Zika viruses. His works also include the development of a phytopharmaceutical compound extracted from *Cocculus hirsutus* as a potent anti-Dengue drug.

Currently, his team is primarily focusing on the development of efficient vaccines and specific drugs against one of the major concerns of the Indo-Pacific region, i.e., Japanese Encephalitis Virus (JEV). It is a major cause of death in children in various parts of India, prominently spreading in areas of Uttar Pradesh like Gorakhpur and Lakhimpur. Dr. Shukla's team has been continuously working on developing subunit-based vaccines and replication cycle-based drugs against JEV. Apart from it, they are working on phytopharmaceutical as well as synthetic drugs' development against various Flaviviruses, including JEV and Dengue.

Also, the team has been deliberately working to unwind various events that are prominent during the pathogenesis of various viruses. For his significant works, Dr. Rahul Shukla was awarded the NASI Young Scientist Award in Biological Sciences in the year 2022.



3.2 Importance of compounds found in *Allium sativum*

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Professor Dr. M. Salman Khan,
IIRC 5, Integral University

Researchers reveal that natural organosulfur compounds protect against hyperglycemia and cardiovascular disease.

The research led by Professor Dr. M. Salman Khan and their research team at the Department of Biosciences, Integral University, examined the Garlic (*Allium sativum*) derived organosulfur compounds in the management of hyperglycemia and atherosclerotic cardiovascular diseases.

Initially, molecular simulation studies reveal that the 4 organosulfur were among the best commercially available modulators which efficiently occupied the active pocket of the targeted protein which are responsible for the hyperglycemia and cardiovascular diseases.

Furthermore, in-vitro inhibition of targeted protein has been carried out that showed promising therapeutic potential against diabetes and cardiovascular diseases.

The preclinical study also depicted that these selected compounds reduced the level of blood glucose, atherogenic lipoproteins and the biomarker of oxidative stress.

The long-term use of currently available drugs for the diabetes and cardiovascular diseases causes several side effects. To overcome these side effects drugs from natural sources is an urgent need. This study will help in the development of drug that will have less toxicity or no side effects.



4.1 A report on one day educational visit to ICAR-IISR (Indian Institute Of Sugarcane Research), Lucknow

One day educational visit to ICAR-IISR, Lucknow was organised by Department of Biosciences, Integral University, Lucknow on 22nd February 2023.

The students were accompanied by Dr. Mohd Ashfaq & Dr. Swati Sharma (faculty members) to guide them regarding the ambience and working of the place. Students were welcomed and briefed about the institute and its research facilities by Dr. Ranjit Singh Gujjar and Dr. Lalan Sharma. Dr. A.D Pathak briefed the students about biocontrol borers and students were taken to the laboratory where they had a very enriched experience as they were exposed to different plant pathogens and harmful insects which greatly impairs the productivity of various crops.

Students were exposed to various types of biofertilizers, vermicomposts and organic manures which can be used along with the chemical fertilizers and thus, can reduce greater dependency on chemical fertilizers. Students were also acquainted with the technique of soil-less cultivation, protected cultivation of fruits and vegetables, organic farming and drip irrigation.

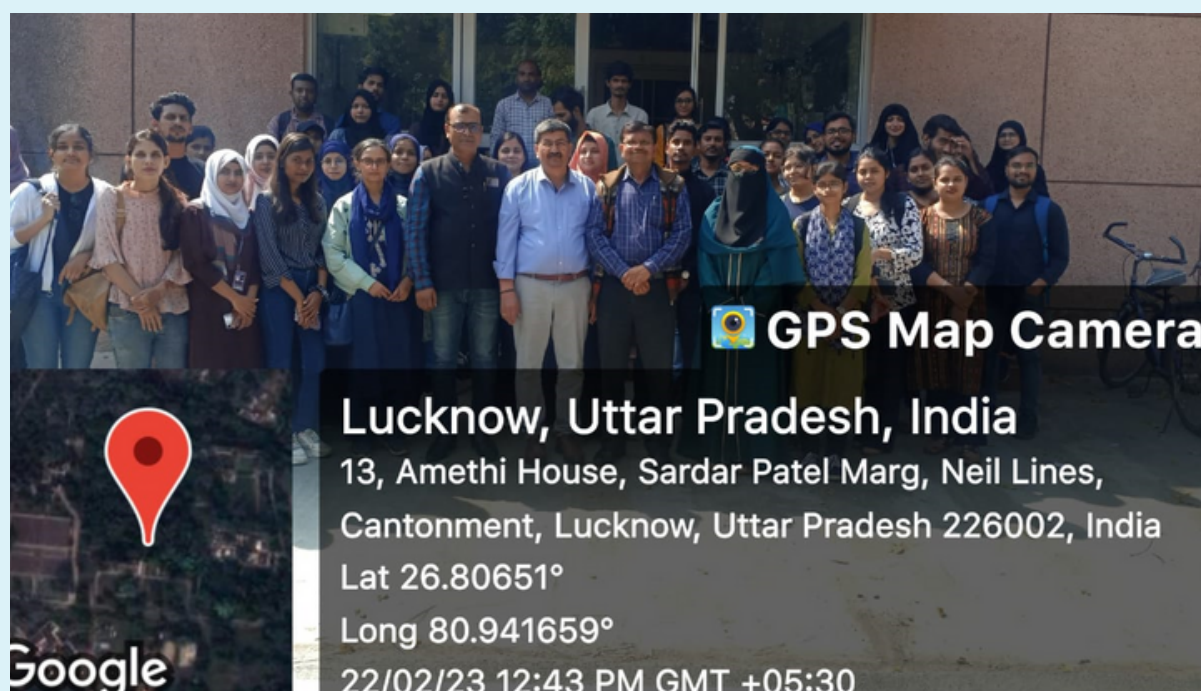




Conclusion

The visit to ICAR-IISR increased our level of knowledge regarding various biological techniques, researches and how the knowledge attained in this field can be utilized for the betterment of the mankind.

At ICAR-IISR students got to know about sugarcane, its production and crop improvement. We learnt about the problems which researchers face while working on sugarcane which includes attack on borers and other parasites and how this can be managed by using biocontrol methods.



4.2 A brief report on DST-STUTI Sponsored Seven Days Hands On Training Programme On “Advanced Molecular Biology Techniques” conducted by the Department Of Biosciences (DST-FIST) and Integral Information & Research Centre (IIRC), Integral University, Lucknow held from 1st December to 7th December, 2022



The Department of Science & Technology (DST) sponsored a one-week hands-on training program on Advanced Molecular Biology techniques from December 1-7, 2022. The program was organized by the Department of Biosciences (DST-FIST) and Integral Information & Research Centre (IIRC), Integral University, Lucknow in collaboration with Jamia Hamdard University, New Delhi as a project management unit (PMU). The objective of the program was to impart both theoretical and practical knowledge of molecular techniques used in agriculture, molecular medicine, and detection and characterization of infectious organisms. The workshop covered different techniques of molecular biology, including animal tissue culture techniques, staining, nucleic acid extraction, cDNA preparation, quantification, RT-PCR, HPLC, and FTIR. The program was aimed at providing hands-on training and sensitization of state-of-the-art equipment and ensuring transparent access to science and technology facilities. The program started with the inaugural function attended by many distinguished dignitaries, including Dr. Jayant Krishna, Chief Executive Officer, Foundation for Advancing Science and Technology, New Delhi, as the chief guest. The workshop was attended by 30 participants from different institutions, including Assistant Professors and research scholars.





**INTEGRAL
UNIVERSITY**
LUCKNOW (INDIA)

Editorial Team

Ilma Khan
(M.Sc. Microbiology
Ist year)

Meghna Chopra
(B.Sc. Life Science IInd
year)

Mohd Danish Khan
(B.Sc. Life Science IIIrd
year)

Sayyed Sehar Ali & Ahmad
Khan
(B.Sc. Biotechnology Ist year)

Affiya Azhar
(B.Sc. Biotechnology
IInd year)

Mohd Ziad Mirza
(B.Sc. ZBC Ist year)

Dr. Snober S. Mir (Mentor)
(Head, Department of Biosciences)

Dr. Arshi Siddiqui
(Mentor)

Dr. Swati Sharma
(Mentor)