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Synapse

OFFICIAL E-NEWSLETTER OF DEPT. OF BIOTECHNOLOGY
RAMA DEVI WOMEN'S UNIVERSITY

This is the official newsletter of Dept. of Biotechnology, Rama Devi Women's University, Bhubaneswar. Read the latest research from around the world on molecular biology, plant biotechnology, bioprocessing, genetic engineering, and more.

In This Volume

Synapse

by Dept. of Biotechnology

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EDITOR's Desk

I am happy to introduce the first edition of SYNAPSE, the official e-newsletter of the Dept. of Biotechnology of Biotechnology, Rama Devi Women's University, Bhubaneswar. This half-yearly e-newsletter will serve as the medium for presenting the departmental activities, achievements of faculty and students as well as bring in new scientific stories exploring the role of biotechnology in human development.
I congratulate the team biotechnology @RDWU for this initiative.

Department Activities

BIOTECHNOLOGY WEBINAR SERIES

A webinar series involving various lectures by eminent guest speakers was conducted by the Dept. of Biotechnology to promote education and research in biotechnology and provide academic and professional excellence for immediate productivity in various sectors.

Dr. Bijaya Kumar Sahoo
Regional Manager (IPFC & TISC), NRDC, Govt. of India, Visakhapatnam

Dr. Gopaljee Jha
Staff Scientist IV, National Institute of Plant Genome Research, New Delhi

Dr. Bijaya Kumar Sahoo spoke about "**Intellectual Property Rights and Innovation Management in Biotechnology**". He affirmed that Biotechnology is a discipline where innovation has no bounds. Therefore, a form of protection is needed to keep the knowledge safe and preserved. Intellectual property rights provides that shield and the barrier to protect it. The rising tide of patent applications is witness to the fact that Biotechnology industry needs such protection and licensing to safeguard the rights of the inventor and to encourage and promote new talents, inventions and innovations for sustainable economic growth.

Dr. Gopaljee Jha spoke about "**Unravelling the secrets of fungal eating bacteria for disease control in plants**". Dr. Jha spoke about a novel discovery by his research group based on the mycophagal properties of bacteria. Mycophagous bacteria can produce different types of antibiotics, toxins (tolaasin, lipase), cell wall degrading enzymes (chitinase, glucanase, and protease), and antifungal secondary metabolites, which are thought to damage fungal cells and release fungal metabolites to utilize them as nutrient source.

Dr. Nivedita Sahu, Chief Scientific Officier, KIIT-TBI, Bhubaneswar and Prof. PKJ Mohapatra, IIT, Bhubaneswar spoke on Innovation and Entrepreneurship in Biotechnology and Introduction to Scientific Writing" respectively.

LIFETECH 2020

Department of Biotechnology and Department of Life Sciences co-organized a two-day national conference on "**Advances in Life Sciences and Biotechnology"- LifeTech 2020**, on 27th-28th February, 2020. Prof. Gitanjali Batamanabane, Director, AIIMS, Bhubaneswar was the Chief Guest.

The conference focused on relevance of Biotechnology in today's world, recent developments, its importance in the field of cancer, disease diagnosis, plant genetic engineering etc. and discussion on various bio-entrepreneurship opportunities available in our country.

Total number of registered participants were 255, whereas there were 10 invited speakers and 11 invited young scientist speakers in the conference.

The seminar was attended by eminent speakers from across the country including Prof. Sumita Jha, Calcutta University, Kolkata, Dr. Alok Krishna Sinha, National Institute of Plant Genome Research, New Delhi, Dr. Rukmini Mishra, Centurion University of Technology and Management, Bhubaneswar, Dr. Sampa Anuparba, BHU, Varanasi, Dr. Dileep Vasudevan, Scientist, Institute of Life Sciences, Bhubaneswar and Prof. K. Tayung, Guwahati University who spoke on different aspects of the theme of the seminar.

Posters relevant to the theme of the seminar were presented by B. Sc, M. Sc and M. Phil students Biotechnology and Life Science from RDWU, North Orissa University, OUAT Bhubaneswar, Centurion University, BJB college , KIIT University, Bhubaneswar.
Majority of the posters were on the topics of gene editing, cancer therapeutics and plant genetic engineering.

Achievements

STUDENT ACHIEVEMENTS

• Students of UG and PG batches have actively participated in various **seminars and workshops** organized by **DBT India, Sharda University, NIT Jalandhar and IIT Kharagpur** about laboratory practices, scientific writing, current trends in condensed physics, molecular genetics and related fields of Biotechnology.

• The students have completed various **online courses** such as COVID 19 training for healthcare workers from **Stanford University**, epidemiology courses offered by **World Health Organization**, Bioinformatic analysis of Bacterial genomes by **Wellcome Sanger Institute.**

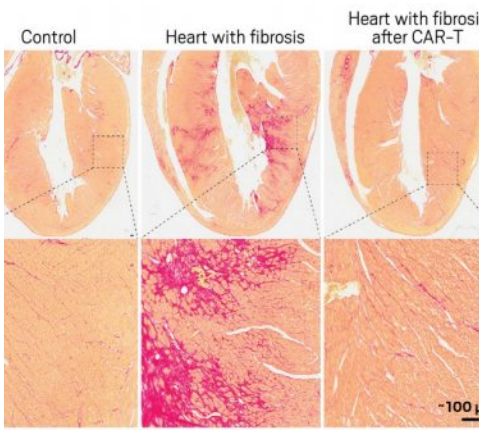
• 8 students of M.Sc batch 2019-2021 have been awarded with the **P.G. MERITORIOUS SCHOLARSHIP**, Institute of Mathematics & Applications, Odisha (Selection criteria : Written Test).

Science Stories

CAR T CELLS REVERSES HEART DAMAGE IN MICE

CAR-T cell therapy, an immune-based therapy that has had notable success in treating difficult cancers, could soon fight one of the most common human ailments —tissue fibrosis. In their new CAR-T fibrosis therapy, Epstein and his team engineered mouse immune cells to find and destroy fibroblasts in the animals through a molecule on the surface of these cells. To do so, the scientists removed T cells from mice and engineered to express a protein called a chimeric antigen receptor, or CAR, that can recognize FAP, a protein that some fibroblasts express on their surface when they are active and in repair mode. In humans, Epstein says, FAP is one of the most common proteins found in diseased human hearts compared with healthy hearts.

For more details, go to:
https://cen.acs.org/biological-chemistry/biotechnology/CAR-T-reverses-heart-damage/97/i36

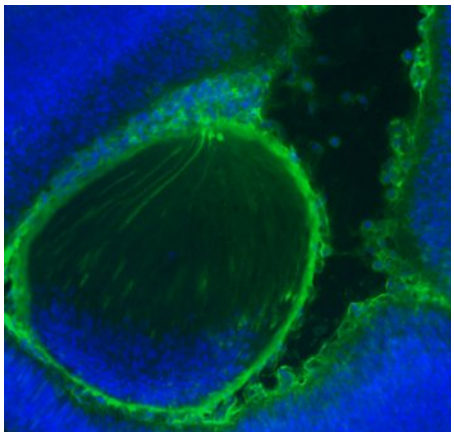


Source : C&EN magazine, American Chemical Society

NEW HYBRID EMBRYOS ARE THE MOST THOROUGH MIXING OF HUMANS AND MICE YET

Many scientists have hit roadblocks in growing human stem cells in mice or other animals, including pigs and cows. "We have analyzed thousands of embryos but never saw robust chimeric contribution" of human stem cells to mouse embryos beyond day 12, says stem cell and developmental biologist Jun Wu of the University of Texas Southwestern Medical Center in Dallas, who wasn't involved in the study. The new method's success comes down to timing, says neuroscientist and stem cell biologist Jian Feng. To grow and thrive in a mouse embryo, human stem cells' developmental clocks must be turned back to an earlier phase called the naïve stage. Feng and his colleagues reset the stem cells' clocks by silencing a protein called mTOR for three hours. This brief treatment shocked the cells back to their naïve stage, presumably restoring their ability to turn into any cell in the body.

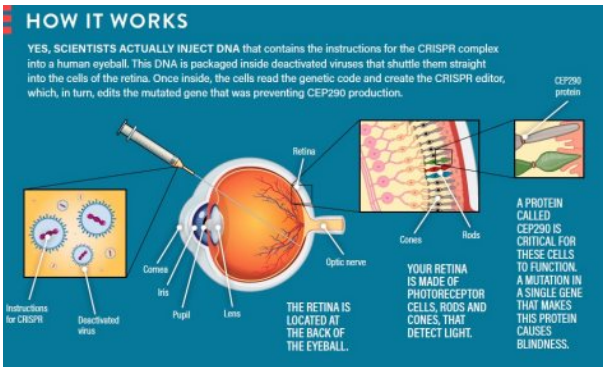
For more details, go to :
https://www.sciencenews.org/article/mouse-human-chimera- hybrid-embryos



Human cells (green) pack into a developing mouse's eye (blue) in this hybrid embryo. Source : Prof. Jian Feng, University at Buffalo

CRISPR TREATMENT INSERTED DIRECTLY INTO THE BODY FOR FIRST TIME

The pharmaceutical companies Allergan and Editas Medicine partnered with Oregon Health & Science University for the trial, named BRILLIANCE, which aims to treat a form of congenital eye disease known as LCA10. In the trial, scientists are injecting instructions for the CRISPR gene editor, encapsulated in the shell of a deactivated virus, into patients' eyes. There, if all goes well, the tool will cut out a problematic gene and restore their vision. This clinical trial is a landmark for CRISPR-Cas9, which has revolutionized gene-editing research since its discovery in 2012.

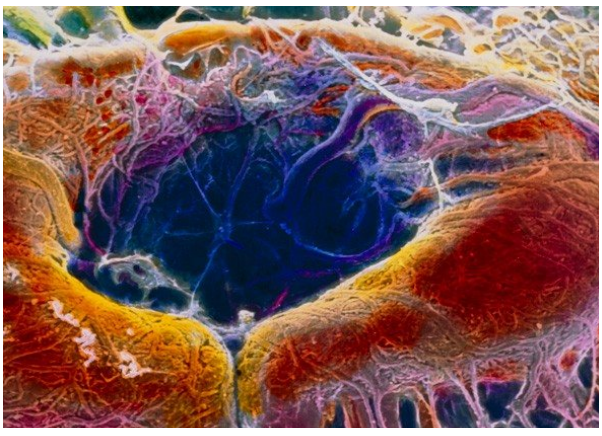


Source: Discover magazine

The technique inserts a healthy copy of the affected gene into a specific location in the genome of liver cells. Although it seems to be safe, early results suggest it might do little to ease the symptoms of Hunter's syndrome.

The findings could open the door to using the same approach to treat other diseases where doctors can't take cells out of the body, including brain disorders such as Huntington's and muscle diseases like muscular dystrophy. "It's exciting. The world is our oyster. We almost have too many targets that we can go after," says Dr. Lisa Michaels, chief medical officer at Editas Medicine, which is sponsoring the study.

For more details, go to :
https://www.nature.com/articles/d41586-020-00655-8

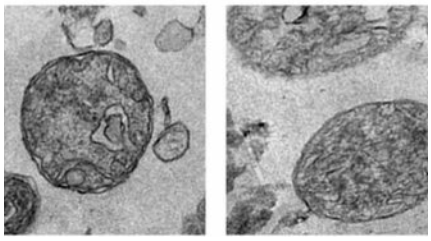


The human retina. Source: Prof. P. Motta/Dept. of Anatomy/University La Sapienza of Rome

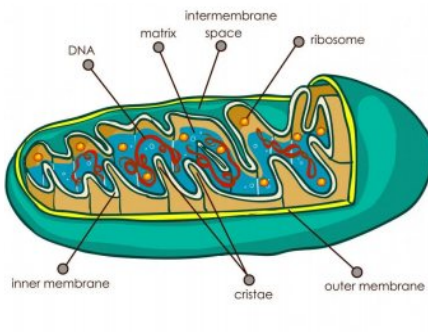
MITOCHONDRIA IN CIRCULATION

Scientists have reported that they had found functioning mitochondria in people's blood. Past studies had shown that mitochondrial DNA could be found in circulation, and at times the organelles might get released from cells in response to damage, but entire, respiring organelles in the blood of healthy individuals was a novel observation.

For more details, go to :
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7139699/#:~:text=Mitochondria%20are%20usually%20located%20in,in%20adult%20human%20blood%20plasma.



Electron microscopy image of mitochondria isolated from healthy human blood plasma
Credit : ALAIN THIERRY, INSERM



Structure of Mitochondria

ALZHEIMER'S BLOOD TEST

When a patient complains of forgetfulness, a neurologist might not know immediately whether it results from normal aging, reduced blood flow to the brain—or, more ominously, Alzheimer's disease. For much of the past century, a definitive Alzheimer's diagnosis could only be made during an autopsy. Brain imaging and spinal fluid tests now make it possible to spot the disease in patients even before the initial symptoms appear. But these invasive tests are expensive and generally limited to research settings that are not part of routine care for the millions of people suffering from the most common neurodegenerative disorder.

The C2N test, called PrecivityAD, uses an analytic technique known as mass spectrometry to detect specific types of beta-amyloid, a protein fragment that is a pathological hallmark of disease. Beta-amyloid proteins accumulate and form plaques visible on brain scans two decades before a patient notices memory problems. As plaques build up in the brain, levels of beta-amyloid decline in the surrounding fluid. Such changes can be measured in spinal fluid samples—and now in blood, where beta-amyloid concentrations are significantly lower. PrecivityAD is the first blood test for Alzheimer's to be cleared for widespread use and one of a new generation of such assays that could enable early detection of the leading neurodegenerative disease—perhaps decades before the onset of the first symptoms.

For more details, go to :
https://www.scientificamerican.com/article/detecting-alzheimers-gets-easier-with-a-simple-blood-test/

SURPLUS CHROMOSOMES MAY FUEL TUMOR GROWTH IN SOME CANCERS

Some cancers are addicted to having extra chromosomes, a study in mice suggests.
Cells usually have just two copies of each chromosome — one inherited from mom and one from dad. But about 90 percent of cancer cells have additional chromosomes, a condition called aneuploidy.

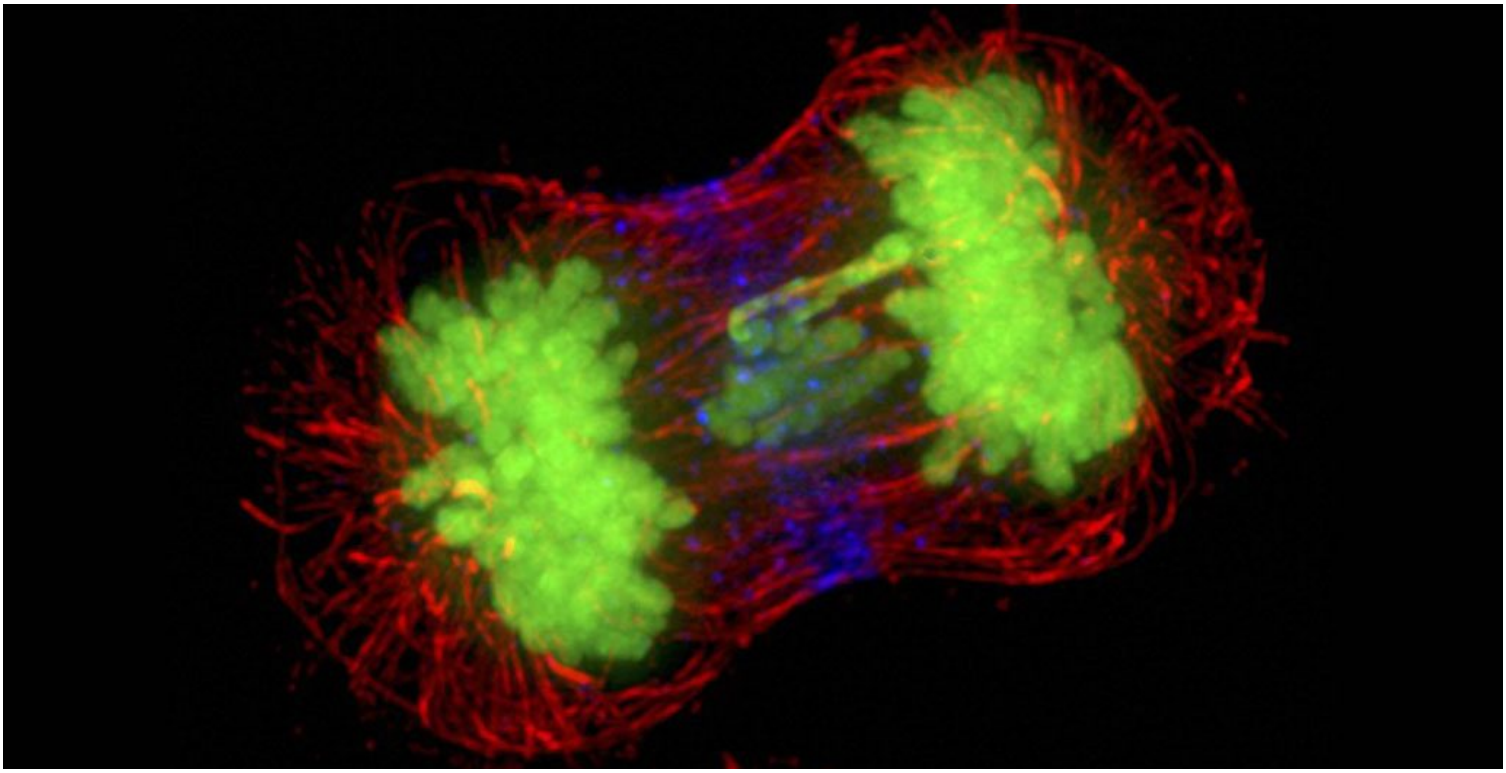
Certain types of cancer cells often carry a third copy of a particular chromosome or part of a chromosome. For instance, more than half of colorectal tumors have a surplus chromosome 13, and more than 40 percent carry an extra chromosome 7 or the long arm of chromosome 8. Stocking spare copies of chromosomes has been associated with poorer outcomes for patients compared with patients whose cancers have the usual two copies.

It turns out that those extra doses of genetic material are necessary for the cancer cells to keep growing, cancer geneticist Jason Sheltzer reported December 11 at the joint annual meeting of the American Society for Cell Biology and the European Molecular Biology Organization. Put another way, cancer tumors are addicted to the bonus chromosomes, he says.

he idea of "addicted" cancer cells isn't completely new. Scientists have known for decades that cancer cells can be addicted to altered versions of certain genes, meaning that those genes are required for the continued cancerous growth of the cells.

As for chromosomes, researchers have speculated for more than a century that some cancers have particular chromosome surpluses that spur growth. But the ability to specifically delete specific chromosomes to test the idea is new, says Beth Weaver, a cancer cell biologist at the University of Wisconsin–Madison, who was not involved in the work.

For more details, go to :
https://www.sciencenews.org/article/surplus-chromosomes-may-fuel-tumor-growth-some-cancers



Mistakes that happen as cells replicate their DNA, repair broken DNA or divide into two cells can result in an extra or missing copy of a chromosome. In this microscope image, one chromosome (green) lags behind as a HeLa cancer cell divides.