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NEWS ITEM

Scientific findings :

Scientists worked out Novel approach to postpone Age related Health Deterioration:

Researchers have discovered a technique for breaking down damaged mitochondria and removing them from cells. This method resulted in improved health and extended lifespan for the insects, and its developers hope it may one day lead to longevity therapies for humans.

Researchers studying middle-aged fruit flies have improved the insects' health substantially and slowing their aging significantly. They believe their technique could someday pave the way toward delaying the onset of Alzheimer's disease, Parkinson's disease, cancer, cardiovascular disease, stroke, and other age-related diseases in humans.Their approach targets the cellular power houses, called mitochondria, which control the cell growth and death. Mitochondria frequently sustain damage as part of the aging process, and cells can't always remove these damaged organelles, which then become toxic as they accumulate in the muscles and the brain and other organs. This buildup contributes to a broad variety of age-related diseases.In this study, published in Nature Communications, the researchers found that the mitochondria in fruit flies changed shape, elongating as the insects hit middle age. The team broke damaged mitochondria up and removed them, which caused the flies to be more energetic and live 12 to 20 percent longer.Perhaps even more excitingly, the scientists discovered key cellular components of the process of mitochondrion elongation and removal. When they increased the levels of a protein called Drp1, this broke down the mitochondria, allowing them to be removed through a process controlled by the Atg1 gene. The scientists also switched off a protein called Mfn so the mitochondria were unable to fuse together into larger pieces, which also improving the health and extending the lives of the flies.

Novel CRISPR therapeutic approach to undo DMD mutations : A new approach to CRISPR-Cas9 gene-editing technology, called myoediting, successfully restored dystrophin production and contraction force in heart muscle cells of Duchenne muscular dystrophy (DMD) patients. The new strategy, developed by U.S. and German researchers, targets sites located in "hot spots" of mutations along the dystrophin gene, allowing its editing and repair. The study, "Correction of diverse muscular dystrophy mutations in human engineered heart muscle by single-site genome editing," was published in the journal Science Advances.DMD is associated with the degeneration of skeletal and heart muscle caused by more than 3,000 different mutations in the dystrophin protein, which is essential for correct muscle movement. Researchers had previously shown that the genome editing method CRISPR could correct genetic defects that characterize Duchenne in mouse models and human cells. The CRISPR-Cas9 system, originally discovered in bacteria as a defense mechanism, allows researchers to edit parts of the genome by adding, removing, or changing specific sections of the DNA sequence. However, due to the high number of mutations involved, a specific therapy would have to be developed for each mutation. The novel CRISPR method, called myoediting, can modify DNA so that a wide region of mutation hot spots is skipped from the final dystrophin protein, potentially correcting the majority of DMD mutations.

Reversal of cell aging is possible now : Induced pluripotent stem (iPS) cells may be the key to reversing aging in hematopoietic stem cells.The technique is also particularly useful for combating blood-related cancers and other disorders.From revitalizing heartbeats and increasing longevity, to removing disorders via gene editing, blood-borne challenges are approached with new solutions as quickly as we can innovate them. While many of the solutions we currently have can tackle blood disorders reactively, researchers at the University of Lunds in Sweden

have devised a method that could address blood disorders proactively.Our blood changes as we age due to epigenetics, a process by which our gene expression is silenced or activated over time, without modification of the genetic code itself. With this in mind, the team of researchers at the University of Lunds took a look at the hematopoietic stem cells (HSC) of aged mice to see if they could unlock the mysteries of how our cells age.The iPS cells served as a "reset button", reprogramming the blood stem cells and sparking a rejuvenation of sorts. Researchers observed that the progenitor HSC cells in the old mice began to produce blood cells functionally similar to those seen in younger mice.The group's data suggests that HSC aging can be reversed by the introduction of iPS cells. It's important to note, however, that these changes in blood cell production do not primarily occur due to mutations — but because of epigenetic changes in gene expression over time. With their encouraging results, the research team is hopeful they may be closer to developing therapies that could reduce the incidence of blood disorders, including the three main types of blood cancers and over 100 blood-related diseases

Novel Tuberculosis detecting devise is on board : There may soon be a cost-effective, time-saving gadget to detect mycobacterium tuberculosis. Researchers from IIT Delhi, Jamia Hamdard University and Indian Council for Medical Research have developed 'iMC2 TB Test', which promises to bring down the detection time from four days to an hour. At present, smear microscopy is used to diagnose pulmonary TB by analysis of sputum samples. The new gadget needs no expertise or heavy infrastructure to test sputum.The gadget is the brainchild of Seyed E Hasnain of IIT-D who is the VC of Jamia Hamdard, Ravikrishnan Elangovan of IIT-D and Nasreen Ehtesham of ICMR. The diagnostic kit costing up to Rs 500 would be designed to minimise exposure among clinical workers. Six samples could be tested at a time. The gadget is already being tested at Jamia Hamdard. The project has cost Rs 2.28 crore and comes under a centrally funded IIT-IISc joint programme.

Drastic decline of Phytoplankton population to 40% since 1950

Researchers find trouble among phytoplankton, the base of the food chain, which has implications for the marine food web and the world's carbon cycleThe microscopic plants that form the foundation of the ocean's food web are declining, reports a study published in Nature.The tiny organisms, known as phytoplankton, also gobble up carbon dioxide to produce half the world's oxygen output—equaling that of trees and plants on land.But their numbers have dwindled since the dawn of the 20th century, with unknown consequences for ocean ecosystems and the planet's carbon cycle.Researchers at Canada's Dalhousie University say the global population of phytoplankton has fallen about 40 percent since 1950. That translates to an annual drop of about 1 percent of the average plankton population between 1899 and 2008.The scientists believe that rising sea surface temperatures are to blame.The researchers found the most notable phytoplankton declines in waters near the poles and in the tropics, as well as the open ocean.They believe that rising sea temperatures are driving the decline. As surface water warms, it tends to form a distinct layer that does not mix well with cooler, nutrient-rich water below, depriving phytoplankton of some of the materials they need to turn CO2 and sunlight into energy.

Scientists from MIT discovered a novel way to freeze water at boiling point, first of its kind : In a scientific breakthrough, researchers discovered a way to freeze water at temperatures higher than 100 degrees Celsius (212 degrees Fahrenheit) successfully.Because of water's unique properties, the technique could be vital for the development of "ice" wires, which provide stable conductors of electricity already in the configuration needed for use in electronics.In an academic article recently published in Nature Nanotechnology, the research team demonstrated how common substances like water can drastically change behavior when confined to a minuscule space measuring in billionths of a

meter.The article's lead author, MIT's Carbon P. Dubbs Professor in Chemical Engineering Michael Strano and his team of researchers utilized single carbon nanotubes to trap water molecules, distorting the substance's change between solid, liquid and gas states.

For the first time scientists measured anti matter

Scientists have made the most precise measurement of antimatter yet, and the results only deepen the mystery of why life, the universe, and everything in it exists.The new measurements show that, to an incredibly high degree of precision, antimatter and matter behave identically. Now, in a new study published today (April 4) in the journal Nature, Hangst's team has achieved an unprecedented standard: They've taken the most precise measurement of antihydrogen — or any type of antimatter at all — to date. In 15,000 atoms of antihydrogen (think doing that aforementioned mixing process some 750 times), they studied the frequency of light the atoms emit or absorb when they jump from a lower energy state to a higher one. [Beyond Higgs: 5 Elusive Particles That May Lurk in the Universe]The researchers' measurements showed that antihydrogen atoms' energy levels, and the amount of light absorbed, agreed with their hydrogen counterparts, with a precision of 2 parts per trillion, dramatically improving upon the previous measurement precision on the order of parts per billion.

Metastasis is influenced by DNA of Mitochondria

The mitochondrial genome of mice is only 16 kilobases long, comprising just 37 genes, yet its polymorphisms appear related to the metastatic potential of cancer, researchers report at the American Association of Cancer Research annual meeting in Chicago. Researchers swapped the nuclear and mitochondrial DNA among several mouse strains and observed changes in immune function, microbiome composition, metabolomics, and tumor spread that tracked with mitochondrial type.The latest, unpublished findings build upon a 2017 report in Cancer Research by Welch's group that showed that the mitochondrial genome was tied to the speed of cancer growth and metastasis. In the latest experiments, the researchers took cancer cells with the mouse strains' original nuclear and mitochondrial genomic backgrounds and infused them into mice with either original or swapped mitochondrial DNA. This set-up gave the investigators a look at how mitochondrial DNA in tissues outside the tumor might affect cancer spread. Again, the team found that the amount of metastases was tied to mitochondrial type.

Indians traversed to Australia 4000 years ago

Genetic evidence suggests that just over 4 millennia ago a group of Indian travellers landed in Australia and stayed. The evidence emerged a few years ago after a group of Aboriginal men's Y chromosomes matched with Y chromosomes typically found in Indian men. Up until now, the exact details, though, have been unclear.But Irina Pugach from the Max Planck Institute for Evolutionary Anthropology may have recently solved the thousand-year-old case. 4,000 years before the First Fleet landed on our fair shores, Indian adventurers had already settled and were accepted into the Indigenous Australian culture. The study found a pattern of SNPs that is only found in Indian genetics, specifically the Dravidian speakers from South India.

Research draws speculation as to why ancient terrestrial deer like animal evolved to whales

Whales come from a species of ancient deer-like creatures known as Indohyus. They roamed southern Asia about 48 million years ago. An Indohyus was only about the size of a raccoon, and researchers believe that they fed on aquatic plants.So what coaxed these creatures back into the ocean 100 million years after their ancestors climbed out of it? A duo of researchers contend that this question has received far too little attention, until now. The results of their study has been published in a report in the journal

Paleobiology. To date, there have been two prevailing hypotheses.The scientists isolated 69 incidents in which a terrestrial species decided to live in or extract sustenance from the ocean after a mass extinction had taken place. In two of the largest such events, one that occurred 201 million years ago at the end of the Triassic and another at the end of the Cretaceous period, there was no grand exodus of land animals back into the sea.

New approach to trace contamination of paraffin oil in coconut oil

Using a novel approach, researchers at Indian Institute of Technology (IIT) Madras have for the first time been able to use mass spectrometry to analyse various saturated and unsaturated hydrocarbons directly from solutions. Ionising the constituent molecules of a hydrocarbon sample for detection using mass spectrometry has not been easy till date as hydrocarbons do not tend to lose or gain electrons to form ions.Using the novel technique — laser-assisted paper spray ionisation mass spectrometry — the research team led by Prof. T. Pradeep from the institute's Department of Chemistry could detect various hydrocarbons, importantly, paraffin oil contamination in coconut oil samples. Though it is common knowledge that vegetable oils are adulterated, the extent of contamination with paraffin oil was as much as 10%. The results were published in the journal Analytical Chemistry.Detecting ions using paper spray ionisation mass spectrometry is known already. In this method, a regular filter paper containing the sample is subjected to high electrical potential and the charged droplets and the ions derived from them are analysed using a mass spectrometry. But this method cannot be used for detecting hydrocarbons. So the researchers turned to the humble laser pointer used commonly during presentations to turn the stubborn hydrocarbons to emit ions for the measurement.

IISc researchers developed nanomotors which aids in study of cell organelles.

Nanomotors and their applications in biomedicine have gained huge interest in recent times and now researchers from Indian Institute of Science (IISc), Bengaluru, have successfully shown how to move them around inside living cells.In a paper published recently in Advanced Materials, the team demonstrated the manoeuvrability of magnetic-material-coated silica nanomotors inside different cell lines. Less than 3 microns in length, they can be used for targeted drug delivery, nanosensing and in therapeutics.The group fabricated two helical nanomotors with different dimensions for their experiments. They found that nanomotors could move inside the cells when a rotating magnetic field of less than eighty Gauss (much below the safe level for human beings) is given.The smaller ones (250 nm thick and 2.4 micron long) could move at a speed of around 500 nanometer per second, throughout the cell much easier than the big ones (400 nm thick and 2.8 microns long) due to the natural porosity of intracellular environment.Three types of cell lines — human cervical cancer cells, human embryonic kidney and endothelial cells from cattle — were used for the study.

Scientists worked out novel technique for In vitro segregation of liposomes

In a prelude to manifest an artificial cell team of researchers lead by Siddharth Deshpande, a postdoctoral researcher at Cees Dekker's lab at Delft University of Technology in the Netherlands mechanically segregates liposomes, which are compositional equivalents of cell envelopes. All living cells are enclosed in a lipid envelope. Thus, a liposome, which is a lipid bubble filled with water, is the simplest mimic of a living cell. Generating pure liposomes in a controlled fashion in the lab is not simple. To achieve this goal, Dr. Deshpande designed tiny fluid chambers with dimensions in the order of one-millionth of a metre to form stable liposomes. He reported this bubble-blowing method called octanol-assisted liposome assembly (OLA) in Nature in 2016 and in Nature Protocols in 2018.The team's next mission was to split these liposomes into 'daughter' liposomes. In the past, researchers have used different

methods to divide liposomes. However, all these methods suffered from leaky daughter liposomes and asymmetric splitting. In their latest study, published in ACS Nano journal, he kept the approach simple. He designed a wedge in the microfluidic chamber that physically blocked the newly formed liposomes as they progressed down the channel. By adding a fluorescent dye to the water inside the liposomes, the researchers visualised their fate using a microscope.

World's tiny fern is reported from Western Ghats

Indian researchers have discovered the world's smallest land fern hiding in the Ahwa forests of the Western Ghats in Gujarat's Dang district. According to a recent study in Scientific Reports, an international journal that publishes multidisciplinary research, the fingernail-sized fern belongs to a group known as the adder's-tongue ferns, named after their resemblance to a snake's tongue. The size of the new Malvi's adder's-tongue fern Ophioglossum malviae – just one centimetre.

Study reported that bacterial resistance is attributed to just a tiny dose of antibiotics

Even low concentrations of antibiotics can cause high antibiotic resistance in bacteria, a growing problem in global health care, according to a study. In the study published in the journal Nature Communications, researchers investigated how prolonged exposure to low levels of antibiotics contributes to the development of bacterial antibiotic resistance. The researchers show that low concentrations of antibiotics, too, play a major part in the development of resistance. The study showed that, over time, bacteria exposed to low doses of antibiotics developed resistance to antibiotic levels that were more than a thousand times higher than the initial level to which the bacteria were subjected.It was also found that the mutations in the bacterial DNA that cause resistance are of a different type than if they have been exposed to high doses.

Sulphur laden fossil fuels cleaned by bacteria

Using novel bacterial strains, scientists have successfully removed sulphur from fossil fuels such as petroleum and coal. Sulphur is one of the major pollutants emitted during the combustion of fossil fuels.Scientists from CSIR-Institute of Minerals and Materials Technology (CSIR-IMMT) in Bhubaneswar used four bacterial strains that use dibenzothiophene (an organic sulphur compound which is a major contaminant of fossil fuel) as an energy source thereby getting rid of the sulphur. The work published in the journal PLOS ONE.

Scientists unleashed first bionic kidney which replaces dialysis process

California in San Francisco have invented the world's first bionic kidney which can replace damaged kidneys. The world's first bionic kidney can be inserted in a body by a common surgical procedure and it has proved to work efficiently. It is now proving to be the perfect replacement for a damaged kidney. The bionic kidney consists of several microchips which is moved by the heart. The bionic kidney also filters out toxins from the blood in the same way as a normal kidney.

ACADEMIC NEWS

UGC's Landmark decision towards institutionalizing Institutions of Eminence (IoE)

In a landmark development in the Higher Education sector in India, the University Grants Commission (UGC) has notified two important regulations: (i) UGC (Institutions of Eminence Deemed to be Universities) Regulations, 2017 for private institutions; (ii) UGC (Declaration of Government Educational Institutions as Institutions of Eminence) Guidelines, 2017 for public Institutions. These two regulations reflect the Government's efforts and seriousness to establish twenty 'Institutions of Eminence' to achieve world class status, from amongst the existing Government/ private institutions and new institutions from the private sector. The objective is to provide for greater Academic, Financial, Administrative and other regulatory autonomy to 10 public and 10 private higher educational institutions to emerge as world-class teaching and research institutions. The Institutions declared as Institutions of

Eminence will be free from the usual regulatory mechanism to choose their path to become institutions of global repute with emphasis on multi disciplinary initiatives, high quality research, global best practices and international collaborations.

PM Research fellowships to curb the cream of India's brain drain

Indian government rolls out Rs 80,000 a month PhD grant to plug brain drain.As part of its move to stop them from taking up research scholarships abroad, the Cabinet has cleared the PM Research Fellowships (PMRF) for students of higher education institutions like the IITs, IISERs and NITs, which will also be the country's most lavish paid scholarships to date. Under the scheme, students who have completed or are in final year of B.Tech or integrated M.Tech or M.Sc in science and technology streams at IISc, IITs, NITs, IISERs, IIITs will be offered direct admissions in PhD programmes in IITs and IISc. The minimum eligibility for aspirants will be a cumulative grade point average (CGPA) of 8.5. The minister said that the scheme will be rolled out from the 2018-19 academic session. Students, who would fulfil the eligibility criteria and get shortlisted, would be offered a fellowship of Rs 70,000 a month during the first two years, Rs 75,000 per month during the third year and Rs 80,000 per month during the fourth and the fifth year.

62 Higher Educational institutions granted full autonomy by UGC

The University Grants Commission (UGC) approved full autonomy for 62 higher educational institutions, including JNU, BHU, AMU, TERI and University of Hyderabad, which have maintained high standards of excellence. The decision was taken at a UGC meeting today where five central universities, 21 state universities, 26 private universities besides 10 other colleges were granted autonomy under the Autonomous Colleges Regulation. These Higher Educational Institutions (HEIs) achieved a benchmark of 3.26 and above NAAC (National Accreditation and Assessment Council) ranking.

POST – DOC OPPORTUNITIES

1.Indian Institute of Technology, Madras offers Postdoctoral Fellowship for women with Break in career : IIT Madras offers PDF for women with Break in career with Ph.D with an objective of maintaining awareness and interest in high quality academic research in various departments. Refer www.iitm.ac.in.

2. **TIFR Postdoctoral Fellow Positions :** Postdoctoral positions funded for a minimum of 3 years are available in the research group of Dr. Sreelaja Nair in the Department of Biological Sciences at the Tata Institute of Fundamental Research in Mumbai, India. Refer www.tifr.res.in

3. Indian Institute of Science Education and Research, Pune Post-Doctoral Position : The research involves using mouse and human cell lines as well as ex vivo cells questions regarding T cell activation, differentiation, commitments to different functional fates, survival and death will be addressed. Refer iiserpune.ac.in.

4. Indian Institute of Technology Gandhinagar Postdoctoral Fellow : One Postdoctoral Position in Aspects of the hot QCD medium in the presence of Strong EM fields under Prof. Vinod Chandra. Refer iitgn.ac.in

5. Indian Institute of Science Education and Research - Tirupati Post - Doctoral Research Fellowship Program : IISER Tirupati is starting an active Post-doctoral Research Fellowship Program to enable highly motivated young researchers to conduct research in the frontier areas of science and Technology. Refer iisertirupati.ac.in

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