

SCIENTIFIC NEWS

Nano material cure Parkinson's disease: A metal oxide nanomaterial capable of mimicking all three major cellular antioxidant enzymes that control the level of reactive oxygen species (ROS) inside cells has been designed. These nanozymes possess therapeutic potential to prevent ROS-mediated neurological disorders such as Parkinson's disease. A team of researchers from IISc, Bengaluru has fabricated a metal oxide nanomaterial that is capable of mimicking all three major cellular antioxidant enzymes, thereby controlling the level of reactive oxygen species (ROS) inside cells. Based on *in vitro* test results, the nanomaterial appears as a promising candidate for therapeutic applications against oxidative stress-induced neurological disorders, particularly Parkinson's. Parkinson's model was tested in the lab. The researchers are trying to design an animal model in mice for *in vivo* testing. The results are encouraging and indicate that the nanomaterial is not toxic and the nanozymes have a neuroprotective effect as they prevent neuronal cells from oxidative stress.

Mimic Fish scales to design Oleophobic surfaces in water: Inspired by fish scales that exhibit excellent property to remain oil-free even when the water is contaminated with oil, scientists have developed a special kind of superior oil-repulsive (oleophobic) coating. When applied to any material - wood, glass or metal objects - the coating keeps the surface free of oil contamination under water. By tweaking the composition of the coating, the team has been able to make the coating also extremely oil-loving (oleophilic) under water. One gram of cotton ball coated with the highly oleophilic material was able to absorb over 1,000 grams of oil, irrespective of the density of the oil, the researchers found. The coating developed were stable even at extreme temperatures -up to -15 degree C and 100 degree C. It was also found to be stable for the duration of test (30 days), when the pH of water was reduced to 2 (highly acidic) and increased to 11 (highly alkaline).

Cancer's Principle method of Energy Synthesis was prevented by a Diabetes Drug:

Researchers have observed that diabetic patients whose diabetes was being treated with the drug metformin had better chances of recovering from head and neck cancer than non-diabetic patients. During the course of a three-year study, which was detailed in the journal *The Laryngoscope*, researchers at the Sidney Kimmel Cancer Center at Thomas Jefferson University examined this unintended side effect further and learned a great deal about how metformin affects the biology of cancer cells. In a study of 39 non-diabetic cancer patients, low-dose treatment with diabetes medication metformin resulted in a significant increase in tumor cell death. Though more studies are needed before this can become a recommended cancer treatment, the results are promising as metformin produces almost no unwanted side effects. The research is certainly off to a good start, as these clinical trials showed.

Aging cells have a Reset Button: 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. But when the old mice were provided with induced pluripotent stem (iPS) cells - essentially a batch of fresh stem cells - something quite fascinating happened. 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.

Photosynthesis mechanism paves way for Developing Efficient Artificial Solar Panels:

A natural process that occurs during photosynthesis could lead to the design of more efficient artificial solar cells, according to

researchers at Georgia State University. This study provide quantitative evidence that inverted-region electron transfer is responsible for the very high efficiency associated with solar energy conversion in photosynthesis.

DNA Folding Mechanism: A Hub of Unseen information: The folding mechanism of DNA is believed to play a large role in how genes are read by the rest of the cell. Biologists have started to isolate mechanical cues that determine how DNA is folded. Now, theoretical physicists from Leiden University in the Netherlands confirmed through computer simulations that these cues are actually coded into our DNA. The team used genomes of baker's yeast and fission yeast to find correlations between the mechanics and the actual folding structure of DNA in the two organisms. The results confirm that this second layer of information exists. This led them to conclude that genetic mutations are not just caused by a change in the sequence of codes but also by a change in the way the strands are folded. This simulation may be helpful in hiding unwanted sequences like those that cause diseases.

Nano Robots kills Cancer cells: Tiny new robots are proving to be life-saving tools in the fight against cancer. As first reported, the scientists have developed nanomachines that are capable of drilling into cancer cells, killing them within minutes. These light-activated nanobots, the size of a molecule, move so rapidly that they can burrow through cell linings of cancer. The researchers found that in order for the nanomachines to function effectively, they need to spin two to three million times per second in order to not be inhibited by objects (or what is known as Brownian motion, or the erratic movement of tiny particles in fluid). When triggered by ultraviolet light, the nanobots begin to spin, allowing them to cut through cancer cells either to destroy the cell or create space for the delivery of beneficial drugs. These nanomachines are so small that we could park 50,000 of them across the diameter of a human hair, yet they have the targeting and actuating components combined in

that diminutive package to make molecular machines a reality for treating disease.

NIN develops India's first Nutrition Atlas: The Nutrition Atlas provides information and data on nutritional status of population groups at national and state levels. Hyderabad-based National Institute of Nutrition has developed a Nutrition Atlas to provide a snapshot of all relevant data and information about nutrition India currently faces twin challenges in the nutrition sector - Undernutrition manifesting in several health problems as well as increasing problem of overweight and obesity, contributing to the burden of non-communicable diseases. In order to provide a snapshot of all relevant data and information about nutrition, the Hyderabad-based National Institute of Nutrition (NIN) has developed the country's first Nutrition Atlas. The Nutrition Atlas provides information and data on nutritional status of population groups at national and state levels, along with an overview of nutrition-related deficiencies, disorders and prevalence levels in various parts of the country. In addition, it provides information on nutrients, nutrient rich foods, nutritional deficiency disorders and a host of other topics. The portal also includes information on nutrition rich foods and nutri-guide for various nutrients, minerals, essential amino-acids, fatty acids, dietary fibers and proteins, along with their biochemical cutoffs, recommended dietary allowances, signs and symptoms and dietary sources.

Tropical forests are now the trigger for Global Warming: So much of the Earth's forest has been destroyed that the tropics now emit more carbon than they capture, scientists have found. Tropical forests previously acted as a vital carbon "sink", taking carbon from the atmosphere and turning it into oxygen, but the trend has reversed: they now emit almost twice as much carbon as they consume. Scientists said ending deforestation and degradation in the tropics could reduce global carbon emissions by 8 per cent. They used a new method to assess carbon density, measuring levels not just in areas of complete deforestation but also places where more subtle losses have

been caused by forest degradation and disturbance. Satellite images, laser technology and field measurements were used to record how vast areas of forest have been lost since 2003. If we're to keep global temperatures from rising to dangerous levels, we need to drastically reduce emissions and greatly increase forests' ability to absorb and store carbon. The study found that the tropics now contribute more carbon to the atmosphere than they take in. 862 teragrams of carbon are emitted while only 437 teragrams are consumed. More than 60 per cent of emissions in the tropics comes from Latin America, which has witnessed large-scale damage to the Amazon rainforest in recent years. 24 per cent comes from Africa and 16 per cent from Asia.

New Categories of Catastrophic to Unknown in changing Global Climate Scenario: A new study evaluating models of future climate scenarios has led to the creation of the new risk categories "catastrophic" and "unknown" to characterize the range of threats posed by rapid global warming. Researchers propose that unknown risks imply existential threats to the survival of humanity. A temperature increase greater than 3°C (5.4°F) could lead to what the researchers term "catastrophic" effects, and an increase greater than 5°C (9°F) could lead to "unknown" consequences which they describe as beyond catastrophic including potentially existential threats. The specter of existential threats is raised to reflect the grave risks to human health and species extinction from warming beyond 5° C, which has not been experienced for at least the past 20 million years.

Cultures of Whales and Dolphins are akin to Humans : Whales and dolphins live in tightly-knit social groups, have complex relationships, communicate with each other and even have regional dialects - just like human societies - a study has found. The study is first of its kind to create a large dataset of cetacean brain size and social behaviours.

Researchers, including those from the University of British Columbia in Canada and

The London School of Economics and Political Science (LSE) in the UK, compiled information on 90 different species of dolphins, whales and porpoises. It found overwhelming evidence that Cetaceans have sophisticated social and cooperative behaviour traits, similar to many found in the human culture. The study, published in the journal *Nature Ecology and Evolution*, demonstrates that these societal and cultural characteristics are linked with brain size and brain expansion - also known as encephalisation. The list of behavioural similarities includes many traits shared with humans and other primates, such as complex alliance relationships and working together for mutual benefit. Researchers also found the social transfer of hunting techniques - teaching each other how to hunt and using tools ocooperative hunting.

NASA says Planet Nine exist in solar system

The elusive 'Planet Nine' does exist, and may be 10 times the mass of the Earth and 20 times away from the Sun than Neptune, NASA scientists say. Planet Nine could turn out to be our solar system's missing 'super Earth' — a planet with a mass higher than the Earth's, but substantially lower than the masses of ice giants Uranus and Neptune. The signs so far are indirect, mainly its gravitational footprints, but that adds up to a compelling case, they have said. Proofs that it exists

"There are now five different lines of observational evidence pointing to the existence of Planet Nine," said Konstantin Batygin, a planetary astrophysicist at the California Institute of Technology (Caltech) in the U.S. "If you were to remove this explanation and imagine Planet Nine does not exist, then you generate more problems than you solve. All of a sudden, you have five different puzzles, and you must come up with five different theories to explain them," said Mr. Batygin. Six known objects in the distant Kuiper Belt, a region of icy bodies stretching from Neptune outward towards interstellar space, all have elliptical orbits pointing in the same direction, researchers have said.

Humidity, the key for colour pattern in Butterfly coccons; IISER study

The dark-branded bushbrown butterfly (*Mycalesis mineus*) is one of the most common species in South and Southeast Asia and is found throughout the year in India. These butterflies are known to produce two different coloured pupae – brown and green. Scientists at the Indian Institute of Science Education and Research, Thiruvananthapuram have found relative humidity was one of the deciding factors which caused the change of colour. Brown pupae are more common in drier conditions and develop faster than green pupae. The results were recently published in the journal *PLOS ONE*. Sixteen female butterflies were collected from the IISER Thiruvananthapuram campus and reared in lab conditions. They were released in cages with maize, wheat and ragi plants to lay eggs. Eggs were collected every two days along with the leaf blades and kept in plastic boxes to hatch out. The hatched caterpillars (larvae) were released on maize plants in insect growth chamber. In 20-25 days, the larvae transformed into a pupa. The green pupae were formed mainly under the maize leaves, whereas the brown were almost exclusively found away from the leaves on substrates such as soil. “The pupal stage is the stationary phase and they are more vulnerable to predation. So it is important to camouflage. Merging with the background avoids detection and maybe an adaptive strategy in pupae,” explains Harshad Vijay Mayekar, at IISER and first author of the paper.

Novel laser technology may detect explosives

Scientists have developed a laser-based method that can accurately identify chemicals such as explosives and dangerous gases, an advance that can be used in airport security and monitoring environmental pollutants. Researchers from University of Michigan in the U.S. used a method called multi-dimensional coherent spectroscopy that uses ultrashort laser pulses to read types of gases like a bar code. To speed up the process while preserving its accuracy, researchers combined MDCS with another method called dual-comb spectroscopy. Frequency combs are laser

sources that generate spectra consisting of equally spaced sharp lines that are used as rulers to measure the spectral features of atoms and molecules with precision.

NOVEL SCIENTIFIC THOUGHTS

Extra ordinary Quantum Distortion: Vacuum birefringence is a weird quantum phenomenon that has only ever been observed on an atomic scale. It occurs when a neutron star is surrounded by a magnetic field so intense, it's given rise to a region in empty space where matter randomly appears and vanishes. Now, for the first time ever, this strange quantum effect has been observed by a team of scientists from INAF Milan (Italy) and from the University of Zielona Gora (Poland). Using the European Southern Observatory's (ESO) Very Large Telescope (VLT), observed neutron star RX J1856.5-375, which is about 400 light-years from Earth.

Novel Smart Drug enhancing the Intelligence of Brain: Qualia is a 42 ingredient 'smart drug' designed to provide users with immediate, noticeable uplift of their subjective experience within 20 minutes of taking it, as well as long-term benefits to their neurology and overall physiologic functioning. The 42 ingredient supplement stack is created by the Neurohacker Collective, a group that boasts an interdisciplinary research.

Connection between Quantum word and Human Mind:

Despite all the research we've done, we still know relatively little about how the human brain works, and we know even less about the mystery of "consciousness." Scientists disagree about whether consciousness exists at all outside the illusions of our own collective imagination. Some believe it exists independently although we've yet to understand its origins have brought quantum physics into the discussion. However, it was the British physicist Roger Penrose who pointed out that, observer effect aside, quantum mechanics may be involved in consciousness. More specifically, he thought it

might be possible that quantum events cause molecular structures in the brain to alter their state and trigger neurons in different ways; that literal quantum effects within the brain exist.

Unusual Intelligence emanates from Forgetfulness: A study at the University of Toronto found that having a perfect memory might have nothing to do with your intelligence. In fact, forgetting the occasional detail might even make you smarter. Traditionally speaking, the person who remembers the most things is seen to be the smartest. The study, however, found that forgetting the occasional detail is normal. In fact, remembering the big picture as opposed to little details is better for your brain and your safety, in the long run.

ACADEMIC NEWS

UGC's antiplagiarism regulation: The University Grants Commission (UGC) has released the Draft UGC (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Education Institutions) Regulations, 2017. As the name suggests, the aim of the draft is to create academic awareness about responsible conduct of research and prevention of misconduct including plagiarism in academic writing. The institutes have also been instructed to implement adequate software and other mechanisms which would ensure that thesis, dissertation or any other such documents submitted are free of plagiarism. The Institutes have also been asked to form an Academic Misconduct Panel (AMP) to investigate any allegation of plagiarism and submit report to the Plagiarism Disciplinary Authority (PDA) of the concerned institute.

New UGC parameters to qualify for NET Exam: Changes have been introduced by the University Grants Commission (UGC) in the qualifying criteria of the UGC-NET (National Eligibility Test). According to a statement issued by UGC earlier qualifying criteria for UGC-NET Exam involved qualifying top 15% of those candidates in each subject and category, who obtained the minimum required marks in paper-I, paper-II and paper-III

according to the category of the candidates. Subsequent to the orders of the High Court of Kerala, University Grants Commission had revised the procedure and criteria of qualifying candidates and as such it has been decided that 6% of the total candidates who appear in the UGC-NET examination will be declared qualified.

New UGC regulations for PhD admissions in Universities: According to the new sets of draft regulations uploaded by University Grants Commission (UGC) in its website, getting admission to PhD will be difficult. The draft regulation has suggested that the institutions which come under 'Category III Institution', would enroll candidates only who have qualified the NET or SLET or SET examinations for their PhD course.

NOBLE PRIZES 2017 ANNOUNCED

Medicine Nobel Prize for work on Biological Clocks: Jeffrey Hall, Michael Rosbash and Michael Young (all are Americans) awarded for their discoveries of molecular mechanisms controlling our biological clocks and raising awareness about the importance of getting proper sleep.

Physics Nobel Prize for work on Gravitational waves: The 2017 Nobel Physics Prize was divided, one half awarded to Rainer Weiss, the other half jointly to Barry C. Barish and Kip S. Thorne for decisive contributions to the LIGO detector and the observation of gravitational waves.

Chemistry Nobel Prize for work on cryo-electron microscopy: The Nobel Prize in Chemistry 2017 is awarded to Jacques Dubochet, Joachim Frank and Richard Henderson for the development of cryo-electron microscopy, which both simplifies and improves the imaging of biomolecules. This method has moved biochemistry into a new era.

OPPORTUNITIES

Post-Doctoral Fellow opportunity at Indian Institute of Science Education and Research Thiruvananthapuram: IISER, Thiruvananthapuram invites applications Postdoctoral fellow

opportunity for the Project on 'Role of Periostin-Integrin- α v in adult and fetal hematopoiesis'. For further details, Refer website http://www.iisertvm.ac.in/openings/read_opening/224.php.

Institute Nano Science And Technology, Mohali Post-Doctoral Research Fellows: INST, Mohali invites applications from various science and engineering aspirants for Post doctoral fellow opportunity. Refer <http://inst.ac.in/careers.php>.

Postdoctoral Opportunities at NCBS/inStem: Applications are invited for Post doctoral fellow opportunities at NCBS/in STEM. Refer website <https://www.ncbs.res.in/academic/postdoc>

SERB-National Post Doctoral Fellowship (N-PDF): Applications are invited for post doctoral opportunities for SERB- N-PDF. Refer web site <http://www.serb.gov.in/npdf.php>

