

NEWS ITEM

IIT Delhi researchers find out novel ways to assess bacterial drug sensitivity

A two-member team from the Indian Institute of Technology (IIT) Delhi has used a novel method to culture bacteria and determine its growth at much lower concentration in relatively less time — four–six hours. *E. coli* and *S. aureus* bacteria were studied. Currently available clinical methods require more than 10 hours to culture and observe growth of pathogenic bacteria and a higher bacterial concentration for laboratory confirmation. While the new method will not be useful in identifying the species of bacteria isolated from a patient sample, it will help in early detection of the presence of bacteria and carrying out drug susceptibility testing within a short time period.

IACS researchers developed novel anti cancer compound

Researchers at Kolkata's Indian Association for the Cultivation of Science (IACS) have synthesised a novel compound that shows potent anticancer activity. The porphyrin compound selectively targets and binds to cellular topoisomerase 1 enzyme (which is essential for maintenance of DNA architecture in the cells) found in cancer cells. Since Top1 enzyme is essential for cell replication and transcription from DNA to RNA, inhibition of its activity leads to DNA torsional strain, overproduction of reactive oxygen species, degradation of the DNA and ultimately cell death. Though the currently available drug and its derivatives and the compound synthesised by IACS researchers target Top1 enzyme, the pathways are very different, which was validated in both in vitro and ex vivo cellular studies. As a result, even when chemoresistance to currently available drug (camptothecin) sets in, the new compound could be used for effective killing of cancer cells

IIT- Delhi, AIIMS duo devised a novel apparatus to combat air pollution

The AIIMS in collaboration with the researchers of the Indian Institute of Technology

(IIT), Delhi have developed a wearable nasal device which restricts the entry of air pollutants into lungs. Named 'Airlens', the two cm device has the capacity to trap pollutants and bring them to safe levels depending on the air quality outside. The use and throw device, which is awaiting a patent, does not need to be attached to anything. In the beginning, the device would be for children aged above 6 years. India had the world's highest number of deaths due to air, water and other forms of pollution in 2015, according to a study published in the Lancet journal last week.

DRDO designed a novel ayurvedic drug that could relieve Vitiligo

Vitiligo or Leucoderma is a skin condition, which affects close to 2-5 percent of the population in India. Vitiligo is not usually medically harmful, and is non-contagious, but can cause white spots or patches to appear on the skin. DRDO scientists have developed Lukoskin, an Ayurvedic drug, and claims that it can greatly ease vitiligo. Allopathic medicines mask the disease, and the patient feels that he/she is healed, but it is not so. Once the patient stops taking the medicine, there is a relapse. However, this is not the case with herb-based medicines. Lukoskin was initially developed in 2012, following many comprehensive research and clinical trials by scientists of the Defence Bio-Energy Research (DIBER) centre at Haldwani, Uttarakhand. Comprising of an ointment and an oral liquid, patients consume the drug over a period of 300 to 400 days for effective results. AIMIL Pharmaceuticals in Delhi have been given the authority to manufacture the drug.

IGIB scientists identified Protein regulating both skin cancer and pigmentation

Researchers at Delhi's CSIR-Institute of Genomics and Integrative Biology (IGIB) have for the first time identified a calcium sensor protein (STIM1) that independently regulates both skin cancer and pigmentation. The STIM1 protein does so by activating two independent signalling

pathways. Interestingly, different parts of the STIM1 protein activate the two independent signalling pathways that control melanoma growth and pigmentation. The role of STIM1 in breast cancer and prostate cancer is already known. To study the role of STIM1 protein in melanoma growth in vitro, the researchers used STIM1 knockdown mouse cells and injected them into mouse models and observed the growth of melanoma. Compared with controls, melanoma growth was reduced by as much as 75% in mice that were injected with STIM1 knockdown cells. Similarly, melanin level reduced when pigmentation decreased. A surprising finding was that when pigmentation was decreasing, the calcium signalling pathway was also decreasing. The paper published in The EMBO Journal.

18 novel species of Madagascan spiders unearthed

Eighteen new species of Madagascan spiders have been discovered, a report published on January 11 in the science journal Zookeys reveals. According to a release from Smithsonian Institution, the discovery adds to scientists' understanding of the biodiversity that exists in Madagascar. It also highlights the need for conserving what remains of Madagascar's forests, what with widespread deforestation posing a threat. Native to Madagascar, these spiders are also called as "living fossils," as similar ones have been found in 165-million-year-old fossils.

Turmeric, a Hub of anti cancer drugs, says researchers from UoH

A research finding by the University of Hyderabad (UoH) might finally pave the way in developing a drug against cancer. Although turmeric has been used since ancient times as home remedy for various ailments in India, and modern medical science has already established the curative properties of the compound 'curcumin' found in the yellow spice, researchers have not been able to effectively utilise the same. This is because of the low solubility, half-life and bio-availability of curcumin in the form of a drug. Artemisinin is also a plant derived compound. For

a drug to be effective in human body against a disease, it is essential that it is easily soluble in the blood/plasma and stays long enough in circulation in the body in order to be potent — bio-availability. This has been a major hurdle till now as pure curcumin is neither soluble nor does it stay long enough in the body. However, UoH researchers found that when CUR-ART co-amorphous in solid form was administered orally to mice at a dosage of 200 milligrams per kilogram (mg/Kg) of body weight, solubility levels of 0.90 - 1.23 microgram per milliliter of blood was recorded in 30 minutes.

IICB reveals molecular basis of gastric ulcers induced by stress

Researchers at Kolkata's CSIR-Indian Institute of Chemical Biology (CSIR-IICB) have for the first time identified the molecular mechanism by which acute mental stress affects the stomach causing gastric ulcer or stress-related mucosal disease. Using a rat model subjected to cold-restrained stress the Division of Infectious Diseases and Immunology at IICB has used drugs that can act specifically on mitochondria present in the stomach to prevent gastric ulcer caused by stress. When subjected to stress, the mitochondrial respiratory capacity was disrupted, ATP production was reduced and oxidative stress increased. Stress also causes morphological changes to the mitochondria such as increased fragmentation. The results of the study were published in the journal Free Radical Biology and Medicine. Due to oxidative stress and fragmentation, the mitochondria in the gastric mucosal lining cannot behave in a normal fashion and ATP production gets further compromised. In the absence of ATP production, cells cannot proliferate and the gastric lining gets thinner due to mucosal cell death.

Researchers from IISc demonstrates the social division of insects, first of its kind

Using an Indian paper wasp, researchers at Bengaluru's Indian Institute of Science (IISc) have for the first time been able to witness in laboratory settings the minimum conditions

required for the emergence of cooperation and division of labour — important for evolutionary success and ecological dominance — among social insects. How the two important features influence productivity (total brood of the colony) was already known theoretically but not adequately demonstrated empirically till now. Using newborn virgin female wasps (*Ropalidia marginata*) the researchers demonstrated the spontaneous emergence of cooperation and two types of division of labour — reproductive and non-reproductive. The reproductive division of labour determines who becomes the queen and reproduces, and who becomes the worker and carries out tasks other than reproduction. When more than two workers are present in a nest, an additional division of labour emerges that determines who does the housekeeping job and who does work outside the nest.

Chinese scientists overcomes technical hurdles to clone monkeys

Researchers at the Institute of Neuroscience in Shanghai have cloned monkeys using the same technique that produced Dolly the sheep two decades ago, breaking a technical barrier that could open the door to copying humans. Zhong Zhong and Hua Hua, two identical long-tailed macaques, were born eight and six weeks ago, making them the first primates — the order of mammals that includes monkeys, apes and humans — to be cloned from a non-embryonic cell. It was achieved through a process called somatic cell nuclear transfer (SCNT), which involves transferring the nucleus of a cell, which includes its DNA, into an egg which has had its nucleus removed. Researchers said their work should be a boon to medical research by making it possible to study diseases in populations of genetically uniform monkeys. But it also brings the feasibility of cloning to the doorstep of our own species. The new research, published in the journal *Cell*, shows that is not the case. The Chinese team succeeded, after many attempts, by using modulators to switch on or off certain genes that were inhibiting embryo development.

MIT researchers discovered a novel virus from oceans

Researchers at the Massachusetts Institute of Technology and the Albert Einstein College of Medicine have reported a new tailless virus prevalent in the world's oceans. These viruses remained undiscovered till now as they cannot be detected using standard tests. The new find was made possible by novel genomic studies, and scientists say these viruses could be the missing link in the evolution of viruses. The virus has been named after a character in Greek mythology, Autolykos, who was a trickster and difficult to catch. The study published in *Nature* shows that these viruses mainly feed on bacteria, and could be helping in regulating the bacterial populations of the ocean. Every drop of surface ocean water can contain almost ten million viruses.

Mosquitoes can differentiate the host's odors

Mosquitoes can rapidly learn and remember the smells of hosts, a study suggests. Dopamine is a key mediator of this process. Hosts who swat at mosquitoes or perform other defensive behaviours may be abandoned, no matter how sweet they are, according to the study published in *Current Biology*. Mosquitoes develop preferences for a particular vertebrate host species, and, within that population, certain individuals, they said. However, the study also proved that even if an individual is deemed delicious-smelling, a mosquito's preference can shift if that person's smell is associated with an unpleasant sensation. The researchers said mosquitoes exhibit a trait known as aversive learning by training female *Aedes aegypti* mosquitoes to associate odours with unpleasant shocks and vibrations. Twenty-four hours later, the same mosquitoes were assessed in a Y-maze olfactometer in which they had to fly upwind and choose between the once-preferred human body odour and a control odour. The mosquitoes avoided the human body odour, suggesting that they had been successfully trained.

SCIENTIFIC NEWS

PSLV – C40 successfully puts in 31 satellites into orbits

The 42nd Polar Satellite Launch Vehicle (PSLV), PSLV-C40, was launched successfully by the Indian Space Research Organisation (ISRO) from the First Launch Pad of the Satish Dhawan Space Centre (SDSC) in Sriharikota and it placed 31 satellites across two orbits. The PSLV, launched at 9.29 a.m., had as its primary payload the country's fourth satellite in the remote sensing Cartosat-2 series, weighing 710 kg. The 30 other co-passenger smaller satellites, together weigh 613 kg. Of them, 28 are from other countries. The Cartosat-2, whose imagery will be used to develop various land and geographical information system applications.

Significant levels of Delhi smog amounting to 40% was dust emanating from Gulf region

Dust travelling thousands of kilometre from a severe storm in the Gulf contributed significantly to the weeklong killer smog that choked Delhi-NCR and much of north India from November 7 onwards, an analysis by the government's air quality research body, SAFAR, has concluded. SAFAR said dust coming in from the Gulf constituted nearly 40% of pollutants in the smog while stubble-burning in Punjab and Haryana contributed around 25%. Making up the remaining 35% was pollution produced locally in Delhi-NCR+. In a nightmarish confluence of factors, favourable upper winds carried the dust from the Gulf and smoke from crop burning into Delhi-NCR while an anti-cyclonic wind circulation over the region pushed these pollutants towards the surface and trapped them there as surface conditions were calm. PM 2.5 concentration was recorded at 537 micrograms (g)/m³ on November 7, nine times the 24-hour average standard. It rose to a peak of 640 g/m³ the next day. According to the SAFAR analysis, if external sources of pollution had not played a role, Delhi's air quality on November 8 would have been closer to 200 g/m³.

Study shows strict Social norms may imprint genes

A study by researchers from the National Institute of BioMedical Genomics (NIBMG) in West Bengal has looked at the genes of various communities to answer questions that have often been suggested in history books: when did caste become the dominant norm for ethnic communities of the region. For most upper-caste communities, endogamy (that is marrying within one's caste) started nearly 70 generations ago, or around the time of the Hindu Gupta period around 1,500 years ago, says the study published in the latest issue of the journal PNAS (Proceedings of the National Academy of Sciences of the United States of America).

IUCN new Red data book unleashes extinct species

According to the updated IUCN (International Union for Conservation of Nature) red list, species Christmas Island Pipistrelle, Christmas Island Whiptail-skink and Gunthers Dwarf Burrowing skink that were marked as "EXTINCT". The new updated list also figure out critically endangered and vulnerable categories.

Earth going to witness Super Moon, Blue Moon and a total lunar eclipse

Get ready for a rare lunar event that has kept the Internet abuzz from the beginning of the year. A Super Moon, Blue Moon and a total lunar eclipse can be seen on the evening of January 31 2018. During a total lunar eclipse, though the Moon gets shadowed by the Earth, sunlight passing through the Earth's atmosphere, break down in its constituent colours and the red part gets scattered by the atmosphere and falls on the Moon's surface, thereby making it take on a reddish copper hue. For this reason since antiquity, a totally eclipsed Moon is called a Blood Moon.

Obituary :

Prof Lalji Singh, Father of DNA fingerprints passes away. Prof Lalji Singh held the position of BHU VC from August 22, 2011 to August 22, 2014.

He is considered to be father of DNA fingerprints, who worked in the area of molecular basis of sex determination, wildlife conservation, forensics and evolution and migration of humans. He also served as director of the Centre for Cellular and Molecular Biology (CCMB) apart from assuming other higher positions.

POST DOC OPPORTUNITIES:

1. NCBS-inStem-Cambridge Postdoctoral Fellowship (NiC-PDF) : The National Centre for Biological Sciences (NCBS), Bangalore, the Institute for Stem Cell Biology and Regenerative Medicine (inStem), Bangalore, and the University of Cambridge <http://www.cam.ac.uk/> (UoC) are pleased to announce the NCBS-inStem-Cambridge Postdoctoral Fellowship (NiC-PDF).

2. National Post Doctoral Fellowship : The SERB-National Post Doctoral Fellowship (N-PDF) is aimed to identify motivated young researchers and provide them support for doing research in frontier areas of science and engineering. The

fellows will work under a mentor, and it is hoped that this training will provide them a platform to develop as an independent researcher. For further information visit <http://www.serb.gov.in/npdf.php>

3. Fellowships of Ministry of Science & Technology (DST/DBT/CSIR(DSIR)/SERB) : Ministry of Science & Technology provides fellowships of different categories ranging from J C Bose National Fellowship to Ramanujan Fellowship and others, please visit for further information visit <http://www.dst.gov.in/fellowship-opportunities-researchers>

4. IISER Pune Postdoctoral Research Associate : Applications are invited for Postdoctoral Research Associate (PRAs) positions at the Indian Institute of Science Education and Research (IISER) Pune, India. These positions are open for candidates with 0-5 years of experience after the submission of their PhD thesis. For further information visit <http://www.iiserpune.ac.in/links/postdoctoral-research>

