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# Science Service

Vol 36 No. 14 (24 pages including cover)

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**AIIMS DOCS TO TRY SEPARATING TWINS JOINED AT THE HEAD**

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Doctors at AIIMS are examining a pair of two-year-old twins joined at the head, and will assess whether surgery can be performed to separate them.

The twins — Jagannath and Balram — from Kandhamal district in Odisha, were taken to AIIMS after they were brought here from Bhubaneswar this afternoon.

They are accompanied by their parents and Assistant Manager of National Adolescent Health Programme, Soumya Samantray.

Dr A K Mahapatra, chief of neuro sciences centre at AIIMS said the twins will undergo a series of tests such as MRI, CT scan, and angiogram, to see to what extent the veins in their brains are fused and whether surgery is feasible.

“They are craniopagus twins, that is who are connected at the head. This is a rare condition. It is very difficult at this stage to say if surgery is feasible to separate them. They will undergo several tests in the next 10-12 days after which we will decide,” Dr Mahapatra said.

Dr Deepak Gupta, professor of neurosurgery, said the conjoined twins suffer from a rare condition which afflicts one in 30 lakh children, of which 50 per cent die either at birth or within 24 hours. Surgery is feasible only on 25 per cent of the survivors while the rest continue to live with the condition.

“Also, there is less than a 20 per cent chance of survival among those who undergo this surgery. Such operations are extremely challenging and doctors from plastic surgery, paediatric surgery, anaesthetists and radiologists, among others, will be involved,” Dr Gupta said.

Jagannath and Balram’s parents, who are poor farmers, expressed the hope that doctors would perform the surgery and separate their sons.

“We have come all the way from Odisha with a hope that the lives of our children will be transformed after the surgery. The rest is up to god, we human beings can only hope for the best,” their mother said.

Railway Minister Suresh Prabhu, who came to know about the twins travelling on the Bhubaneswar Rajdhani to Delhi, ensured medical facilities for them on board during the journey and also arranged transport to bring them to AIIMS from New Delhi station.

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**AIIMS TO SET UP SKIN BANK, RAISE AWARENESS FOR ITS DONATION**

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The All India Institute of Medical Sciences (AIIMS) here will soon set up a skin bank for patients with severe burns and those who suffer damage during accident or surgery.

The hospital’s department of plastic, reconstructive and burns surgery will launch an awareness campaign for cadaver skin donation soon, said Dr Rajesh Malhotra, the chief of AIIMS Trauma Centre.

Malhotra said the hospital is in the process of getting regulatory approval.

“We are also in the process of buying equipment to process cadaver skin to remove infections and antigenicity,” Malhotra said.

He said a person suffering more than 60 per cent burns often requires skin implantation.

As part of the procedure, the skin from the wounded part is removed and replaced either with the own skin of the patient or donated or artificial skin, he explained.

“The artificial skin available in India is manufactured and patented by a US-based company. It is quite costly. That is where skin donations come useful,” he added.

Dr Maneesh Singhal, HOD of the plastics, reconstructive and burns surgery department at AIIMS said awareness about skin donation was lacking and seldom someone turns up for skin donation.

“All those who can donate eye, can donate their skins but because of lack of awareness and such facilities, the skin donation has not picked up, especially in northern India,” he said.

After a person dies, within six hours the skin can be taken and after that using special techniques they can be stored for a few years.

However, there are misconceptions that taking out skin will disfigure the body which is not true as the skin is taken from selective area and no cosmetic disfigurement is produced.

He further informed that the institute is planning to start a hand transplant facility at the Trauma Centre.

“Those people who lose both their upper limbs and have not benefited by prosthesis, they may benefit from hand transplant.

“Like one donates their kidney or heart, one can donate their hands as well,” he added.

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**FORENSIC REPORT: NO EVIDENCE OF TAMPERING IN EVM USED IN MAHA POLLS**

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In a first, a forensic test was conducted on an EVM on the orders of a high court to check whether it can be tampered with and the lab gave its clearance saying there is no evidence of manipulation in the machine.

According to a senior Commission functionary, who did not wish to be quoted, it is for the first time an EVM underwent such a test.

EVMs had replaced the ballot paper nearly 20 years ago.

In May, the Bombay High Court had ordered examination of the EVMs from the Parvati constituency in Pune. The order was issued to rule out tampering during elections to Maharashtra legislative assembly in 2014.

The court had asked the central forensic science laboratory (CFSL), Hyderabad to examine the EVMs and opine as to whether they could have been remotely accessed. It also asked the lab to find out whether there was any additional memory chip with other data that could be activated to alter results of an election.

One control unit, one ballot unit and two batteries were sent to the lab. An EVM comprises a control unit and a ballot unit.

As per the report received from the lab, the machine is a stand alone, non-networked, one-time programmable unit, which is neither computer controlled externally nor could be connected internally or to any network.

“Hence, it is opined that no evidence of tampering, altering or any other manipulation could be detected,” the report said.

The report was made public after being submitted to the high court.

After the declaration of assembly poll results of Uttar Pradesh, Punjab, Goa, Manipur and Uttarakhand, some parties had raised concerns over the credibility of EVMs used by the EC and had alleged tampering of the machines during the elections.

In April, 13 parties had met the Commission and had urged it to revert to the old ballot paper system. After an all-party meet on the issue, the poll panel had organised a challenge to tamper with its EVMs. But no political party took part in the June 3 challenge.

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### PLASTIC SURGERY DAY: INDIAN DOCS GIVE GHANAIAI NEW GENITALIA

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Abdullahi Kojo (name changed) from Ghana has no complaints — not after a group of doctors in India gave him a new set of genitals.

A year after he was attacked by a stray dog that bit off his testes and scrotum back home in Ghana, Kojo says life is back to normal.

The Ghanaian, on the advice of a doctor in his country, decided to seek help in India and, two operations later, says he is now experiencing a “good sexual life”.

As India celebrates National Plastic and Reconstructive Surgery Day tomorrow, doctors who conducted two operations on him at Fortis Hospital in Shalimar Bagh here talk about the challenges of such surgery, and how far the country has moved in this area of treatment.

Dr Richie Gupta, senior consultant, department of plastic, aesthetic and reconstructive surgery at the hospital, said

reconstructing a body part, particularly genitals, needed the skills of both a surgeon and an artist.

According to her, penile reconstruction surgery is akin to “performing four or five reconstructive surgeries in one sitting”, during which a new penis, urethra and scrotum are created.

“Penile reconstruction is one of the most challenging and difficult operations in plastic surgery,” she said.

The surgery involves the “tedious art of sculpturing” and “meticulous microsurgical skills” to make the reconstructed part look like a normal penis.

“Hence, it involves the skills of an artist and plastic surgeon specialised in microsurgery,” Dr Richie told PTI.

With Sushruta — believed to have been born in 600 BC and author of an ancient text on medicine and surgery — hailed as the father of plastic surgery, it was perhaps natural for doctors in Kojo’s hometown to suggest treatment in India.

“One of the doctors in my country told me about phalloplasty and said India had good doctors in this speciality. While searching the Internet, I came across the website of a doctor and contacted him,” he told PTI.

Doctors said plastic surgery in India is now performed using the latest procedures, with the help of 3D printing, fat and stem cell therapy and many other processes.

For Kojo’s operation, the “Radial artery forearm flap, Tube within tube technique” was used, where the genital was recreated with the skin, blood vessels and nerves taken from his forearm.

“The total operation took almost 12 hours. Post surgery, pain lasted for two weeks,” the patient said. The surgery cost him about Rs 3.5 lakh.

Six months later, silicone rods were inserted, and Kojo, who was a university student in Ghana when the dog attacked him, is now back home.

One of the major risks involved in such surgeries is scarring of the body part which is used for the flap — the lifting of tissues — on the injured site. Patients are given an option of penile reconstruction with a “thigh flap”. Most patients go for that, since the grafting leads to multiple scars which are not as visible on the thigh as they are on forearm.

Flap loss and accidental urinary leaks are among the other risks involved, added Dr Rajat Gupta, associate consultant, plastic surgery, at the hospital.

The idea of reconstructing one’s genitals may seem impossible, but Kojo urges people not to hesitate to seek help if they face similar problems.

“Loss of my genital was my biggest trauma. I had to see a psychiatrist in Ghana. I never knew that it could be regenerated and I could get back to my previous life. Science and technology have advanced, and we must use them for our benefit,” Kojo said.

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**INDIAN SCIENTISTS DISCOVER 'SARASWATI' — A SUPERCLUSTER OF GALAXIES**

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A team of Indian astronomers has discovered an extremely large supercluster of galaxies — as big as 20 million billion suns — which they have named Saraswati, Pune-based Inter University Centre for Astronomy and Astrophysics (IUCAA) has said.

This is one of the largest known structures in the neighbourhood of the universe, 4,000 million light-years away from Earth and roughly more than 10 billion years old, IUCAA said.

Its mass extends over the scale of 600 million light years, it said.

Scientists of this institute were also involved in the path-breaking discovery of gravitational waves last year.

The supercluster was discovered by Joydeep Bagchi, a faculty member from IUCAA; Shishir Sankhyayan, a PhD student at the Indian Institute of Science Education and Research (IISER), Pune; Prakash Sarkar of the National Institute of Technology, Jamshedpur; Somak Raychaudhury, Director IUCAA; Joe Jacob of the Newman College, Kerala and Pratik Dabhade, IUCAA research fellow.

Their findings were published in the latest issue of *The Astrophysical Journal*, the premier research journal of the American Astronomical Society.

“Superclusters are the largest coherent structures in the cosmic web. They are a chain of galaxies and galaxy clusters, bound by gravity, often stretching to several hundred times the size of clusters of galaxies, consisting of tens of thousands of galaxies,” the IUCAA said in a statement.

Sankhyayan said this “newly-discovered Saraswati supercluster” extends over a scale of 600 million light-years and may contain the mass equivalent of over 20 million billion suns.

A cluster could roughly have galaxies ranging from 1000 to 10,000. A supercluster could have clusters ranging from 40 to 43, he added.

“Our own galaxy is part of a supercluster called the Laniakea supercluster,” the IUCAA said.

Bagchi from IUCAA, the lead author of the paper in the journal, and co-author Sankhyayan said they were “astonished to spot this giant wall-like supercluster of galaxies”, visible in a large spectroscopic survey of distant galaxies, known as the Sloan Digital Sky Survey.

Sankhyayan said the data was then analysed, following which the discovery was made.

“This supercluster is clearly embedded in a large network of cosmic filaments traced by clusters and large voids,” Bagchi said.

He said previously “only a few comparatively large superclusters” had been reported, such as the Shapley Concentration or the Sloan Great Wall in the nearby universe.

“The Saraswati supercluster is far more distant,” Bagchi said.

The two hoped that the work would help shed light on “perplexing questions” like how such matter-density clusters had been formed billions of years ago.

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**WORSENING CONGESTION, SPIRALLING POLLUTION CHOKE DELHI: STUDY**

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Delhi’s traffic speed is rapidly falling due to crippling congestion, with weekends faring worse than weekdays, which is pushing up pollution levels and if left unaddressed, the city may come to a “standstill”, a study has said.

The Centre for Science and Environment (CSE), based on a month-long study, said the average traffic speed on 13 major arterial roads remains 50-60 per cent lower than the designed speed and up to 48 per cent lower than the regulated speed.

Designed speed is the speed that a vehicle is supposed to achieve as per the existing street design guidelines while regulated speed, lower than the former, is calculated based on the speed limit imposed by the authorities.

“If not addressed immediately, Delhi will run to a standstill. This is an inevitable consequence of explosive and unrestrained vehicle numbers that have crossed the mark of one crore in 2017,” Anumita Roychowdhury, executive director-research and advocacy of CSE, said.

The survey, undertaken using Google Maps, was based on data collected for every hour between 8 am to 8 pm in the month of June.

The survey report said the situation has reached a state where the line between peak, and non-peak hours, when traffic is supposed to be less, has blurred and roads have become more congested during weekends.

The regulated speed is 40-55 km per hour while the actual observed average peak speed on these roads now is 26 km per hour and during off-peak hours (12 pm - 4 pm) it is 27 km per hour.

“The average peak speed noted during weekends is 25 km/hr which is lower than the weekday speed of 26 km/hr. This even drops to 8 km/hr on Sri Aurobindo Marg and 9 km/hr on Mehrauli Badarpur road during peak hours,” the CSE report said.

The CSE also analysed hourly air quality data for nitrogen dioxide (NO<sub>2</sub>), which is largely influenced by traffic, for a selected day.

The Central Pollution Control Board’s (CPCB) real time monitoring data for NO<sub>2</sub> from Anand Vihar, R K Puram, Mandir

Marg and Punjabi Bagh shows that when the average morning peak speed drops, NO<sub>2</sub> levels increase from 68 microgramme/cubic metre to 94 microgramme/cubic metre — an increase of 38 per cent, the report observed.

“Congestion also imposes staggering costs on the economy that no one pays for. An IIT Madras study estimated annual congestion had cost Delhi Rs 54,000 crore in 2013. This is 12.5 per cent higher than Delhi’s total annual budget for the year 2017-18,” it said.

It underlined that congestion on Delhi roads was growing at 7 per cent annually with about 537 cars and 1,158 two-wheelers added everyday and the numbers are further inflated by daily influx of vehicles from outside Delhi.

With a further drop in car prices under the GST, congestion will only grow, a CSE statement said.

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### DEMOGRAPHIC DIVIDEND MAY BECOME LIABILITY WITHOUT SKILL DEVPT: PREZ

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President Pranab Mukherjee warned that India’s demographic dividend may become “demographic liability” in the absence of adequate skill development.

“We have rich demographic dividend. But this is a challenge also.... to provide jobs for them. I am scared that demographic dividend may be converted into demographic liability unless we think about it. Leaders and administrators will have to think how to tackle it,” he said addressing the annual convocation of the Indian Institute of Science here.

Mukherjee said he wholeheartedly supports the government’s initiative of ‘Skill India’ by which 500 million people will get skill training by 2030. It is important to achieve this target, he said.

The president said by 2020 the average age of people in the US will be 46 years, that in Europe 42 years, 48 years in Japan and just 27 in India. “So we have the opportunity to capture the job market,” he said.

Mukherjee said there was no point in complaining about IT talent related protectionism by some countries and India has to prepare itself to face such challenges in the future.

Stressing on the importance of basic research and innovation, he said unless the required investments were made in these areas, the country cannot make further progress.

He noted India occupied an important place in the sector and had some advantages initially because of the skills of its IT professionals.

“Therefore there is no point of saying that certain countries are changing their policies about the immigration, movement of the skilled personnel from one country to another and we are now losing jobs which were exclusively enjoyed by us in the initial years.

“We shall have to be ready for these types of challenges coming in the future not from one or two countries but from all across the world. Therefore we require excellent teachers, bright students and conducive atmosphere which are most important in the academic life,” he added.

His comments assume significance in view of the curbs imposed by the United States on grant of H1B visas.

Pointing out that this was his last visit to a central institute as the 13th President before demitting office later this month, Mukherjee said, he is “deeply satisfied” with the IISc as its ‘Visitor’.

“I am concluding with an institution which has made India proud,” he said, noting IISc was the best university in the country and among the best in the world.

Karnataka Governor Vajubhai Vala and Chief Minister Siddaramaiah were among others present at the event.

Noting that research and innovation are the most fundamental things, Mukherjee said, “I am sorry that not only in our academies, but also in our industries we have neglected them for too long”

He said, “Unless we make investment in basic research and innovation, I’m sorry we cannot make any further progress, to see the type of India which we would like to see.”

Addressing the graduating students, the President said “unfortunately” those opting for fundamental research are less and “we have to change this picture and see to that Indian bright minds dedicate themselves towards it.”

“Your demand in the market could be much more...you may lead a very comfortable life abroad, you may earn huge amount of money, but equally make the country happy,” he said.

Mukherjee also noted that after C V Raman several products (alumni) of Indian universities received the Nobel Prize, but they were recognised while working abroad.

He said creating a conducive atmosphere and retaining such talents in domestic institutes of higher learning were major challenges that planners, leaders and administrators will have to address.

Noting that the country had the opportunity to capture the world job market because of its demographic dividend (large young population), he, however cautioned that this could become a liability if they were not provided proper inputs that include skill and employment.

Skill development initiative should be expedited and implemented with all earnestness.

Universities must have good quality laboratories and libraries, he said while advocating regular updating of knowledge and equipment there in order to compete in today’s fast changing world.

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### CSIR TO OPEN ITS LABORATORIES FOR KV STUDENTS

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The students of Kendriya Vidyalayas will now be able to access 38 laboratories of the Council for Scientific and Industrial Research (CSIR) to conduct experiments to supplement their classroom learning.

A Memorandum of Understanding (MoU) was signed between the CSIR and the Kendriya Vidyalaya Sangathan (KVS) under “Jigyasa-Student, scientist connect programme”.

The programme is expected to connect 1,151 KVs with 38 national laboratories of the CSIR and around 1 lakh students and nearly 1000 teachers would reap the benefits annually.

“To inculcate scientific temper among the students we have to make them aware about the impact of science on the society. Science has played a very important role in changing our lives,” Union HRD Minister Prakash Javadekar said during the event.

Union Science and Technology Minister Harsh Vardhan also attended the MoU signing ceremony.

Some of the initiatives that will be undertaken during the programme include student residential programmes; exchange of scientists as teachers and teachers as scientists; lab specific activities, onsite experiments; visits of scientists to schools/outreach Programmes; establishment of science and maths clubs and popular lecture series/ demonstration programme at schools, an official statement said.

Student apprenticeship programmes; science exhibitions; projects of National Children’s Science Congress, teacher’s workshops and tinkering laboratories, will be other activities which will be organised during the programme, it said.

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### LIQUID NITROGEN: FUN AND INSTA-WORTHY BUT HANDLE WITH CARE

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The incident of a 30-year-old losing half his stomach when he swilled a liquid nitrogen- laced drink has become a red flag for molecular gastronomy, the newest foodie fad in India with bars, ice cream chains and haute cuisine restaurants conjuring magic on the table.

When a Gurgaon bar served up an enticing smoky drink and reportedly didn’t warn the customer to wait before he took a sip, it put the spotlight on the lack of proper training and the dangers it posed to life.

Liquid nitrogen, which is used as an important ingredient for “flash freezing” or instant cooling, also makes food or drink “insta-worthy” by making them visually appealing with the fumes, says restaurateur Priyank Sukhija.

“It is being used by restaurants for years. Liquid nitrogen not only helps in cooling but also makes the drinks and food items insta-worthy. It is really about the drama,” Sukhija, who owns a chain of restaurants in NCR including Lord of the Drinks and Teddy Boy, told PTI.

Often used to lace the drink from outside to maintain cooler temperatures, liquid nitrogen has a freezing point as low as -210 °C.

But, when inside the human body, it causes rapid freezing of cells and tissues causing perforation, which is what happened to the Delhi resident about two months ago. He survived, but others may not be so lucky.

“The whole process can be compared to what would happen to the body if one consumed acid or boiling oil,” said Dr Gourdas Chaudhuri, director and head of department, gastroenterology and hepatobiliary sciences, Fortis Memorial Research Institute.

However, neither medical experts nor restaurateurs suggest a ban on the use of liquid nitrogen.

“It is unfair to ban it due to a single unfortunate incident,” said Sukhija.

He, instead, calls for regulating the usage of liquid nitrogen and training the staff.

He also plans to have a standard operating procedure (SOP) in all his restaurants, under which staffers would be directed to serve items using liquid nitrogen only after a time lag.

“One should make sure that all the liquid has evaporated before any food or drink that has been prepared with liquid nitrogen is consumed,” said Dr Vivek Raj, senior director, Department of Gastroenterology and Hepatology at Max Hospital, Saket.

Given the laxity in implementing basic safety dos and don’ts in India, is the use of liquid nitrogen at all necessary or just a gimmick?

Raj terms the use such chemicals unnecessary gimmicks by restaurants to make their menu “look stylish”.

“There is no need to take such risks with the health of human lives as liquid nitrogen does not enhance the taste or add anything to the flavour in any way,” he said.

Gaurav Sahai, who runs the city-based restaurant Sana-Di-Ge, echoes his views. Liquid nitrogen in cocktails “doesn’t make sense”, he asserted.

“Ice is enough to make a drink chilled. Molecular gastronomy came like a revolution in India, and not everyone knows what liquid nitrogen is. We have to be careful while using chemicals such as dry ice, liquid nitrogen and sodium alginate,” he said.

The incident has also led to panic among those who frequent bars.

Take 28-year-old Atul, a digital media marketer, who said he would never order food or a drink with such chemicals.

“After this incident I am too scared to even go to a restaurant or a bar that serves such food. These drinks are also more expensive, so I don’t think I want to pay to risk my life,” he said.

### TEXTBOOK SPARKS ROW OVER MOSQUE DEPICTED AS NOISE POLLUTANT

An image in a class VI textbook taught in ICSE schools depicting a “mosque” as a source of noise pollution has sparked outrage on social media, prompting an apology from the publisher and the promise that the picture would be removed in subsequent editions.

The ICSE, however, maintained the board did not publish or prescribe textbooks, and that schools had to deal with the issue.

The science textbook, published by Selina Publishers, has a chapter on the causes of noise pollution.

The picture, shared widely on social media, shows a train, car, plane and a mosque, all with symbols depicting loud sound, next to a man grimacing and shutting his ears.

Netizens have now launched an online petition demanding the book be withdrawn.

The outcry drew an apology from the publisher.

“This is to inform all concerned that we will be changing the picture in subsequent editions of the book,” publisher Hemant Gupta said on social media sites.

Gupta said the diagram on page 202 of its publication, Integrated Science, consisted of “a structure resembling a portion of a fort and other noise producing objects in a noisy city”.

“We do apologise if it has hurt the sentiments of anyone,” he said.

Gerry Arathoon, chief executive and secretary of the Council for Indian School Certificate Examinations, said the board does not publish or prescribe textbooks for schools.

“If any book with objectionable content is being taught at certain schools, it is for schools and publisher to ensure such a thing does not happen,” he told PTI.

Bollywood singer Sonu Nigam had stoked a controversy in April this year when he said he was woken up by the sound of “azaan” — early morning calls for prayers from mosques — amplified by loudspeakers.

There have been several incidents of controversial content being found in school textbooks in recent months.

Excerpts from a class XII Physical Education textbook taught in some CBSE schools had kicked up a furore for defining a figure measurement of 36-24-36 as the “best body shape for females”.

A class IV environmental science textbook that suggested killing a kitten as part of an experiment went viral on

social media, forcing the publisher to withdraw it from the market earlier this year.

### GOVT LAUNCHES USD 400-MN PROG TO PROMOTE BIO-PHARMA SECTOR

The government today launched a USD 400-million research and development programme in collaboration with the World Bank to accelerate the growth of bio-pharmaceutical sector in the country.

The ‘Biopharma Mission’ will specifically focus on the development of vaccines for diseases like dengue and cervical cancer, bio-therapeutics, diagnostics and medical devices.

Science and Technology Minister Harsh Vardhan said the “game-changer” mission aims to target at least 6-10 products in the next five years.

He said the aim of the mission is also to increase India’s share in the sector from 2.8 to 5 per cent in the coming years.

“This is for the first time that the World Bank has given a loan for any research and development programme in the country.

“This will also help us collaborate with global leaders in the field from the academia and the industry and this will ultimately help the country,” Vardhan said.

Of the USD 400 million, the government will give USD 250 million while the World Bank’s share is USD 150 million.

Vijay Raghvan, the secretary of the Department of Biotechnology, which is executing the project, said India already has a good infrastructure and ecosystem that has been built over the years.

“The mission is a second step to take forward the work at another level.”

Renu Swarup, Managing Director of Biotechnology Industry Research Assistance Council (BIRAC), a PSU under the DBT, said the guidance to the programme would be provided by the Inter-Ministerial Steering Committee.

The steering committee will have members from various ministries who would be supported by Programme Technical Advisory Group comprising global and national leaders from the industry and academia.

### EDUCATION IN INDIA HAS BECOME COMMERCIAL COMMODITY: SCIENTIST

Rather than imparting knowledge, education in India has become a “commercial commodity”, rued eminent scientist G Madhavan Nair, who also spoke out strongly against the tendency of parties to make campuses a training ground for budding politicians.

The former Chairman of Indian Space Research Organisation said “real education” is not being imparted to

children who in fact are being “spoon-fed”, and most of the evaluation exams are memory-tests rather than gauging their understanding of the subject.

“That’s why the education system has deteriorated considerably. Result is that the people who come out even after graduation or engineering, they are not employable. They don’t have the basic understanding of the subject, don’t have the skills for applying knowledge for practical applications and this is resulting in a pathetic situation,” he told PTI.

Quality is the “first casualty” at many of India’s private institutions, which are only interested in increasing student intake number and making money, according to him.

“I think basically education has become a commercial commodity these days rather than acquiring excellence in knowledge,” Nair said.

He, however, said institutions such as IITs and Indian Institute of Science in Bengaluru are maintaining their standards mostly because they get “best of the students” on their campus but they need to raise their level from global perspective.

He expressed the view that one should not mix politics with education.

“Today, there is a bad tendency. There are many political parties who want to use these institutions for building up their cadres, and that should be stopped,” Nair said.

Instead, he said, interested political parties can start a separate institute for training politicians, rather than converting educational institutions for such a purpose.

Nair stressed that the thrust of education should be on improving observation, analytical and communication skills of students, in addition to cultivating moral values.

“These should form the basis of primary education. Once the foundation is strong and you show them the way how to acquire knowledge, that is sufficient. There is no point in just doing 10,000 answers by-heart, that will not take you anywhere. Education system should be an enabler, that kind of change is required,” he said.

Nair also regretted that talented people are not coming into the teaching profession, adding, teachers are not being given proper and professional training.

Stressing that quality is a must in teaching, he said teachers also need to be evaluated periodically.

Nair advocated adopting some basic lessons from “Gurukul system”, particularly strong relation between the teacher-student and the parent.

“That ambience has to be created. Evaluations should not be based on annual exam. It should be constant evaluation where the parent also participates in a very scientific manner. Moral studies have to be given strong base in early part of education,” he said.

Nair said three language (Hindi, English and local language) policy has to be adopted in all the states. Hindi is a link language, while English cannot be kept out of our system, he said, adding, basic education can be imparted in a much more efficient manner in local language.

He also favoured giving students an option to study Sanskrit. “Sanskrit is one of the most scientific languages, learning that, I understand, will improve analytical skills of the individual.”

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### **'MOST HOMES IN LOW-INCOME COUNTRIES DON'T HAVE ACCESS TO SOAP'**

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Most families in low income countries such as Iraq and Serbia do not have access to soap, scientists including those of Indian origin have found.

Researchers including those from University of Buffalo in the US, found that the percentages ranged from less than 0.1 per cent in Ethiopia to 96.4 per cent in Serbia.

The team identified the proportion of households in which soap and water was present at a hand washing place in the home.

Researchers found the availability of soap anywhere in the dwelling ranged from nearly 21 per cent in Senegal to 99.1 percent in Iraq and Serbia, according to the surveys that included data on soap availability in the home.

In Africa, the proportions of households with soap and water at a hand washing place range from as low as 0.1 per cent in Ethiopia to a high of 34.7 per cent in Swaziland, researchers said.

They also found that compared to Africa, the availability of soap and water was higher in the Eastern Mediterranean region, and ranged from 42.6 per cent in Afghanistan to 91.5 per cent in Iraq.

In Southeast Asia, nearly 79 per cent of households in Bhutan had soap and water, compared to 21.4 per cent in Bangladesh, researchers said.

The poorest households often had extremely low access to soap and water for hand washing, compared to wealthier households (for example, six per cent and 85 per cent in regions of Nepal).

"These data is useful to public health programs and policy makers because they underscore the deep inequities that persist globally and within countries, contributing to these preventable child deaths among people living in poverty and in rural areas in sub-Saharan Africa and South Asia," said Pavani Ram from University of Buffalo.

The findings underscore the need to improve access to soap, along with hand washing behaviour in general, in many impoverished countries, said Swapna Kumar from University of Buffalo.

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### **BUG SPRAY CHEMICALS CAN PERSIST IN HOMES FOR A YEAR: STUDY**

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Chemicals present in bug- repellent sprays can linger in the dust in our homes for as long as a year, posing a health hazard - especially among children and pets - due to prolonged exposure to pesticides, scientists warn.

Warmer temperatures can lead to a flurry of unwelcome guests to our house - flies, mosquitoes, fleas, wasps, bedbugs and lice.

Pyrethroids are a common pesticide used to repel these pests, and even though they have been found more or less safe for mammals in laboratory studies, they can cause skin irritation, headache, dizziness and nausea for more sensitive individuals.

Since the active ingredients of household pesticides are often the same as those used in agriculture, researchers wanted to find out if laboratory studies are truly representative of what happens in a home.

Researchers from the the Biological Institute in Brazil found that when used outdoors, microorganisms, rain or sprinklers, and sunlight act to break down the pesticide's chemical compounds fairly quickly.

The chemicals in pyrethroid pesticides adhere to cloth, tiled floors and wood differently than they would to outdoor surfaces.

By running concurrent experiments - one in a controlled laboratory and the other in a test house - researchers found that the pesticides used in the controlled experiment broke down more quickly than those in the test house, with 70 per cent of cypermethrin, a pyrethroid pesticide, still found in dust samples around the house after one year.

Researchers said that the persistence of pesticides inside buildings, on surfaces and in the dust in houses can be viewed in a couple of different ways.

On the one hand, when using pesticide products in the home, fewer applications should still maintain a long-term control of pests.

On the other hand, extended persistence increases the likelihood that residents will be exposed to the pesticide, which can be especially worrying for young children and household pets, who spend more time on the floor and are frequently picking up things and putting them in their mouths.

The findings, published in the journal Environmental Toxicology and Chemistry, highlight the importance of further studies to evaluate the actual risks of human exposure to pyrethroids when present in dust and on miscellaneous surfaces.

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### **MOST SELFIES ARE ABOUT FLAUNTING LOOKS: STUDY**

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More than half of selfies on Instagram are posted to show off a person's appearance, including make-up and clothes, scientists say.

Researchers from Georgia Institute of Technology in the US combed through selfie posts on photo-sharing social platform Instagram to determine what kinds of identity statements people make by taking selfies.

They gathered the data by searching for hashtag '#selfie,' and then used computer vision to confirm that the pictures actually included faces.

Researchers found nearly 52 per cent of all selfies fell into the appearance category: pictures of people showing off their make-up, clothes, lips, etc.

Pictures about looks were two times more popular than the other 14 categories combined.

After appearances, social selfies with friends, loved ones and pets were the most common (14 per cent). Then came ethnicity pics (13 per cent), travel (seven per cent), and health and fitness (five per cent).

Researchers noted that the prevalence of ethnicity selfies (selfies about a person's ethnicity, nationality or country of origin) is an indication that people are proud of their backgrounds.

They also found that most selfies are solo pictures, rather than taken with a group.

Researchers noted that overall, an overwhelming 57 per cent of selfies on Instagram were posted by the 18-35-year-old crowd.

The under-18 age group posted about 30 per cent of selfies. The older crowd (over 35) shared them far less frequently (13 per cent).

Appearance was most popular among all age groups, researchers said.

Selfies are an identity performance - meaning that users carefully craft the way they appear online and that selfies are an extension of that.

"People project an identity that promotes their wealth, health and physical attractiveness. With selfies, we decide how to present ourselves to the audience, and the audience decides how it perceives you," said Julia Deeb-Swihart from Georgia Institute of Technology.

"Selfies, in a sense, are the blending of our online and offline selves. It is a way to prove what is true in your life, or at least what you want people to believe is true," Deeb-Swihart said.

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### **'CITY NOISES DISRUPT HEARTBEAT, MAY CAUSE CARDIAC DISEASE'**

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Fluctuating noises from busy city streets and town centres disturb normal heart rhythms and could trigger serious cardiac problems, scientists warn.

Researchers from Nottingham Trent University in the UK found that constant changes in noise - even at low levels - had an immediate and disruptive effect on normal heart rates.

The findings show that everyday surroundings could have wider implications for long-term health, researchers said.

For the study published in the journal *Information Fusion*, shoppers were asked to wear mobile body sensors to

monitor their heart rates as they moved about Nottingham city centre for 45 minutes.

"We found that rapid changes in noise resulted in rapid disturbance to the normal rhythm of participants' hearts," said Eiman Kanjo from Nottingham Trent.

"If this pattern is repeated regularly then there is a danger it might lead to cardiovascular problems," Kanjo said.

The study is the first to use sensors to model the short-term impact that city environments can have upon the human body, the 'Telegraph' reported.

The researchers also found that air pressure had an effect on heart rate as well as body temperature.

Environmental data including noise, air pressure and light levels were compared to data from participants relating to heart rate, body temperature and movement and changes in the electrodermal activities of the skin.

None of the participants had heart problems, but the researchers say it would be useful to study whether people with heart conditions suffered a greater impact.

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### **NATURAL BODY NOISE CAN HELP DETECT CANCER**

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Natural sound waves made by the human body can be used to diagnose cancers and other diseases non-invasively at the earliest stages, just as seismology is used to detect earthquakes, scientists say.

Elastography, sometimes referred as 'seismology of the human body', is an emerging technology used to enhance medical ultrasound imaging.

It does this by measuring the elasticity of biological tissue to diagnose cancer or liver and thyroid disease more accurately and at the earliest stages, researchers said.

In passive elastography, the elasticity of tissue is measured using the body's own propagation of shear waves, which enables more effective imaging deeper inside the body in an even more noninvasive way than traditional elastography.

"Passive elastography is foreseen as a viable technique for cancer detection in organs deep in the body, such as the prostate or liver, for well-protected organs such as the brain, and for fragile organs such as the eye," said Stefan Catheline, from the University of Lyon in France.

Shear waves, which penetrate through an object, are generated when pressure on an object causes it to deform, such as during an earthquake or explosion.

In medical science, shear waves are produced by vibrational devices to measure the stiffness of tissue.

A cancerous tumour and other tissue dysfunction exhibit much higher stiffness than in healthy tissue or even in benign tumours.

This difference in stiffness cannot be felt or seen in conventional ways or through other imaging methods.

Typically, a medical technician places a probe with a vibrating mechanism on the area for testing and presses down to produce the shear waves, which then interact with the tissue in question.

The waves are tracked at ultrafast imaging rates. The shear waves can be difficult to produce in hard-to-reach organs, such as the liver that is located deep in the body behind the ribcage.

Researchers have developed a new approach to remedy this problem: Analyse the noise of natural shear waves that are produced biologically.

Just as in earthquakes, shear waves constantly move through organs and other soft tissue of a person during the everyday functionalities of these bodily systems, such as the beating of a heart or the liver performing everyday metabolic processes.

“The idea, as in seismology, is to take advantage of shear waves naturally present in the human body due to muscles activities to construct a shear elasticity map of soft tissues,” Catheline said.

“It is thus a passive elastography approach since no shear wave sources are used,” he said.

Passive elastography is compatible with slow imaging devices, such as standard echographs and MRI scanners, as well as with optical coherent tomography.

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### **NASA'S MARS PROBE SPOTS EVIDENCE OF ANCIENT LAKE**

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NASA's Opportunity Mars rover is examining the edge of a crater on the red planet that may once have been a lake of liquid water.

The Opportunity rover found rocks at the edge of Endeavour Crater that were either transported by a flood or eroded in place by wind.

The features were seen just outside the crater rim's crest above "Perseverance Valley," which is carved into the inner slope of the rim.

Researchers plan to drive Opportunity down Perseverance Valley after completing a "walkabout" survey of the area above it.

The Opportunity mission has been investigating sites on and near the western rim of Endeavour Crater since 2011. The crater is about 22 kilometres across.

"The walkabout is designed to look at what's just above Perseverance Valley," said Ray Arvidson, from Washington University in St Louis.

"We see a pattern of striations running east-west outside the crest of the rim," said Arvidson, Deputy Principal

Investigator of the Opportunity mission.

A portion of the crest at the top of Perseverance Valley has a broad notch. Just west of that, elongated patches of rocks line the sides of a slightly depressed, east-west swath of ground, which might have been a drainage channel billions of years ago.

"We want to determine whether these are in-place rocks or transported rocks," Arvidson said.

"One possibility is that this site was the end of a catchment where a lake was perched against the outside of the crater rim," he said.

"A flood might have brought in the rocks, breached the rim and overflowed into the crater, carving the valley down the inner side of the rim," he added.

"Another possibility is that the area was fractured by the impact that created Endeavour Crater, then rock dikes filled the fractures, and we're seeing effects of wind erosion on those filled fractures," Arvidson said.

In the hypothesis of a perched lake, the notch in the crest just above Perseverance Valley may have been a spillway.

Weighing against that hypothesis is an observation that the ground west of the crest slopes away, not toward the crater.

The science team is considering possible explanations for how the slope might have changed.

A variation of the impact-fracture hypothesis is that water rising from underground could have favoured the fractures as paths to the surface and contributed to weathering of the fracture-filling rocks.

The team is analysing images of Perseverance Valley, taken from the rim, to plot Opportunity's route.

The valley extends down from the crest into the crater at a slope of about 15 to 17 degrees for a distance of about two football fields.

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### **KIDS WHO DO NOT DRINK COWS MILK TEND TO BE SHORTER: STUDY**

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Parents, take note! Children who drink plant based milk beverages or milk from animals other than cows are more likely to be shorter, a study claims.

Researchers from St Michael's Hospital in Canada found that for each daily cup of non-cow's milk they drank, children were 0.4 centimetres shorter than average height for their age and for each daily cup of cow's milk they drank, children were 0.2 centimetres taller than average.

This height difference is similar to the difference between major percentile lines on the World Health Organisation growth chart, said Jonathon Maguire, pediatrician at St Michael's Hospital.

This means drinking three cups of non-cow's milk per day might move a child to the 15th from the 50th percentile for height, and vice versa, compared with other children their age, he said.

Researchers also found that children who drank a combination of cow's milk and non-cow's milk daily were shorter than average.

"This finding suggests adding some cow's milk to a child's diet did not reverse the association between non-cow's milk consumption and lower height," Maguire said.

Height is an important indicator of children's overall health and development, researchers said.

Many parents are choosing non-cow's milk for their children, which may have lower nutritional content, Maguire said.

Researchers examined about 5,034 children between the ages of 24-72 months. Of those studied, 13 per cent drank non-cow's milk daily, and 92 per cent drank cow's milk daily.

While the majority of children studied drank cow's milk daily, the number who drank non-cow's milk daily suggests its popularity has increased in recent years, possibly due to perceived health benefits, researchers said.

The study was published in the American Journal of Clinical Nutrition.

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### **NEW, EXTINCT WASP SPECIES NAMED AFTER DAVID BOWIE'S ALTER EGO**

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Scientists have discovered an 100 million years old extinct wasp species and named it after the English musician David Bowie's alter ego - Ziggy Stardust.

Researchers from Capital Normal University in China found two unidentified wasp specimens that were exceptionally well-preserved in Burmese amber.

An analysis of the specimens revealed that both represent species new to science. One of the wasps showed such amazing similarities to a modern group of wasps that it was placed in a currently existing genus, *Archaeoteleia* which has long been considered as an ancient lineage.

However, *Archaeoteleia* has changed since the times when the ancient wasp got stuck on fresh tree resin, researchers said.

The team notes that "a novice might not recognise the characters that unite the fossil with extant species." For instance, the modern wasp species of the genus show visibly longer antennal segments and a different number of teeth on the mandible when compared to the fossil.

In turn, the description of the new extinct species enhances the knowledge about living species by highlighting anatomical structures shared by all species within the genus.

They named the fossil *Archaeoteleia astropulvis*. The species name, *astropulvis*, translates from Latin to 'star dust'.

The name to refer to both "the ancient source of the atoms that form our planet and its inhabitants," as well as to commemorate the late David Bowie's alter ego - Ziggy Stardust, researchers said.

The second new species belongs to a genus (*Proteroscelio*) known exclusively from Cretaceous fossils. Likewise, it is a tiny insect, measuring less than 2millimetre in length, researchers said.

It also plays an important role in taxonomy by expanding the anatomical diversity known from this extinct genus.

"The discovery, especially the Star dust wasp and its placement in an extant genus, where it is the only fossil species, 'exemplifies the importance of understanding the extant fauna of a taxon to interpret fossils'," researchers including Longfeng Li from China's Capital Normal University said.

"Such union of fossil and extant morphologies is especially illuminating and requires examination of both kinds of specimens," they add.

The study was published in the Journal of Hymenoptera Research.

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### **PUTTING OTHERS FIRST CAN COST MORE LIVES IN EMERGENCIES: STUDY**

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Selfless heroism is not the best strategy during life-and-death situations such as accidents of natural disasters, as trying to save others first may lead to more deaths, a study warns.

Researchers from University of Waterloo in Canada found that overall survival rates were substantially higher when strong people in a 30-member group reached safety themselves before trying to help weaker people.

When strong members try to help weak members before they are secure themselves, both are dragged down and the group as a whole suffers, researchers said.

"Foolhardiness is not a good strategy for rescuing. In very critical situations, we have to be kind of selfish, but we can still help others if we have proper equipment and proper strategies," said Eishiro Higo, PhD candidate at University of Waterloo.

Researchers built a two-dimensional computer model of an actual three-level underground space in Kyoto, Japan that consists of a subway platform, a parking garage and a shopping mall.

The model simulated severe flooding from a nearby river, with a mix of adults and senior citizens who must reach safety via staircases from the subway platform level to the surface.

Researchers ran the model using three different evacuation strategies: one in which people only worried about themselves, one in which people immediately worked together as a group and one in which those capable of saving themselves reached a safe place before trying to save others using a rope.

The team found that in most life-and-death scenarios when variables such as the ratio of adults to seniors were adjusted, the rope strategy resulted in the highest overall survival rate.

In a typical scenario that assumed evacuation efforts beginning at a particular point in time, for example, 12 of 30 people survived using the rope strategy, while there were just five survivors using either of the other two strategies, researchers said.

Researchers found that crucial to the success of the rope strategy, however, was the availability of simple tools for use by rescuers.

Design features including handrails and raised areas on stairs for evacuees to brace themselves or rest also markedly increased the chances of survival.

“We have to identify what is brave and what is reckless. Helping people from a safe location is still good behaviour and the result is actually much better,” Higo said.

The study was published in the journal *Expert Systems with Applications*.

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### ANCIENT ‘BILLBOARD’ WITH EGYPTIAN ROCK INSCRIPTIONS DISCOVERED

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Archaeologists have uncovered previously unknown ‘billboard-sized’ hieroglyphs - Egyptian rock inscriptions dating back to 5,200 years.

The individual hieroglyphs each measure just over a half metre in height, and the entire tableau is about 70 centimetres in height.

“This discovery isn’t new in the sense that this is the first time that anyone has seen these hieroglyphs, this is the first time that anyone has seen them on such a massive scale,” said John Coleman Darnell, Egyptologist and professor at Yale University in the US.

“In the modern world this would be akin to seeing smaller text on your computer screen and then suddenly seeing very large ones made the same way only on a billboard,” Darnell added.

Researchers, including those from Royal Museums of Art and History in Belgium, also discovered rock art depicting a herd of elephants that was carved between 4,000-3,500 BC.

One of the elephants has a little elephant inside of it, which, according to researchers, “is an incredibly rare way of representing a pregnant female animal.”

The newly discovered rock art site of El-Khawy preserves some of the earliest and largest signs from the formative stages of the hieroglyphic script and provides evidence for how the ancient Egyptians invented their unique writing system, researchers said.

The team also identified a panel of four signs, created circa 3,250 BC and written right to left - the dominant writing direction in later Egyptian texts - portraying animal images of a bull’s head on a short pole followed by two back-to-back saddlebill storks with a bald ibis bird above and between them.

These discoveries reveal that there was not a slow development of writing primarily for bureaucratic use as previously believed, but that hieroglyphic writing was more geographically widespread and topically diverse at the time of or shortly after its development, researchers said.

The team of archaeologists located the rock inscriptions by mapping out routes based on road networks in Egypt.

Most inscriptions are located along major roads, either roads that parallel the Nile or roads that head out into the desert. They are usually at a junction or crossroads, researchers said.

“Any place where someone might pause in their journey,” Darnell added.

Using a new recording technique, the team created a series of 3D images of the inscriptions from photographs taken in the field.

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### KIDS RAISED BY SINGLE PARENTS HAVE LOWER WELLBEING: STUDY

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People who grow up in single-parent families have lower levels of wellbeing and life satisfaction in adulthood, a study has found.

Researchers from the University of Warwick in the UK found that individuals who were brought up by a single parent for their entire childhood earn on average 30 per cent less and are more likely to be unemployed.

Furthermore, on average they are nine per cent less likely to be in a romantic relationship and had a smaller number of friends.

In a study of over 24,000 adults aged 18-66, the researchers identified 641 individuals who spent their entire childhood with a single parent and 1,539 who spent part of their childhood with a single parent.

The sample group was asked how satisfied they are with life in general, using an 11-point scale - ranging from zero (completely dissatisfied) to ten (completely satisfied). They were also asked who they lived with for the first fifteen years of their life.

The researchers analysed the participants’ annual income, number of visits to the doctor, level of social integration, and success in romantic relationships.

After accounting for childhood socio-economic circumstances, the differences in life-satisfaction were relatively small.

Those who grew up with a single parent for their entire childhood were about 0.2 points lower on the scale ranging from 0 to 10 than those who were brought up by both parents - and 0.1 points lower than those who experienced parental separation during childhood.

“These findings suggest that both parents still provide important resources even when children have already grown up

and left their parent's home," said Sakari Lemola from University of Warwick.

"During young adulthood these resources may include financial support as well as access to social networks, which is important to find a good job," said Lemola.

"Children who had grown up with a single parent for their entire childhood are less likely to know their second parent well and to receive such support during adult life," he said.

Single parenthood is increasingly common in Western societies, with 20 per cent of children in Germany and 24 per cent in the UK currently being raised in single-parent households - more than 80 per cent of those in households headed by single mothers.

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### **NEW FLEXIBLE DEVICES CAN BE POWERED BY BODY HEAT**

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New York, Jun 25 (PTI) Scientists have designed a flexible energy harvester that may pave the way for wearable devices which are powered using only body heat.

Wearable devices used to monitor a variety of health and environmental measures are becoming increasingly popular.

The performance and efficiency of flexible devices, however, pale in comparison to rigid devices, which have been superior in their ability to convert body heat into usable energy.

"We wanted to design a flexible thermoelectric harvester that does not compromise on the material quality of rigid devices yet provides similar or better efficiency," said Mehmet Ozturk, professor at North Carolina State University in the US.

Using rigid devices is not the best option when you consider a number of different factors. Superior contact resistance - or skin contact - with flexible devices, as well as the ergonomic and comfort considerations to the device wearer, researchers said.

One of the key challenges of a flexible harvester is to connect thermoelectric elements in series using reliable, low-resistivity interconnects, they said.

The team used a liquid metal of gallium and indium - a common, non-toxic alloy called EGaIn - to connect the thermoelectric 'legs'.

"The electric resistance of these connections is very low, which is critical since the generated power is inversely proportional to the resistance: Low resistance means more power," researchers said.

"Using liquid metal also adds a self-healing function: If a connection is broken, the liquid metal will reconnect to make the device work efficiently again. Rigid devices are not able to heal themselves," Ozturk said.

Future work will focus on improving the efficiencies of these flexible devices, by using materials and techniques to further eliminate parasitic resistances, researchers said.

The study was published in the journal Applied Energy.

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### **MYSTERIOUS 'PLANET 10' MAY BE LURKING AT EDGE OF SOLAR SYSTEM**

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A mysterious, unseen 'Planet 10' may be lurking in the outer reaches of our solar system, say scientists including one of Indian origin, who have found evidence of a Mars-like object that could be orbiting our Sun.

This object would be different from, and much closer than, the Planet Nine - whose existence yet awaits confirmation.

Researchers, including Renu Malhotra of the University of Arizona in the US, found compelling evidence of a yet-to-be-discovered planetary body with a mass somewhere between that of Mars and Earth.

The mysterious mass has given away its presence only by controlling the orbital planes of a population of space rocks known as Kuiper Belt objects (KBOs) in the icy outskirts of the solar system.

While most KBOs - debris left over from the formation of the solar system - orbit the Sun with orbital tilts that average out to the invariable plane of the solar system, the most distant of the Kuiper Belt's objects do not.

Their average plane is tilted away from the invariable plane by about eight degrees, researchers said.

This means something unknown is warping the average orbital plane of the outer solar system.

"The most likely explanation for our results is that there is some unseen mass," said Kat Volk, a postdoctoral fellow at University of Arizona.

"According to our calculations, something as massive as Mars would be needed to cause the warp that we measured," said Volk, lead author of the study published in the *Astronomical Journal*.

The Kuiper Belt lies beyond the orbit of Neptune and extends to a few hundred Astronomical Units (AU) - the distance between Earth and the sun.

Like its inner solar system cousin, the asteroid belt between Mars and Jupiter, the Kuiper Belt hosts a vast number of minor planets, mostly small icy bodies and a few dwarf planets.

Through their observations, researchers ruled out the possibility that the postulated object could be the hypothetical Planet Nine, whose existence has been suggested based on other observations.

That planet is predicted to be much more massive (about 10 Earth masses) and much farther out at 500 to 700 AU.

The data also do not rule out the possibility that the warp could result from more than one planetary mass object.

The planet has most likely not been found yet because we have not searched the entire sky for distant solar system objects, researchers said.

The most likely place a planetary mass object could be hiding would be in the galactic plane, an area so densely packed with stars that solar system surveys tend to avoid it.

“The chance that we have not found such an object of the right brightness and distance simply because of the limitations of the surveys is estimated to be to about 30 per cent,” Volk said.

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### **DRONES THAT CAN PLANT ONE BILLION TREES EVERY YEAR DEVELOPED**

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Scientists have developed new drones that can identify ideal places to grow trees and sow one billion plants every year, an advance that may help combat deforestation.

Deforestation and forest degradation make up 17 per cent of the world’s carbon emissions - more than the entire world’s transportation sector, according to the United Nations.

Researchers from UK-based company BioCarbon Engineering helped build a drone system that can scan the land, identify ideal places to grow trees, and then fire germinated seeds into the soil.

The new drones can plant in areas previously impossible to reach, like steep hills, researchers said.

The firing drone follows a pre-set planting pattern determined from an algorithm, which uses information from a separate scanning drone, they said.

To work out the best possible place to plant, the team used the drone to map the area, looking to create a 3D model of the land, ‘ABC News’ reported.

“The data gets downloaded and we’ve developed the algorithms that use that data to make smart decisions about exactly where to plant and how to manage that ecosystem,” said Susan Graham, from BioCarbon Engineering.

The planet loses 15 billion trees every year and much of it is cleared for farmland to feed the world’s booming population, but it is feared this could be exacerbating climate change,

“Although we plant about nine billion trees every year, that leaves a net loss of six billion trees. The rate of replanting is just too slow,” Graham said.

Graham is hoping to change that with a system that plants at “10 times the rate of hand planting and at 20 per cent of the cost.”

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### **NEW METHOD TO MONITOR MUSCLE INJURIES**

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Scientists have developed a low-cost and non-invasive method of measuring the severity of muscle injuries in footballers, an advance that will help the players return to action faster.

Researchers from Polytechnic University of Catalunya in Spain developed the new technique, called localised bioimpedance measurement (L-BIA).

It is often difficult to get a clear idea of when athletes would be fit again because the ‘muscle gap’ - or muscle damage - cannot easily be measured by current methods, researchers said.

The technique works by sending a low intensity alternating current through healthy muscle tissue and then comparing that with readings from injured tissue.

Passing a current through the affected muscles gives a clearer picture of soft tissue damage than ultrasound or MRI scans, researchers said.

The team looked at about 22 muscle injuries in 18 Futbol Club Barcelona players over five years, ‘BBC News’ reported.

They took measurements soon after the footballers’ injuries occurred and then again when they returned to the fray, and they also compared them with healthy muscles.

Researchers were able to separate the injuries into two distinct groups, work out the seriousness of the injury and then the players’ likely recovery time.

“It can support the image from ultrasound or MRI to help quantify the disrupted soft tissue structure in injured muscles,” said Javier Yanguas, lead doctor at FC Barcelona.

The study was published in the journal *Physiological Measurement*.

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### **NEW ULTRA-THIN CAMERA CREATES IMAGES WITHOUT LENSES**

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Scientists have developed a new camera design that substitutes an array of light receivers for a lens, making cameras thin, light, cheap and flexible.

Traditional cameras - even those on the thinnest of cell phones - cannot be truly flat due to their optics: lenses that require a certain shape and size in order to function.

The ultra-thin optical phased array (OPA) does computationally what lenses do using large pieces of glass: it manipulates incoming light to capture an image.

Lenses have a curve that bends the path of incoming light and focuses it onto a piece of film or, in the case of digital cameras, an image sensor.

The OPA has a large array of light receivers, each of which can individually add a tightly controlled time delay (or phase shift) to the light it receives, enabling the camera to selectively look in different directions and focus on different things.

“Here, like most other things in life, timing is everything. With our new system, you can selectively look in a desired direction and at a very small part of the picture in front of you at any given time, by controlling the timing with femto-second - quadrillionth of a second - precision,” said Ali Hajimiri, Professor at California Institute of Technology (Caltech) in the US.

“We have created a single thin layer of integrated silicon photonics that emulates the lens and sensor of a digital camera, reducing the thickness and cost of digital cameras.

“It can mimic a regular lens, but can switch from a fish-eye to a telephoto lens instantaneously - with just a simple adjustment in the way the array receives light,” Hajimiri said.

Phased arrays, which are used in wireless communication and radar, are collections of individual transmitters, all sending out the same signal as waves.

These waves interfere with each other constructively and destructively, amplifying the signal in one direction while cancelling it out elsewhere.

Thus, an array can create a tightly focused beam of signal, which can be steered in different directions by staggering the timing of transmissions made at various points across the array.

The research was published in the Optical Society of America’s Technical Digest.

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### **NEW SMARTPHONE COATING ALLOWS YOU TO READ IN BRIGHT SUNLIGHT**

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Scientists have developed a new anti-reflection coating that could allow people to read from their smartphones and tablets even in bright sunlight.

The film, inspired by the nanostructures found on moth eyes, exhibits a surface reflection of just 0.23 per cent, much lower than the iPhone’s surface reflection of 4.4 per cent, for example.

Reflection is the major reason it is difficult to read a phone screen in bright sunlight, as the strong light reflecting off the screen’s surface washes out the display.

“Using our flexible anti-reflection film on smartphones and tablets will make the screen bright and sharp, even when viewed outside,” said Shin-Tson Wu from the University of Central Florida in the US.

“In addition to exhibiting low reflection, our nature-inspired film is also scratch resistant and self-cleaning, which would protect touch screens from dust and fingerprints,” said Wu, who led the study published in the journal *Optica*.

The new film contains tiny uniform dimples, each about 100 nanometres in diameter (about one-thousandth of the width of a human hair).

The coating can also be used with flexible display applications such as phones with screens that fold like a book, which are expected to hit the market as soon as next year.

Many of today’s smartphones use a sensor to detect bright ambient light and then boost the screen’s brightness level enough to overcome the strong surface reflection.

Although this type of adaptive brightness control can help improve readability, it also drains battery power. Other

methods for solving the sunlight visibility problem have proved difficult to implement.

Looking for a simpler approach to improve screen readability outside, the researchers turned to nature.

The eyes of moths are covered with a pattern of antireflective nanostructures that allow moths to see in the dark and prevent eye reflections that might be seen by predators.

The researchers developed a fabrication technique that uses self-assembled nanospheres to form a precise template that can be used to create the moth-eye-like structure on a coating.

The simplicity and precision of this process allowed fabrication of the intricate structure in a film large enough to apply to a mobile screen.

Tests of the film after optimisation showed that when viewed in sunlight, glass covered with the new film exhibited a more than four-fold improvement in contrast ratio - the difference between the brightest white and darkest black.

When viewed in the shade, glass with the new film showed about a ten-fold improvement in contrast ratio. The researchers also used standard industrial procedures to test its flexibility as well as its anti-scratch and self-cleaning capabilities.

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### **NEW SYSTEM DETECTS SARCASM ON SOCIAL MEDIA**

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Scientists have developed a new system that can detect sarcasm in social media posts, and interpret it for people with autism and Asperger’s syndrome who have difficulty understanding such statements.

“There are a lot of systems designed to identify sarcasm, but this is the first that is able to interpret sarcasm in written text,” said Lotam Peled, graduate student at Technion-Israel Institute of Technology.

“We hope in the future, it will help people with autism and Asperger’s, who have difficulty interpreting sarcasm, irony and humour,” said Peled.

Based on machine translation, the new system, called Sarcasm SIGN (sarcasm Sentimental Interpretation GeNerator), turns sarcastic sentences into honest, non-sarcastic ones.

For example, it will turn a sarcastic sentence such as, “The new ‘Fast and Furious’ movie is awesome. #sarcasm” into the honest sentence, “The new Fast and Furious movie is terrible.”

Despite the vast development in this field, and the successes of sentiment analysis applications on “social media intelligence,” existing applications do not know how to interpret sarcasm, where the writer writes the opposite of what they actually mean.

In order to teach the system to produce accurate interpretations, the researchers compiled a database of 3,000 sarcastic tweets that were tagged with #sarcasm, where each tweet

was interpreted into a non-sarcastic expression by five human experts.

In addition, the system was trained to identify words with strong sarcastic sentiments - for example, the word "best" in the tweet, "best day ever" - and to replace them with strong words that reveal the true meaning of the text.

The system was examined by a number of (human) judges, who gave its interpretations high scores of fluency and adequacy, agreeing that in most cases it produced a semantically and linguistically correct sentence.

Automatic identification and analysis of sentiment in text is a very complex challenge being explored by many researchers around the world because of its commercial potential and scientific importance.

Sentiment identification could be used in social, commercial, and other applications to improve communication between people and computers, and between social media users.

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### **MERE PRESENCE OF SMARTPHONE REDUCES BRAIN POWER: STUDY**

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Your brain power may be significantly reduced when your smartphone is within reach - even if it is switched off - affecting your ability to concentrate on a task, scientists have found.

Researchers from The University of Texas at Austin in the US conducted experiments with nearly 800 smartphone users to measure, for the first time, how well people can complete tasks when they have their smartphones nearby even when they are not using them.

In one experiment, the researchers asked study participants to sit at a computer and take a series of tests that required full concentration in order to score well.

The tests were geared to measure participants' available cognitive capacity - that is, the brain's ability to hold and process data at any given time.

Before beginning, participants were randomly instructed to place their smartphones either on the desk face down, in their pocket or personal bag, or in another room.

All participants were instructed to turn their phones to silent.

The researchers found that participants with their phones in another room significantly outperformed those with their phones on the desk, and they also slightly outperformed those participants who had kept their phones in a pocket or bag.

The findings suggest that the mere presence of one's smartphone reduces available cognitive capacity and impairs cognitive functioning, even though people feel they are giving their full attention and focus to the task at hand.

"We see a linear trend that suggests that as the smartphone becomes more noticeable, participants' available

cognitive capacity decreases," said Adrian Ward, Assistant Professor at University of Texas at Austin.

"Your conscious mind isn't thinking about your smartphone, but that process - the process of requiring yourself to not think about something - uses up some of your limited cognitive resources," Ward said.

In another experiment, researchers looked at how a person's self-reported smartphone dependence - or how strongly a person feels he or she needs to have a smartphone in order to get through a typical day - affected cognitive capacity.

Participants performed the same series of computer-based tests as the first group and were randomly assigned to keep their smartphones either in sight on the desk face up, in a pocket or bag, or in another room. In this experiment, some participants were also instructed to turn off their phones.

The researchers found that participants who were the most dependent on their smartphones performed worse compared with their less-dependent peers, but only when they kept their smartphones on the desk or in their pocket or bag.

Researchers also found that it did not matter whether a person's smartphone was turned on or off, or whether it was lying face up or face down on a desk.

Having a smartphone within sight or within easy reach reduces a person's ability to focus and perform tasks because part of their brain is actively working to not pick up or use the phone.

"It's not that participants were distracted because they were getting notifications on their phones. The mere presence of their smartphone was enough to reduce their cognitive capacity," said Ward.

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### **SOON, PROSTHETIC LIMBS THAT TAKE FEEDBACK FROM HUMAN BODY**

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Scientists have developed a novel design approach for exoskeletons and prosthetic limbs that incorporates direct feedback from the human body.

The approach will dramatically improve energy economy, speed and balance for millions of people, especially those with disabilities, researchers said.

The technique, called human-in-the-loop optimisation, customises walking assistance for individuals and significantly improves energy economy during walking.

The algorithm that enables this optimisation represents a landmark achievement in the field of biomechatronics - study of biology, mechanics, electronics and control.

"Existing exoskeleton devices, despite their potential, have not improved walking performance as much as we think they should," said Steven Collins, a professor at Carnegie Mellon University in the US.

"We have seen improvements related to computing, hardware, and sensors, but the biggest challenge has remained

the human element - we just have not been able to guess how they will respond to new devices,” said Collins.

The software algorithm is combined with versatile emulator hardware that automatically identifies optimal assistance strategies for individuals.

During experiments, each user received a unique pattern of assistance from an exoskeleton worn on one ankle.

The algorithm tested their responses to 32 different patterns over the course of an hour, making adjustments based on measurements of their energy use with each pattern.

The optimised assistance pattern produced larger benefits than any exoskeleton to date, including devices acting at all joints on both legs.

“When we walk, we naturally optimise coordination patterns for energy efficiency. Human-in-the-loop optimisation acts in a similar way to optimise the assistance provided by wearable devices,” said Collins.

“We are really excited about this approach because we think it will dramatically improve energy economy, speed, and balance for millions of people, especially those with disabilities,” he said.

The findings were published this week in Science.

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### **EXTRA-VIRGIN OLIVE OIL PROTECTS BRAIN AGAINST ALZHEIMER’S**

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A diet enriched with extra- virgin olive oil may protect memory and learning ability, and prevent Alzheimer’s disease, a study claims.

The Mediterranean diet, rich in plant-based foods, is associated with a variety of health benefits, including a lower incidence of dementia.

Researchers at the Lewis Katz School of Medicine at Temple University (LKSOM) in the US identified a specific ingredient that protects against cognitive decline: extra- virgin olive oil, a major component of the Mediterranean diet.

In a study published in the journal *Annals of Clinical and Translational Neurology*, researchers show that the consumption of extra-virgin olive oil reduces the formation of amyloid-beta plaques and neurofibrillary tangles in the brain - classic markers of Alzheimer’s disease.

The team also identified the mechanisms underlying the protective effects of extra-virgin olive oil.

“We found that olive oil reduces brain inflammation but most importantly activates a process known as autophagy,” said Domenico Pratico, Professor at LKSOM.

Autophagy is the process by which cells break down and clear out intracellular debris and toxins, such as amyloid plaques and tau tangles.

“Brain cells from mice fed diets enriched with extra-virgin olive oil had higher levels of autophagy and reduced levels of amyloid plaques and phosphorylated tau,” Pratico said.

Phosphorylated tau, is responsible for neurofibrillary tangles, which are suspected of contributing to the nerve cell dysfunction in the brain that is responsible for Alzheimer’s memory symptoms.

In order to investigate the relationship between extra-virgin olive oil and dementia, researchers used a well- established Alzheimer’s disease mouse model.

Known as a triple transgenic model, the animals develop three key characteristics of the disease: memory impairment, amyloid plaques, and neurofibrillary tangles.

The researchers divided the animals into two groups, one that received a chow diet enriched with extra-virgin olive oil and one that received the regular chow diet without it.

The olive oil was introduced into the diet when the mice were six months old, before symptoms of Alzheimer’s disease begin to emerge in the animal model.

In overall appearance, there was no difference between the two groups of animals. However, at age nine months and 12 months, mice on the extra virgin olive oil-enriched diet performed significantly better on tests designed to evaluate working memory, spatial memory, and learning abilities.

Studies of brain tissue from both groups of mice revealed dramatic differences in nerve cell appearance and function.

The integrity of the connections between neurons, known as synapses, were preserved in animals on the extra-virgin olive oil diet.

In addition, compared to mice on a regular diet, brain cells from animals in the olive oil group showed a dramatic increase in nerve cell autophagy activation, which was ultimately responsible for the reduction in levels of amyloid plaques and phosphorylated tau.

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## **WALLPAPER FUNGUS CAN MAKE YOU SICK: STUDY**

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Toxins produced by fungus growing on the wallpapers in our home can contaminate the air and be easily inhaled, leading to “sick building syndrome,” a new study has found.

The sick building syndrome (SBS) is used to describe a situation in which the occupants of a building experience acute health-related effects that seem to be linked directly to the time spent in the building.

“We demonstrated that mycotoxins could be transferred from a mouldy material to air, under conditions that may be encountered in buildings,” said Jean-Denis Bailly, Professor at National Veterinary School of Toulouse in France.

“Thus, mycotoxins can be inhaled and should be investigated as parameters of indoor air quality, especially in homes with visible fungal contamination,” said Bailly.

The impetus for the study was the dearth of data on the health risk from mycotoxins produced by fungi growing indoors.

Researchers built an experimental bench that can simulate an airflow over a piece of contaminated wall paper, controlling speed and direction of the air. Then they analysed the resulting bioaerosol.

“Most of the airborne toxins are likely to be located on fungal spores, but we also demonstrated that part of the toxic load was found on very small particles - dust or tiny fragments of wallpaper, that could be easily inhaled,” said Bailly.

The researchers used three fungal species in their study: *Penicillium brevicompactum*, *Aspergillus versicolor* and *Stachybotrys chartarum*.

These species, long studied as sources of food contaminants, also “are frequent indoor contaminants,” said Bailly.

They produce different mycotoxins, and their mycelia are different from one another, likely leading to differences in the quantity of mycotoxins they loft into the air.

Mycelia are the thread-like projections of fungi that seek nutrition and water from the environment.

Bailly noted that the push for increasingly energy efficient homes may aggravate the problem of mycotoxins indoors.

Such homes “are strongly isolated from the outside to save energy,” but various water-using appliances such as coffee makers “could lead to favourable conditions for fungal growth,” he said.

“The presence of mycotoxins in indoors should be taken into consideration as an important parameter of air quality,” Bailly concluded.

The study was published in the journal *Applied and Environmental Microbiology*.

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## **HOT TEMPERATURES MAKE PEOPLE MOODY, LESS HELPFUL: STUDY**

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Uncomfortably hot temperatures may make people moody and less likely to be helpful or “pro-social”, a study suggests.

“Ambient temperature affects individual states that shape emotional and behavioural reactions, so people help less in an uncomfortable environment,” said Liuba Belkin, associate professor at Lehigh University in the US.

Researchers conducted a three part study. They collected data from a large retail chain for part one of the study and analysed the differences in individual behaviour under hot versus normal temperature conditions.

They found that clerks working in an uncomfortably hot environment were 50 per cent less likely to engage in pro social behaviours, including: volunteering to help customers, listening actively, and making suggestions.

For part two, a randomised online experiment was conducted.

The team asked paid online panel to just recall or imagine situations where they were uncomfortably hot and then, after measuring their feelings and perceptions and a number of survey questions, asked them to help with another survey for free.

Participants were not even experiencing heat at the moment - and researchers still found that, compared to the control group, they were more fatigued, which reduced their positive affect and, ultimately, pro-social behaviour, researchers said.

Only 34 per cent of the participants who were asked to recall a time when they were uncomfortably hot were willing to help with the free survey, compared to 76 per cent in the control group.

Researchers also noted that recalling being uncomfortably hot also increased the negative affectivity, but it did not have any impact on pro-social behaviour, while reduction in positive affect did.

In part three of the study, researchers found that even slight fluctuations in temperature changed behaviour. They chose students in two sections of a college management course as subjects for a field experiment.

One group sat in a lecture in a room that was uncomfortably warm, the other group sat in a room that was held in an air conditioned room - there was a 15 per cent difference in the actual room temperature.

The team then asked the students to answer a series of questions and fill out a survey ‘for a non-profit organisation that serves children and underprivileged individuals in the local community.’

Researchers found only 64 per cent in the hotter room agreed to answer at least one question, while in the cooler room 95 per cent did so.

Even those who agreed to help in the hotter room helped less, answering, on average, six questions, almost six times less than the number of questions answered in the cooler room (average 35).

Researchers were also able to replicate the mechanism that drives reduction in pro social behaviour - the same pattern of results as in study two showed that uncomfortably warm classroom temperature increased fatigue, reduced positive affect and led to less helping.

The study was published in the European Journal of Social Psychology.

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### **INDIA'S ANTARCTIC OCEAN EXPEDITION TO DEPLOY UNDER-ICE MOORING**

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India's expedition to the Southern Ocean, scheduled to be launched in December, will deploy an under-ice mooring for a period of one year to understand the seasonal variabilities in the coastal waters of Bharati station in Antarctica, and its impact on the ecosystem.

An under-ice mooring is a line anchored to the seafloor and held aloft by floats at the surface.

Bharati is an Antarctic research station commissioned by India. It is the country's third research facility and one of two active stations, alongside Maitri.

India's first committed research facility, Dakshin Gangotri, is being used as a supply base.

"During the Southern Ocean Expedition (SOE) 2017, detailed observations were made in the Prydz Bay (PB) region during austral summer," Dr N Anilkumar, from Ocean Science Group of Goa-based National Centre for Antarctic and Ocean Research (NCAOR) said.

"However in the Southern Ocean (SO) expedition 2017-18, it is planned to deploy an under-ice mooring for a period of one year," he said.

"This time, the observations are significant to understand the seasonal variabilities in the dynamics and biochemical processes of the coastal waters of Bharati station as well, as its impact on this ecosystem," the scientist said.

The tenth SOE to the Indian Ocean sector of the Southern Ocean will be launched in early December to have a comprehensive study in the region between the Polar Front (PF) and PB as well as with an under-ice mooring in the coastal waters of the Bharati station, Anilkumar said.

The SO research programme is mainly focusing on the "role and response of Southern Ocean to the regional and global climate variability".

The previous SOEs, from 2004-2017, attempted to understand the spatial and temporal variability of different fronts as well as the coastal processes in the Indian Ocean sector of the SO based on the hydrographic data collected along various transects.

"The last four years' SOE mainly focused on the Subtropical Front (STF) to Polar Front (PF) and in the Prydz Bay (PB) region, coastal waters of Antarctica near India's third station, Bharati," the NCAOR said.

A set of mooring equipments like current meters, micro-cats and sediment traps have been deployed in the STF region during SOE 2016-17 for a comprehensive understanding of the seasonal and inter-annual variability of the physical, biological and geological parameters of this dynamic regime.

The Indian Ocean sector of the SO is a region which remains under-investigated, where the data available is sparse which impedes our knowledge to understand the role of SO in the climatic variabilities.

Availability of long term data from this area is imperative for understanding the various processes affecting the climate so as to evolve suitable mitigating measures, the NCAOR said.

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### **'BAD MEMORIES' CAN BE SELECTIVELY ERASED: STUDY**

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Memories that trigger anxiety and post-traumatic stress disorder (PTSD) could be erased without affecting other important memories of past events, according to a study.

The finding could help develop drugs that can treat anxiety without affecting the patient's normal memory, researchers said.

Brains create long-term memories by increasing the strength of connections between neurons and maintaining those connections over time.

The study, published in the journal *Current Biology*, tested that hypothesis by stimulating two sensory neurons connected to a single motor neuron of the marine snail *Aplysia*.

One sensory neuron was stimulated to induce an associative memory and the other to induce a non-associative memory.

"The example I like to give is, if you are walking in a high-crime area and you take a shortcut through a dark alley and get mugged, and then you happen to see a mailbox nearby, you might get really nervous when you want to mail something later on," said Samuel Schacher, professor of neuroscience at Columbia University Medical Centre (CUMC).

In the example, fear of dark alleys is an associative memory that provides important information based on a previous experience.

Fear of mailboxes, however, is an incidental, non-associative memory that is not directly related to the traumatic

event.

By measuring the strength of each connection, the researchers found that the increase in the strength of each connection produced by the different stimuli was maintained by a different form of a Protein Kinase M (PKM) molecule (PKM Apl III for associative synaptic memory and PKM Apl I for non-associative).

They found that each memory could be erased - without affecting the other - by blocking one of the PKM molecules.

They found that specific synaptic memories may also be erased by blocking the function of distinct variants of other molecules that either help produce PKMs or protect them from breaking down.

“By isolating the exact molecules that maintain non-associative memory, we may be able to develop drugs that can treat anxiety without affecting the patient’s normal memory of past events,” said Jianguan Hu, an associate research scientist in the Department of Psychiatry at CUMC.

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### **BRISK WALK MAY SLOW DOWN ALZHEIMER’S RISK: STUDY**

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Taking a brisk walk or engaging in other moderate-intensity physical activities may help slow down the progression of Alzheimer’s disease in people who are already at a risk of developing the disorder, a study claims.

Researchers from University of Wisconsin-Madison in the US studied about 93 members of a parental history Alzheimer’s risk study group.

They measured the daily physical activity of participants, all of whom were in late middle-age and at high genetic risk for Alzheimer’s disease, but presently show no cognitive impairment.

Activity levels were measured for one week, quantified, and analysed. This approach allowed researchers to determine the amount of time each subject spent engaged in light, moderate, and vigorous levels of physical activity.

Light physical activity is equivalent to walking slowly, while moderate is equivalent to a brisk walk and vigorous a strenuous run. Data on the intensities of physical activity were then statistically analysed to determine how they corresponded with glucose metabolism - a measure of neuronal health and activity - in areas of the brain known to have depressed glucose metabolism in people with Alzheimer’s disease.

Researchers measured brain glucose metabolism using a specialised imaging technique called 18F-fluorodeoxyglucose positron emission tomography (FDG-PET).

They found moderate physical activity was associated with healthier (greater levels of) glucose metabolism in all brain regions analysed.

Researchers also noted a step-wise benefit: subjects who spent at least 68 minutes per day engaged in moderate physical

activity showed better glucose metabolism profiles than those who spent less time.

“While many people become discouraged about Alzheimer’s disease, these results suggest that engaging in moderate physical activity may slow down the progression of the disease,” said Ryan Dougherty from University of Wisconsin-Madison.

The study was published in Journal of Alzheimer’s Disease.

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### **YOUR SWEAT MAY SOON POWER YOUR SMARTPHONE**

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Scientists have created a skin patch that can power a radio for two days using human sweat, and may eventually be used to charge mobile devices while people are out for a run.

The bio fuel patch may also provide a way to monitor glucose levels in people with diabetes, without needles and blood samples, researchers said.

The skin patch developed by researchers from University of California, San Diego in the US is a flexible square just a couple of centimetres across and sticks to the skin.

It contains enzymes that replace the precious metals normally used in batteries and uses sweat to provide power.

Getting enough power out of a bio fuel cell to make it useful has proved tricky, but the latest version can extract 10 times more than before, researchers said.

“We are now getting really impressive power levels. If you were out for a run, you would be able to power a mobile device,” said Joseph Wang from the University of California, San Diego.

Researchers used the lactate found in sweat to power their particular bio fuel cell, ‘News Scientist’ reported.

The amount of lactate or lactic acid in sweat is also related to how efficiently a person’s muscles are working, so could help give readings on an athlete’s performance during exercise, researchers said.

Similarly, levels of glucose in sweat are related to its concentration in the blood, they said.

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### **PORTABLE SINK TO HELP CAMPERS MAINTAIN HYGIENE**

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Scientists have designed a special portable basin which campers can carry wherever they go to clean off mud, dirt and sweat, eliminating the need for wet-wipes and hand gels.

Researchers from Birmingham City University in the UK created the PODSINK design that can be folded up and placed in camping bags to be transported from site to site, before being constructed within seconds.

PODSINK can be created from a frame of fibre-glass tent poles and a sink formed from Ripstop Nylon fabric that is thin, waterproof and durable.

The product uses a collapsible tripod system to mount a fabric sink basin above ground level, which can be used to clean hands or alongside a sponge and shower gel to form a makeshift body cleaning system.

It would remove the need for wet-wipes and hand gels to form a temporary hygiene solution in the absence of sinks or showers and could become a mainstay of festival gear alongside tents, wellies and campfires, researchers said.

"All of my life I have been a camper and spent many a summer in a caravan. So I have always had a connection with the concept of camping and have been interested in creating a product like this for a long time," said Max Wilson, product design student at Birmingham City University.

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### **MOST POPULAR SELFIES ARE ABOUT LOOKS: STUDY**

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More than half of the selfies clicked are about appearance of people, highlighting their make-up, clothes and lips, according to a study that analysed 2.5 million pictures on popular photo-sharing website Instagram.

Researchers from Georgia Institute of Technology in the US combed through selfie posts on website Instagram to determine what kinds of identity statements people make by taking selfies.

They gathered the data by searching for hashtag '#selfie,' on the popular picture sharing website and then used computer vision to confirm that the pictures actually included faces.

Researchers found nearly 52 per cent of all selfies fell into the appearance category: pictures of people showing off their make-up, clothes, lips, etc.

Pictures about looks were two times more popular than the other 14 categories combined.

After appearances, social selfies with friends, loved ones and pets were the most common (14 per cent). Then came ethnicity pics (13 per cent), travel (seven per cent), and health and fitness (five per cent).

Researchers noted that the prevalence of ethnicity selfies (selfies about a person's ethnicity, nationality or country of origin) is an indication that people are proud of their backgrounds.

They also found that most selfies are solo pictures, rather than taken with a group.

Researchers noted that overall, an overwhelming 57 per cent of selfies on Instagram were posted by the 18-35-year-old crowd.

The under-18 age group posted about 30 per cent of selfies. The older crowd (35+) shared them far less frequently (13

per cent). Appearance was most popular among all age groups, researchers said.

Selfies are an identity performance - meaning that users carefully craft the way they appear online and that selfies are an extension of that.

"People project an identity that promotes their wealth, health and physical attractiveness. With selfies, we decide how to present ourselves to the audience, and the audience decides how it perceives you," said Julia Deeb-Swihart from Georgia Institute of Technology.

"Selfies, in a sense, are the blending of our online and offline selves. It is a way to prove what is true in your life, or at least what you want people to believe is true," Deeb-Swihart said.

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### **NEW SMARTPHONE COATING ALLOWS YOU TO READ IN BRIGHT SUNLIGHT**

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Inspired by the nanostructures found on moth eyes, scientists have developed a new anti-reflection film that could allow people to read from their smartphones and tablets even in bright sunlight.

The film exhibits a surface reflection of just 0.23 per cent, much lower than the iPhone's surface reflection of 4.4 per cent, for example.

Reflection is the major reason it is difficult to read a phone screen in bright sunlight, as the strong light reflecting off the screen's surface washes out the display.

"Using our flexible anti-reflection film on smartphones and tablets will make the screen bright and sharp, even when viewed outside," said Shin-Tson Wu from the University of Central Florida in the US.

"In addition to exhibiting low reflection, our nature-inspired film is also scratch resistant and self-cleaning, which would protect touch screens from dust and fingerprints," said Wu, who led the study published in the journal *Optica*.

The new film contains tiny uniform dimples, each about 100 nanometres in diameter (about one-thousandth of the width of a human hair).

The coating can also be used with flexible display applications such as phones with screens that fold like a book, which are expected to hit the market as soon as next year.

Many of today's smartphones use a sensor to detect bright ambient light and then boost the screen's brightness level ~~enough to overcome the strong surface reflection.~~

Although this type of adaptive brightness control can help improve readability, it also drains battery power. Other ~~methods for solving the sunlight visibility problem have proved difficult to implement.~~

Looking for a simpler approach to improve screen readability outside, the researchers turned to nature.

The eyes of moths are covered with a pattern of antireflective nanostructures that allow moths to see in the dark and prevent eye reflections that might be seen by predators.

The researchers developed a fabrication technique that uses self-assembled nanospheres to form a precise template that can be used to create the moth-eye-like structure on a coating.

The simplicity and precision of this process allowed fabrication of the intricate structure in a film large enough to apply to a mobile screen.

Tests of the film after optimisation showed that when viewed in sunlight, glass covered with the new film exhibited a more than four-fold improvement in contrast ratio - the difference between the brightest white and darkest black.

When viewed in the shade, glass with the new film showed about a ten-fold improvement in contrast ratio. The researchers also used standard industrial procedures to test its flexibility as well as its anti-scratch and self-cleaning capabilities.

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### **CLIMATE CHANGE THREATENS SEA TURTLE POPULATION: STUDY**

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Climate change may negatively impact the sea turtle population, as warmer temperatures could lead to higher numbers of females and increased nest failure, scientists have warned.

The temperature at which sea turtle embryos incubate determines the sex of an individual, which is known as Temperature-Dependent Sex Determination (TSD).

The pivotal temperature for TSD is 29 degrees Celsius as both males and females are produced in equal proportions - above 29 degrees Celsius mainly females are produced while below 29 degrees Celsius more males are born.

“Up to a certain point, warmer incubation temperatures benefit sea turtles because they increase the natural growth rate of the population: more females are produced because of TSD, which leads to more eggs being laid on the beaches,” said Jacques-Olivier Laloe from Swansea University in the UK.

However, beyond a critical temperature, the natural growth rate of the population decreases because of an increase of temperature-linked in-nest mortality, researchers said.

“Temperatures are too high and the developing embryos do not survive. This threatens the long-term survival of this sea turtle population,” Laloe said.

Within the context of climate change and warming temperatures, all else being equal, sea turtle populations are expected to be more female-biased in the future.

While it is known that males can mate with more than one female during the breeding season, if there are too few males in the population this could threaten population viability, researchers said.

Sea turtle eggs only develop successfully in a relatively narrow thermal range of about 25-35 degrees Celsius, so if incubation temperatures are too low the embryo does not develop but if they are too high then development fails, they said.

This means that if incubation temperatures increase in the future as part of climate warming, then more sea turtle nests will fail.

Researchers recorded sand temperatures at a globally important loggerhead sea turtle nesting site in Cape Verde off the northwest coast of Africa over six years.

They also recorded the survival rates of over 3,000 nests to study the relationship between incubation temperature and hatchling survival.

Using local climate projections, the team then modelled how turtle numbers are likely to change throughout the century at this nesting site.

“In recent years, in places like Florida - another important sea turtle nesting site - more and more turtle nests are reported to have lower survival rates than in the past,” Laloe said.

“This shows that we should really keep a close eye on incubation temperatures and the in-nest survival rates of sea turtles if we want to successfully protect them,” he added.

The study was published in the journal *Global Change Biology*.