



www.ptinews.com

Science Service

Vol 36 No. 05 (19 pages including cover)

CONTENTS

NATIONAL SCIENCE BRIEFS:

INDIA NEEDS TO STEP UP WAR AGAINST CANCER: NATHEALTH OVER 70K CHILDREN SUFFERED FROM DIABETES IN 2015: GOVT* INDIA, NORWAY SET UP BODY TO ACCELERATE RESEARCH FOR EPIDEMICS* IMMUNOTHERAPY MAY REVOLUTIONISE CANCER TREATMENT, SAYS EXPERT*RESEARCH ON TO PRODUCE 'PERSONALISED MEDICINE': NOBEL LAUREATE* UMBILICAL CORD BLOOD EXPERTS PITCH FOR EXPANDING POOL BASE*CCMB ESTABLISHES GENETIC LINKS TO SKIN COLOUR VARIATIONS* IMA PITCHES FOR MONITORING USE OF* KERALA TEMPERATURE TO RISE BY 2-3 DEGREE CELSIUS: REPORT *HONEY CAN TREAT ORAL CANCER WOUNDS, FIND SCIENTISTS*OVER 90% PEOPLE WITH HIV, TUBERCULOSIS HAVE ACCESS TO THERAPY*UK SCIENTIST STRESSES ON USING SPACE APPLICATIONS TO CONSERVE MARINE ECOLOGY*

INTERNATIONAL SCIENCE BRIEFS:

OUR UNIVERSE MAY BE VAST, COMPLEX 2D HOLOGRAM VIRTUAL REALITY MAY HELP GET OVER FEAR OF DEATH!* 'BAG-LIKE SEA CREATURE IS OUR OLDEST KNOWN ANCESTOR'* NASA SPACE TELESCOPE SPOTS MOST EXTREME BLAZARS YET* BABY'S GENDER MAY AFFECT PREGNANT WOMAN'S IMMUNITY* KIDS WHO ENJOY MATHS HAVE HIGHER ACADEMIC ACHIEVEMENTS*NEW BIRDS SPECIES DISCOVERED IN NEPAL* GUT BACTERIA MAY ACCELERATE ALZHEIMER'S DISEASE: STUDY*NOW, FOUR-IN-ONE PILL TO TREAT HIGH BLOOD PRESSURE* WHY MOSQUITOES ARE ATTRACTED TO PEOPLE WITH MALARIA DECODED*

GLOBE SCAN:

*SEXUAL ORIENTATION POSES NO RISK TO MENTAL HEALTH: STUDY*DAYLIGHT SAVINGS TIME MAY UP IVF MISCARRIAGE RATES*KETAMINE VACCINE MAY HELP PREVENT PTSD: STUDY* 5,000-YEAR-OLD CHINESE BEER RECIPE RECREATED*GECKOS THAT SHED SKIN TO ESCAPE FOES DISCOVERED*BRIEF, INTENSE STAIR CLIMBING MAY BOOST HEART HEALTH: STUDY*

FOR SUBSCRIPTION

Quality Publications from PTI

Besides news and photo services, India's premier news agency offers a host of other services.

The services are:

PTI ECONOMIC SERVICE

A fortnightly journal providing analytical reports on the state of Indian economy and trends in the corporate world

Subscription: Rs 8,750 per annum

DATA INDIA

A reference weekly providing a digest on the happenings in India in a user-friendly alphabetical listing. A must for every library, educational institution and an excellent source of information for those who want to keep themselves upto date on happenings in India.

Subscription:

- * for libraries and educational institutions Rs 2,500 per annum
- * for others Rs 3,125 per annum

PTI SCIENCE SERVICE

A journal published fortnightly containing reports on developments in the fields of science and technology with particular reference to India.

Subscription:

- * for educational and other charitable institutions Rs 2,000 per annum
- * Others Rs 6,750 per annum (for A class newspapers)
- * Others Rs 3,500 per annum (for B class newspapers)

PTI FEATURES

A package of four weekly feature articles on topical national, international and general events.

Subscription: Rs 8,500 per annum

ALL SUBSCRIPTION PAYABLE IN ADVANCE

For further information on PTI services please contact, **Marketing Officer**, at:

The Press Trust of India Ltd, PTI Building, 4, Parliament Street, New Delhi 110 001.

e-mail: trans@pti.in

**INDIA NEEDS TO STEP UP WAR AGAINST
CANCER: NATHEALTH**

A health body said India needs to step up the war against cancer which is the second biggest killer after heart disease even as it urged the government to expand current programmes to overcome the growing cancer burden in the country.

On World Cancer Day today, the Healthcare Federation of India (NATHEALTH) said there are 7 lakh new cancer cases per year while referring to World Cancer Report 2015 in India and asserted that Non Communicable Disease (NCDs) will cost the country USD 6 trillion by 2030.

"We need to scale up and expand current programmes to control cancer with care offerings that integrate screening, prevention, treatment and follow-up, enabled by partnerships, both private-private and public-private, and across the delivery, insurance, technology and pharmaceutical sectors of the healthcare industry," said Anjan Bose, Secretary General, NATHEALTH.

According to the World Cancer Report, 8.2 million people die each year from cancer, an estimated 13 per cent of all deaths worldwide.

"Today, cancer is the second biggest killer after heart disease in India. Data from the World Cancer Report released in 2015 indicates that in India, there are 7 lakh new cancer cases per year, killing over 3.5 lakh people every year," the body said.

It is feared that that this count is only expected to rise in the next 10-15 years which makes it "crucial" to focus on new and more effective cancer treatments, in addition to the focus on prevention and wellness, it said.

It said new cancer cases are estimated to increase by 70 per cent over the next two decades and the Sustainable Development Goals (SDGs) adopted by the governments for 2030, have a clear target for one-third reduction of death rates due to non-communicable diseases (NCDs).

The theme of this year's World Cancer Day "We can. I can," it said.

"We urgently need to declare war on NCDs. It is estimated that NCDs will cost India USD 6 trillion by 2030. Population- level NCD screening efforts are required among high-risk groups, followed by enrolment

of diagnosed populations in holistic care plans, including education and counseling on healthy living," Bose said.

The demographic distribution of different kinds of cancers in our country also makes it important to scale up and expand current programmes with more advanced technologies and therapies so that India can find more effective solutions to overcome the cancer burden, it said.

NATHEALTH strongly recommended higher spending by both public and private sector in cancer research and treatment which can increase patient access to more effective and affordable treatment in India.

"A significant increase in healthcare spending (USD 3 trillion cumulatively) is needed to bridge the gaps in Indian healthcare. PPPs will play a key role in encouraging private investment in delivery, medical education and research and development," the body said.

**OVER 70K CHILDREN SUFFERED FROM
DIABETES IN 2015: GOVT**

Over 70,000 children between the age of 0-14 years were suffering from diabetes in 2015, the government today said.

"As informed by the Indian Council of Medical Research (ICMR), International Diabetes Federation estimates the number of children (0-14 years) suffering from Type-1 diabetes as 70,200 in India in 2015.

"For persons aged 20 years and above, the estimates are 66.8 million in 2014 as against 61.3 million persons in 2011," Minister of State for Health Faggan Singh Kulaste said in a written reply in Lok Sabha.

He said the ICMR is conducting a study--ICMR INDIAB involving states and UTs-- for both urban and rural populations for ascertaining the exact number of diabetes patients.

He said 15 states have been covered so far and the prevalence of diabetes varies from 4.3 per cent in Bihar to 13.6 per cent in Chandigarh while the prevalence of pre-diabetes varies from 5.8 per cent in Mizoram to 14.6 per cent in Chandigarh and Tripura.

The ICMR has also initiated 'Registry of people with diabetes in young age onset in India' with the objective to understand the natural history of disease, complications and management practice patterns among youth.

"So far data on 5,546 people with youth onset diabetes from eight centres across the country reported 40 per cent of youth onset diabetics," he said.

He said the government is implementing the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) for interventions for upto district level under the National Health Mission.

INDIA, NORWAY SET UP BODY TO ACCELERATE RESEARCH FOR EPIDEMICS

India and Norway have founded a Coalition for Epidemic Preparedness Innovations (CEPI) to accelerate life-saving research and development for epidemics, government today said.

In a written reply in Lok Sabha, Minister of State for Health Faggan Singh Kulaste said the WHO had published a document 'An R&D blueprint for action to prevent epidemics- funding and coordination models for preparedness and response' and asked member countries, including India, to develop a research and development blueprint during epidemics.

"Accordingly, CEPI has been founded by governments of India (Department of Biotechnology, Indian Council of Medical Research and Department of Health) and Norway, the Wellcome Trust, the Bill and Melinda Gates Foundation and the World Economic Forum in collaboration with industry, other governments, foundations regulatory bodies, civil society and the WHO.

"The CEPI will prioritise list of diseases against which vaccines are most feasible to overcome barriers for development of vaccines," he said, adding that people die every year due to communicable and seasonal outbreak of diseases.

With an objective to tackle disease outbreaks due to epidemic-prone diseases, the government has launched Integrated Disease Surveillance Programme which is implemented in all states and UTs.

Besides a network of viral research and diagnostic laboratories has been set up across the country to deal with epidemic of diseases of viral origin, he said.

IMMUNOTHERAPY MAY REVOLUTIONISE CANCER TREATMENT, SAYS EXPERT

Immunotherapy that boosts the in-born immunity of individuals to fight cancer cells is likely to revolutionise cancer treatment in the years to come, a leading oncologist said here today.

"Now, immunotherapy is showing better results than chemotherapy. That is going to come in a very big way in the near future," Apollo Cancer Hospital director P Vijay Anand Reddy told PTI.

"Body immunity, can we improve on, to fight against the cancer cells. That is called immunotherapy. Research is going on. Now, medicines have also come. They are showing better results than chemotherapy. Earlier, it was chemotherapy for cancer," he said.

The overall treatment cost of immunotherapy is presently high, but it will definitely come down, Reddy said. "Patency is there for every drug. It's going to be minimum of one year (for cost to come down) and for some companies it is going to be two years," he said.

The beauty of immunotherapy is that it can be used in treatment of all types of cancer, he said.

Other than immunotherapy, advances have been made in radiation treatment for cancer, he said.

"It is so precise now. Radiation used to be five-seven weeks treatment. Now we are doing entire treatment in one or two days without hurting the patient...," he said.

The other advanced treatments include photon therapy in radiation oncology and the costs of radiation treatment would also come down, he said.

Reddy said about 12 lakh fresh cases of cancer were seen during 2016 in India and the number is expected to go up to 15 lakhs this year.

In India, lung cancer, gastro-intestinal cancer and head and neck cancers (throat cancers) are commonly found among men. Among women, breast cancer and cervical cancer are common and they are also prone to develop head and neck cancers, Reddy said.

Around one hour of daily physical exercise, a vegetarian diet or avoiding red meat by non-vegetarians, avoiding high salt, fried and masala foods and staying away from consumption of tobacco would help in prevention of cancers, he said.

He also said that annual health check-ups would lead to early detection of tumours, if any.

**RESEARCH ON TO PRODUCE
'PERSONALISED MEDICINE': NOBEL
LAUREATE**

Active research is going on towards the goal of producing 'personalised medicine' broadly to see that unsuitable drugs are not consumed by patients, Kurt Wuthrich, a Nobel laureate, said here today.

"...From my viewpoint, it would be much more important to identify those who should not be given a particular drug. There are so many drug candidates that have to be thrown out," he told reporters at the CSIR-Centre for Cellular and Molecular Biology (CCMB) here.

Certain drugs, including some very popular, had to be taken out from markets, he said.

Wuthrich was awarded Nobel in chemistry "for his development of nuclear magnetic resonance spectroscopy for determining the three-dimensional structure of biological macromolecules in solution" in 2002, the CCMB said.

'Personalised medicine' is an active area of research as response of patients would be different to drugs due to genetic differences, CCMB Director Rakesh K Mishra said.

"We have genetic variation in the population. Some individuals have different sequence in which proteins or any drug target is behaving differently. That's why people are now interested in sequencing the genomes and relating to the drug response and then able to tell that this population will respond to the drug and that population will not respond to the drug," he said.

There are psychiatric drugs or cancer drugs that respond only to 50 per cent or 60 per cent population, Mishra said.

"That (differences in drug response) is because genetic differences exist. So, personalised medicine is a very active area of research where after some years you will go with your genome card for your medicine like your identity card," he said.

**UMBILICAL CORD BLOOD EXPERTS
PITCH FOR EXPANDING POOL BASE**

A city-based umbilical cord blood bank has created a facility which will allow its members access to other best matched samples rather than just their own, for treatment of haematological disorders.

An umbilical cord is a flexible cord-like structure containing blood vessels which attaches foetus to the placenta during gestation.

CelluGen, the owner of the facility, held a press conference today to educate the public about the need for banking umbilical cord, and doctors and researchers from the field discussed how the precious resource can revolutionise the treatment of haematological disorders in the country.

Private stem cell banks have been growing in India with parents investing huge amounts annually to protect their newborn from blood-related disorders, S P Yadav, Pediatric Haematologist at Medanta Hospital said.

"The fact is that the possibility of utilising one's own umbilical cord blood (UCB) for transplant in blood-related disorders is less than 5 per cent. This futility of storage of UCB for self-use is well recognised by the medical fraternity today.

"To make umbilical cord blood stem cell transplants a viable option, accessing another person's cord blood (allogenic) is the best solution," he said.

Umbilical Cord Blood Transplant (UCBT) has gained popularity as an efficacious treatment modality for various malignant and non-malignant haematological disorders.

The first successful UCBT was done in France in 1988. More than 35,000 successful cord blood transplants have since been performed worldwide, Founder-Director, CelluGen Biotech, Lalit Jaiswal said.

"There are at least 142 public and 25 private UCB banks across the world over with three public and seven private banks located in the country. In India, insufficient quantity of just about 5000 cord blood units are available in public banks.

"The chance of obtaining a matched donor for an Indian recipient from foreign registries is meagre due to ethnicity and exorbitant cost. Till date, only 32 patients have received a transplant using related or unrelated UCB," he added.

Umbilical Cord tissue derived stem cells find potential use in treatment of various degenerative disorders of the nervous system, osteoarthritis, optic nerve atrophy, diabetes etc, to name a few, CelluGen said.

CCMB ESTABLISHES GENETIC LINKS TO SKIN COLOUR VARIATIONS

Social structure defined by the caste system has a "profound" influence on skin pigmentation, according to a study conducted by the city-based Centre for Cellular and Molecular Biology (CCMB).

The study was carried out in collaboration with Estonian Biocentre, Estonia, on skin colour of over 1,000 individuals in India. It has explored the genetics of skin colour variations across the country.

The findings also reflected the "profound influence" of the strict marriage patterns and multi-layered endogamy adding further to the variation in skin colour.

The study, led by Kumarasamy Thangaraj, the senior principal scientist at CCMB, Estonian Biocentre, and five other institutes was published on November 17 in the online edition of the Journal of Investigative Dermatology.

"We have done extensive epidemiological survey of 1,167 individuals belonging to 27 populations and quantified melanin content at most exposed and low exposed area of human body at Middle region of Gangatic plains (Uttar Pradesh and Bihar), and selected 374 individuals for the first round of genetic study," a CCMB release issued today quoted Anshuman Mishra, the first author of the study, as saying.

The researchers said SLC24A5 gene is known to make skin lighter and explains about 25-38 per cent of pigmentation differences between Europeans and West Africans.

A variant/modification (rs1426654) in the gene has been earlier shown to be associated with skin pigmentation measures in India, the release stated.

In this study, the research team has analysed the entire gene and found another variant (rs2470102), which contributes to skin pigmentation variation in Indian subcontinent.

"Further analyses revealed that both the variants (rs1426654 and rs2470102) together could better explain the variation in skin colour among Indian populations than

considering each variant independently.

"The difference in skin colour persisted even when the contribution by the previously known SNP (single nucleotide polymorphism) was adjusted, suggests that the new SNP has an independent effect on skin colour," it said.

The authors found that social structure defined by the caste system has a "profound influence on skin pigmentation."

The authors found out that skin colour was found to vary significantly among ethnic groups and social categories studied. The researchers then compared the skin colour (phenotype) with the genetic variation (genotype) of the individuals. Those with derived (mutant) alleles had fairer skin compared to those who had old (wild type) alleles.

"Our study clearly reflects the profound influence of the strict marriage patterns and multi-layered endogamy adding further to the variation in skin colour contributing to the mosaic of skin tones," said Chandana Basu, one of the authors of the study and a researcher at Estonian Biocentre.

This team also studied 1,825 individuals belonging to 52 diverse populations across India and found that the social category and associated SNPs explain 38.4 per cent of the variation in skin color.

"Unlike Africans and Europeans, we do not have homogeneous skin colour throughout the country. This could be due to different waves of human migration into India and recent admixture of all Indian populations, which we predicted in our previous study that it could have happened about two thousand years ago," said Thangaraj.

This is yet another effort of CSIR-CCMB in the field of genomics, which helped us understand the genetic link to the skin colour, said CCMB Director Rakesh Mishra.

"These are steps that point to the era of personalised medicine based on link of genomic features with disease susceptibility and drug response.

"Such studies, at very large scales, will be needed to establish individual specific lifestyle advisory and medical prescriptions as it is clear that 'one size does not suit all' is also applicable to the area of human health and disease," Mishra added.

IMA PITCHES FOR MONITORING USE OF

To tackle antibiotic resistance, the Indian Medical Association (IMA) today pitched for monitoring the use of antibiotics to curb over-prescription by doctors.

"Antibiotic resistance is a global concern. We stand at the edge of an imminent 'post-antibiotic' era where resistant bacteria can render precious lifesaving drugs obsolete.

"Medical science is heavily dependent on antibiotics, from treating simple tetanus wounds to complex surgical procedures. If this over-usage continues, even simple infections will have the potential to be fatal. It is important that both medical and patient communities become more aware about the judicious and just use of these precious drugs," Dr K K Aggarwal, national president-elect, IMA, said.

He said it was important to understand when the doctor or the patient is at fault as far as antibiotic usage is concerned.

"From the physician's side, over prescription needs to be controlled. Sometimes, these drugs are given as a preventive measure rather than a cure. Moreover, in the interest of being careful, physicians deem it best to prescribe a low dose antibiotic even when the said drug is not clinically required.

"From the patient's side, self-medication is worrisome. Several of clinically precious antibiotics are available over the counter, and are often taken without a guided instruction about dosage and proper regimen," he said.

The instances where the physician or the patient could be faulted for prescribing antibiotics include prescribing antibiotics when no bacterial infection exists, prescribing the wrong antibiotic or the wrong dose, prescribing antibiotics for longer than necessary, prescribing strong antibiotics when a less strong would be as effective, he said.

KERALA TEMPERATURE TO RISE BY 2-3 DEGREE CELSIUS: REPORT

Kerala, one of the most abundant rainfall-receiving states of the country, is likely to witness an increase in temperature by 2-3 degrees Celsius by the end

of this century due to climate change, according to a recent study.

Considering the past observed data, "consecutive droughts together with heat wave conditions could be ringing the bell of climate change for this otherwise heavenly state," the report by M G Manoj, Research Scientist, Advanced Centre for Atmospheric Radar Research, CUSAT, said.

"The projections of climate change for Kerala reveals an increase in temperature by 2-3 degrees Celsius by the end of

this century," the report appeared in 'Kerala Climate', a publication of Institute of Climate Change Studies, said.

Intense lightning and thunder, gusty winds and rainfall, heat waves, droughts, polluted environment, pattern shifts in crops, reduced plant and animal productivity etc would be some of the consequences of the rising temperature, it said.

Frequency and duration of weak rainfall periods and drought condition is gradually increasing in Kerala.

"Kerala, the most abundant rainfall-receiving state of the country, witnessed the most deficient rain this year," it said.

"The large-scale dynamics driven by warming in the Indian Ocean and changes in rainfall pattern has resulted in a deficient monsoon for Kerala this year," the report, titled 'Concerns on Changing Patterns of Climate over Kerala', said.

Due to increase in anthropogenic activities and emissions, global temperatures have shown a warming trend of 0.85 degree Celsius over the period 1880-2012, it said.

"This is a permanent factor in increasing the surface temperatures, even at our state too," it said, adding that "during the recent years, minimum temperatures (night-time) have increased more than daytime temperatures, suggesting the possible role of moisture and the greenhouse gases.

HONEY CAN TREAT ORAL CANCER WOUNDS, FIND SCIENTISTS

After years of research, a group of Indian scientists have found out that the secret formula to treat oral cancer wounds lies in honey.

An inter-disciplinary research group comprising

chemical engineers, bio-technologists and doctors at IIT, Kharagpur have developed a therapeutic patch which is made of silk and embedded with honey.

Experiments at the lab of School of Medical Science and Technology at the IIT have shown that the patch can not only heal the cancer wound faster but also minimise the chances of recurrence of the oral cancer after surgical intervention.

"Honey is well-known for its remarkable wound healing potential and anti-cancer, antibacterial properties. The technology involved in this process is modulating cellular environment by using biometrically devised honey-silk fibroin scaffolds," researcher Monika Rajput told PTI.

The soft nano technology concepts have been devised by IIT-Kgp professor Rabibrata Mukherjee while the idea of using honey came from Dr Jyotirmoy Chatterjee.

"Many patients have to go for surgeries in case of oral cancer. After the affected part of the body is removed it causes a wound which may have some cancerous or pre-cancerous cells left in it. Therefore the chances are high that you will contract cancer again. Our technology helps patients control these wounds," said co-researcher Dr Nandini Bhandaru.

Currently there is no available therapeutic patch particularly for oral cancer wound in market which can heal the wound faster and minimise the chances of recurrence.

The team has already filed a patent and their research work has been published in the international journal of the American Chemical Society, 'ACS Biomaterials Science and Engineering'.

Before commercialising the technology the scientists will have to conduct experiments on animals and then on human patients.

"In our lab the tool has been found to enable growth of healthy cells while hindering growth of cancer associated cells which fail to grab the patterned micropillar structure in the scaffold. On the other hand, the healthy cells grab the patterns very well and grow faster," the researchers said.

The membrane sheet is made of silk because its flexible and bio-compatible with the human body.

Since the tool uses cheap and easily available materials like honey and silk, the cost of the technology will

also be cheap for patients once they are able to commercialise it by making it available in the market with a pharma company.

India has an alarming figure for deaths due to oral cancer with one death every six hours, according to the Indian Dental Association.

Around 40 per cent of all cancer related cases can be attributed to oral cancer. Though treatments are available at early stages but recurrence is a very common concern in people who have had cancer thus leading to life threat and reverting to painful cancer treatment.

OVER 90% PEOPLE WITH HIV, TUBERCULOSIS HAVE ACCESS TO THERAPY

Over 90 per cent of people in India who are infected simultaneously with HIV and tuberculosis have access to HIV therapy, a new study released said.

The report by UNAIDS showed that countries are getting on the 'fast-track', with an additional one million people accessing treatment in just six months (January to June 2016).

By June 2016, around 18.2 million (16.1 million–19 million) people had access to the life-saving medicines, including 910,000 children, double the number five years earlier.

If these efforts are sustained and increased, the world will be on track to achieve the target of 30 million people on treatment by 2020, the report said.

"Antiretroviral therapy among TB patients known to be living with HIV was 78 per cent globally, and above 90 per cent in India, Kenya, Malawi, Mozambique, Namibia and Swaziland," the report said.

Antiretroviral therapy (ART) is the combination of several antiretroviral medicines used to slow the rate at which HIV makes copies of itself (multiplies) in the body.

As far as decline in new HIV infections among children (aged 0-14 years) low and middle income countries, 2010-2015 was concerned, for India measures were not available, the report said.

However, percentage of pregnant women living with HIV receiving antiretroviral medicines (either prophylaxis or lifelong therapy) to prevent mother-to-

child transmission, low and middle income countries, 2015, for India it was between 33-65 per cent, the report said.

Globally, access to HIV medicines to prevent mother-to-child transmission of HIV has increased to 77 per cent in 2015 (up from 50 per cent in 2010) as a result of which new HIV infections among children have declined by 51 per cent since 2010.

'Get on the Fast-Track: the life-cycle approach to HIV' was launched today in Windhoek, Namibia, by Namibian President Hage Geingob and the Executive Director of UNAIDS, Michel Sidibé, a press statement on the UNAIDS said.

UK SCIENTIST STRESSES ON USING SPACE APPLICATIONS TO CONSERVE MARINE ECOLOGY

An eminent marine-optics scientist from the UK today stressed the need for using the benefits of space applications to conserve the marine ecology of India.

"India should use remote sensing data to assess potential of fisheries and to implement a sustainable fisheries management suitable to the country," Prof Trevor Platt said.

Platt, Professorial Fellow at Plymouth Marine Laboratory in UK, was speaking after inaugurating a 21-

day National Training Programme on 'Monitoring Structure and Functions of Pelagic Ecosystem at Regional Sectors: Relevant for Fisheries', being organised by the Central Marine Fisheries Research Institute in association with the Jawaharlal Nehru Science Fellow (JNSF), currently with the institute.

"Indian fisheries sector is facing a number of challenges including the depletion of commercially important fish species," he said, adding, ecosystem based approach was essential for maintaining the sustainability of the fishery. Platt also stressed the need for incorporating the latest technology in the marine sector giving prior focus to the ecological importance.

The training programme is aimed at boosting the research base towards the development of an eco-friendly fishery management practices in the country.

The programme, sponsored by National Innovations in Climate Resilient Agriculture (NICRA), will provide the oceanographic and biogeochemical background required for the ecosystem based approach for fisheries management.

Dr Shubha Sathyendranath, Senior Scientist, Plymouth Marine Laboratory, UK, Dr P U Zachariah, Principal Scientist and Head of the Demersal Fisheries Division of CMFRI and Dr Grinson George, Senior Scientist, CMFRI, also spoke on the occasion.

OUR UNIVERSE MAY BE VAST, COMPLEX 2D HOLOGRAM

Our universe may be a vast and complex hologram, one where all the information, which makes up our three-dimensional 'reality' is actually contained in a 2D surface on its boundaries, scientists say.

The idea of a holographic universe was first suggested in the 1990s.

Scientists investigating irregularities in the cosmic microwave background ('afterglow' of the Big Bang), have found substantial evidence supporting a holographic explanation of the universe.

The findings may further our understanding of the early universe and explain how space and time emerged.

"Imagine that everything you see, feel and hear in three dimensions (and your perception of time) in fact emanates from a flat two-dimensional field," said Kostas Skenderis, a professor at the University of Southampton in the UK.

"The idea is similar to that of ordinary holograms where a three-dimensional image is encoded in a two-dimensional surface, such as in the hologram on a credit card. However, this time, the entire universe is encoded!" Skenderis said.

Although not an example with holographic properties, it could be thought of as rather like watching a 3D film in a cinema.

We see the pictures as having height, width and crucially, depth - when in fact it all originates from a flat 2D screen.

The difference, in our 3D universe, is that we can touch objects and the 'projection' is 'real' from our perspective.

In recent decades, advances in telescopes and sensing equipment have allowed scientists to detect a vast amount of data hidden in the 'white noise' or microwaves (partly responsible for the random black and white dots you see on an un-tuned TV) left over from the moment the universe was created.

Using this information, the team were able to make complex comparisons between networks of features in the data and quantum field theory.

They found that some of the simplest quantum field theories could explain nearly all cosmological

observations of the early universe.

"Holography is a huge leap forward in the way we think about the structure and creation of the universe," said Skenderis.

"Einstein's theory of general relativity explains almost everything large scale in the universe very well, but starts to unravel when examining its origins and mechanisms at quantum level," he said.

"Scientists have been working for decades to combine Einstein's theory of gravity and quantum theory. Some believe the concept of a holographic universe has the potential to reconcile the two," he added.

The study was published findings in the journal *Physical Review Letters*.

VIRTUAL REALITY MAY HELP GET OVER FEAR OF DEATH!

Using virtual reality (VR) devices to create an illusion of out-of-body experience may help people get over the fear of death, a new study has claimed.

A Near-Death Experience (NDE) is an altered state of consciousness that can occur during clinical death - typically following cardiac arrest.

Characteristics of NDEs can vary widely, but generally include the perception of moving through a tunnel, bright lights, meeting spiritual beings, a panoramic life review, euphoria, and an out-of-body experience (OBE).

OBE is defined "as the experience in which a person seems to be awake and to see his body and the world from a location outside the physical body," researchers said.

Scientists from the University of Barcelona in Spain used immersive VR to give volunteers a virtual OBE to see if it could reduce their fear of death.

They divided 32 women into two groups who wore virtual reality headsets, movement trackers as well as vibrating wrist and ankle bands.

The volunteers saw a 3D digital environment, as well as a model of their body through their headsets. Matching their virtual body's movements with their own added to what is known as a 'body ownership illusion'.

Lastly, a floating ball tapped against the volunteer's wrists and ankles in time with a vibration through their wrist and ankle bands, providing one more piece of

sensory information to the illusion, 'Science Alert' reported.

The volunteers would then see their viewpoint slip out of their virtual body, towards the ceiling.

Half of the volunteers continued to feel the tap of the ball against their ankles and wrists as they watched from above.

The other half acted as the control group and felt nothing, simply watching their body as it was tapped with the floating balls.

A follow-up questionnaire probed the volunteers on their experience and their fear of death.

Only those who continued to feel the vibration of the ball tapping against their wrists and ankles felt as if they were still connected to their bodies as their perspective shifted - a sensation resembling an out-of-body experience.

These same volunteers also later reported a reduction in their fear of dying.

'BAG-LIKE SEA CREATURE IS OUR OLDEST KNOWN ANCESTOR'

Researchers have identified traces of what they believe is the earliest known prehistoric ancestor of humans - a microscopic, bag-like sea creature found in China, which lived about 540 million years ago.

Named *Saccorhytus*, after the sack-like features created by its elliptical body and large mouth, the species is new to science and was identified from microfossils found in China.

It is thought to be the most primitive example of a so-called "deuterostome" - a broad biological category that encompasses a number of sub-groups, including the vertebrates.

The study by researchers from University of Cambridge in the UK and Northwest University in China suggests *Saccorhytus* was the common ancestor of a huge range of species, and the earliest step yet discovered on the evolutionary path that eventually led to humans, hundreds of millions of years later.

Saccorhytus was about a millimetre in size, and likely lived between grains of sand on the seabed. Its features were spectacularly preserved in the fossil record - and the researchers were unable to find any evidence that the animal had an anus.

"We think that as an early deuterostome this may represent the primitive beginnings of a very diverse range

of species, including ourselves," Simon Conway Morris, Professor at University of Cambridge, said.

"To the naked eye, the fossils we studied look like tiny black grains, but under the microscope the level of detail is jaw-dropping. All deuterostomes had a common ancestor, and we think that is what we are looking at here," said Morris.

"*Saccorhytus* now gives us remarkable insights into the very first stages of the evolution of a group that led to the fish, and ultimately, to us," Degan Shu, from Northwest University, added.

Most other early deuterostome groups are from about 510 to 520 million years ago, when they had already begun to diversify into not just the vertebrates, but the sea squirts, echinoderms (animals such as starfish and sea urchins) and hemichordates (a group including things like acorn worms).

The *Saccorhytus* microfossils were found in Shaanxi Province, in central China, and pre-date all other known deuterostomes, researchers wrote in the study published in journal *Nature*.

By isolating the fossils from the surrounding rock, and then studying them both under an electron microscope and using a CT scan, the team was able to build up a picture of how *Saccorhytus* might have looked and lived.

This revealed features and characteristics consistent with current assumptions about primitive deuterostomes.

NASA SPACE TELESCOPE SPOTS MOST EXTREME BLAZARS YET

Scientists, including those of Indian origin, have identified the farthest gamma-ray blazars, a type of galaxy whose intense emissions are powered by supersized black holes, by using NASA's Fermi Gamma-ray Space Telescope.

Light from the most distant object began its journey to us when the universe was 1.4 billion years old, or nearly 10 per cent of its present age.

"Despite their youth, these far-flung blazars host some of the most massive black holes known," said Roopesh Ojha, an astronomer at NASA's Goddard Space Flight Centre in the US.

"That they developed so early in cosmic history challenges current ideas of how supermassive black holes form and grow, and we want to find more of these objects

International Science Briefs

to help us better understand the process," Ojha said.

Blazars constitute roughly half of the gamma-ray sources detected by Fermi's Large Area Telescope (LAT).

Astronomers think their high-energy emissions are powered by matter heated and torn apart as it falls from a storage, or accretion, disk toward a supermassive black hole with a million or more times the Sun's mass.

A small part of this infalling material becomes redirected into a pair of particle jets, which blast outward in opposite directions at nearly the speed of light.

Blazars appear bright in all forms of light, including gamma rays, the highest-energy light, when one of the jets happens to point almost directly toward us.

Researchers led by Vaidehi Paliya and Marco Ajello at Clemson University in South Carolina began by searching for the most distant sources in a catalogue of 1.4 million quasars, a galaxy class closely related to blazars.

Since only the brightest sources can be detected at great cosmic distances, they then eliminated all but the brightest objects at radio wavelengths from the list.

With a final sample of about 1,100 objects, the scientists then examined LAT data for all of them, resulting in the detection of five new gamma-ray blazars.

The light we now detect from them started on its way when the universe was between 1.9 and 1.4 billion years old, researchers said.

"Once we found these sources, we collected all the available multiwavelength data on them and derived properties like the black hole mass, the accretion disk luminosity, and the jet power," said Paliya.

Two of the blazars boast black holes of a billion solar masses or more. All of the objects possess extremely luminous accretion disks that emit more than two trillion times the energy output of our Sun.

This means matter is continuously falling inward, corralled into a disk and heated before making the final plunge to the black hole.

The study was published in *The Astrophysical Journal Letters*.

BABY'S GENDER MAY AFFECT PREGNANT WOMAN'S IMMUNITY

Mothers-to-be, take note! Your immunity maybe affected by the gender of your baby, say scientists who found that women carrying female foetuses show a

heightened inflammatory response.

Researchers from The Ohio State University in the US followed 80 pregnant women across the course of their pregnancy and examined whether women exhibited different levels of immune markers called cytokines based on foetal sex.

Analyses were conducted on levels of cytokines in the blood and levels produced by a sample of immune cells that were exposed to bacteria in the lab.

"While women didn't exhibit differences in blood cytokine levels based on foetal sex, we did find that the immune cells of women carrying female foetuses produced more pro-inflammatory cytokines when exposed to bacteria," said Amanda Mitchell, a postdoctoral researcher at Ohio State University in the US.

"This means that women carrying female foetuses exhibited a heightened inflammatory response when their immune system was challenged, compared to women carrying male foetuses," said Mitchell.

Inflammation is a critical part of the immune response involved in wound healing and responses to viruses, bacteria and chronic illnesses.

However, excessive inflammation is stressful to the body and can contribute to sickness-related symptoms, such as achiness and fatigue.

While more research is needed, the heightened inflammation observed among women carrying female foetuses could play a role in why women tend to experience exacerbated symptoms of some medical conditions, including asthma, when carrying a female versus a male foetus.

"This research helps women and their obstetricians recognise that foetal sex is one factor that may impact how a woman's body responds to everyday immune challenges and can lead to further research into how differences in immune function may affect how a women responds to different viruses, infections or chronic health conditions (such as asthma), including whether these responses affect the health of the foetus," Mitchell said.

While maternal inflammation can affect outcomes related to the foetus, like timing of birth, more research is necessary to understand how foetal sex is associated with maternal inflammation.

It is possible the sex hormones or other hormones in the placenta affect maternal inflammation levels, Mitchell said.

"It's important to think about supporting healthy immune function, which doesn't necessarily mean boosting it - it's problematic to have too little or too great of an immune response," Mitchell said.

"That being said, research has shown that exercise supports healthy immune functioning, as does eating some foods, like leafy greens, and relaxing with activities like meditation," she said.

The study was published in the journal *Brain, Behaviour and Immunity*.

KIDS WHO ENJOY MATHS HAVE HIGHER ACADEMIC ACHIEVEMENTS

Children who enjoy studying mathematics and take pride in good scores are more likely to have higher academic achievements, say scientists who found that positive emotions and success at learning in math mutually reinforce each other.

Scientists found that students' learning and cognitive performance can be influenced by emotional reactions to learning, like enjoyment, anxiety and boredom.

Researchers Ludwig-Maximilians-Universitat (LMU) in Munich in Germany studied how students' emotions in a school context relate to their achievement.

The study focused on achievement in math, which is not only important for education and economic productivity but is also known to prompt strong emotional reactions in students.

"We found that emotions influenced students' math achievement over the years," said Reinhard Pekrun, professor at LMU Munich and Australian Catholic University.

"Students with higher intelligence had better grades and test scores, but those who also enjoyed and took pride in math had even better achievement," said Pekrun, who led the study.

"Students who experienced anger, anxiety, shame, boredom, or hopelessness had lower achievement," he said.

The research was conducted as part of the Project for the Analysis of Learning and Achievement in Mathematics (PALMA).

It included annual assessments of emotions and achievement in math in 3,425 students from grades five through nine.

Students' self-reported emotions were measured by questionnaires, and their achievement was assessed by year-end grades and scores on a math achievement test.

The study also found that achievement affected students' emotions over time.

"Successful performance in math increased students' positive emotions and decreased their negative emotions over the years," said Stephanie Lichtenfeld, from LMU.

"In contrast, students with poor grades and test scores suffered from a decline in positive emotions and an increase in negative emotions, such as math anxiety and math boredom," said Lichtenfeld.

"Thus, these students become caught in a downward spiral of negative emotion and poor achievement," she said.

The findings that emotions influenced achievement held constant even after taking into account the effects of other variables, including students' intelligence and gender, and families' socioeconomic status.

The results are consistent with previous studies showing that emotions and academic achievement are correlated, but they go beyond these by disentangling the directional effects underlying this link.

Specifically, the research suggests that emotions influence adolescents' achievement over and above the effects of general cognitive ability and prior accomplishments.

NEW BIRDS SPECIES DISCOVERED IN NEPAL

A new species of birds has been discovered in the high mountainous region of Nepal, bringing the total number of avian species in the Himalayan country to 866.

A Rufous-tailed Rock Thrush (*Monticola saxatilis*), considered an autumn passage migrant bird species in Pakistan and India, was first seen and photographed by an expedition last year near the Shey monastery within the Shey-Phoksundo National Park.

Researchers from an NGO Friends of Nature (FoN) Nepal spotted the bird while studying Himalayan wolf, wild yak and snow leopard last year.

The identification of the bird reported by the team was confirmed by the bird experts Carol Inskipp and Hem Sagar Baral.

The Department of National Parks and Wildlife Conservation (DNPWC) and Bird Conservation Nepal authorised the presence of a new bird species in the country, said Naresh Kusi, from FoN.

Rufous-tailed Rock Thrush is considered an autumn passage migrant bird species in Pakistan and India, 'The Kathmandu Post' reported.

"The sighting location was very remote and rarely visited by ornithologists. More research is needed to ascertain the status of Rufous-tailed Rock Thrush in Nepal," said Yadav Ghimirey, director, Wildlife Research at FoN.

GUT BACTERIA MAY ACCELERATE ALZHEIMER'S DISEASE: STUDY

Your gut bacteria may accelerate the development of Alzheimer's disease, according to a new study that may pave the way for therapies to prevent and treat the neurocognitive disorder.

Since our gut bacteria have a major impact on how we feel through the interaction between the immune system, the intestinal mucosa and our diet, the composition of the gut microbiota is of great interest to research on diseases such as Alzheimer's.

Exactly how our gut microbiota composition is composed depends on which bacteria we receive at birth, our genes and our diet, researchers said.

By studying both healthy and diseased mice, researchers from Lund University in Sweden found that mice suffering from Alzheimer's have a different composition of gut bacteria compared to mice that are healthy.

They also studied Alzheimer's disease in mice that completely lacked bacteria to further test the relationship between intestinal bacteria and the disease.

Mice without bacteria had a significantly smaller amount of beta-amyloid plaque in the brain. Beta-amyloid plaques are the lumps that form at the nerve fibres in cases of Alzheimer's disease.

To clarify the link between intestinal flora and the occurrence of the disease, the researchers transferred intestinal bacteria from diseased mice to germ-free mice, and discovered that the mice developed more beta-amyloid plaques in the brain compared to if they had received bacteria from

healthy mice.

"Our study is unique as it shows a direct causal link between gut bacteria and Alzheimer's disease. It was striking that the mice which completely lacked bacteria developed much less plaque in the brain," said Frida Fak Hallenius, at the Food for Health Science Centre.

"The results mean that we can now begin researching ways to prevent the disease and delay the onset. We consider this to be a major breakthrough as we used to only be able to give symptom-relieving antiretroviral drugs," she said.

NOW, FOUR-IN-ONE PILL TO TREAT HIGH BLOOD PRESSURE

A new ultra-low dose four-in-one pill has been found to be 100 per cent effective at tackling high blood pressure, according to the results of a clinical trial published in *The Lancet* journal.

Every patient on the pilot trial conducted by The George Institute for Global Health in Australia saw their blood levels drop to normal levels in just four weeks.

Recognising the need to check whether trial results were "too good to be true", the researchers also completed a systematic review of past trials, including 36 trials with 47,500 patients testing single and dual quarter-dose therapy.

This previous evidence also indicated little or no side effects with very low doses, and important benefits with three or four drug combinations.

Professor Clara Chow, of The George Institute, said the results were exciting but larger trials were still needed to see if these high rates could be maintained and repeated.

"Most people receive one medicine at a normal dose but that only controls blood pressure about half the time. In this small trial blood pressure control was achieved for everyone. Trials will now test whether this can be repeated and maintained long-term," Chow said.

"Minimising side effects is important for long-term treatments - we didn't see any issues in this trial, as you would hope with very low dose therapy, but this is the area where more long-term research is most needed.

"We know that high blood pressure is a precursor to stroke, diabetes and heart attack. The need for even lower blood pressure levels has been widely accepted in the last few years. So this could be an incredibly important step in helping to reduce the burden of disease globally,"

said Chow.

Hypertension or high blood pressure affects around 1.1 billion people worldwide.

Over four weeks 18 patients in Sydney were either given a quadpill - a single capsule containing four of the most commonly used blood pressure-lowering drugs each at a quarter dose - or a placebo.

This was then repeated for a further four weeks with the patients swapping their course of treatment.

Blood pressure levels were measured hourly over a 24 hour period at the end of each treatment, allowing researchers to significantly reduce the amount of patients normally required in a clinical trial.

As many as 100 per cent of patients on trial saw their blood levels drop below 140 over 90. Just 33 per cent of patients on the placebo achieved this rate.

None of the patients experienced side effects commonly associated with hypertension lowering drugs, which can vary from swollen ankles to kidney abnormalities depending on the type of class of the drug.

"What makes these results even more exciting is that these four blood pressure medications are already in use. We are increasingly finding there are opportunities to treat many common diseases hiding in plain sight. This ultimately means we will be able to deliver life changing medications much more quickly, and more affordably," Chow said.

WHY MOSQUITOES ARE ATTRACTED TO PEOPLE WITH MALARIA DECODED

Researchers have found the reason why mosquitoes prefer to feed on blood from people infected with malaria, an advance that can lead to new ways to fight the deadly disease without using poisonous chemicals.

"The malaria parasite produces a molecule, HMBPP, which stimulates the human red blood cells to release more carbon dioxide and volatile compounds with an irresistible smell to malaria mosquitoes. The mosquito

also eats more blood," said Ingrid Faye from Stockholm University in Sweden.

Faye and her colleagues from the Swedish University of Agricultural Sciences and KTH Royal Institute of Technology in Sweden discovered that most malaria mosquitoes, were attracted by HMBPP-blood, even at very low concentrations.

The mosquitoes are also attracted more quickly and drink more blood.

Moreover, these mosquitoes acquire a more severe malaria infection - higher numbers of parasites are produced.

This indicates that the extra nutrients from the larger meal of blood are used to produce more parasites, researchers said.

Neither humans nor mosquitoes use HMBPP themselves, but the parasite needs the substance to be able to grow.

"HMBPP is a way for the malaria parasite to hail a cab, a mosquito, and successfully transfer to the next host," said Noushin Emami from Stockholm University.

"This seems to be a well-functioning system, developed over millions of years, which means that the malaria parasite can survive and spread to more people without killing the hosts," said Faye.

These results may be useful in combating malaria. Today the most efficient way is to use mosquito nets and insecticides to prevent people being bitten.

Resistance against the insecticides require new control methods to be developed to tackle the mosquitoes.

In addition, medicines, even the drug awarded with the 2015 Nobel Prize, become progressively inefficient when the parasite becomes resistant to them and new drugs must be developed constantly, researchers said.

A vaccine seems far away, said Faye. A major step forward in the fight against malaria would be to create a trap that uses the parasite's own system for attracting malaria mosquitoes.

The study was published in the journal *Science*.

SEXUAL ORIENTATION POSES NO RISK TO MENTAL HEALTH: STUDY

Sexual orientation is not a major risk for long-term mental health problems, according to a new study that challenges the common perception that homosexual and bisexual people are at risk of poor mental health and suicide.

"Childhood sexual trauma, risky health behaviours, smoking, a lack of positive support and negative social interactions pose more of a risk for people's mental health than their sexual orientation," said lead researcher Richard Burns from Australian National University (ANU).

He said homosexual and bisexual people were more likely to experience these mental health risk factors than heterosexual people.

The study followed about 5,000 adults over eight years as part of the Personality and Total Health Through Life Project.

"Initially, we found there was a long-term risk for depression and anxiety among individuals with a bisexual orientation, and there was long-term risk for anxiety amongst homosexual individuals. But when we adjusted for these other mental health risk factors, we found no major risk associated with sexual orientation itself," said Burns.

"We concluded that all things being equal that there is no particular mental health risk for people with a homosexual or bisexual orientation," he said.

"Our findings emphasise the importance of using longitudinal data to estimate long-term mental health risk associated with sexual orientation," he added.

DAYLIGHT SAVINGS TIME MAY UP IVF MISCARRIAGE RATES

Daylight savings time - setting clocks an hour back or ahead according to seasons - may increase the risk of miscarriages in women undergoing IVF, according to a new study that shows the impact of circadian rhythm changes on reproduction. Daylight Saving Time is used to save energy and minimise the use of artificial light. It was first used in 1908 in Canada.

Researchers at Boston Medical Centre (BMC) in the US and IVF New England said daylight savings time

represents a subtle but widespread disruption to daily circadian rhythms.

The one-hour difference has been previously reported to cause negative health impacts, such as increased instances of heart attacks, but little is known regarding its impact on fertility.

"To our knowledge, there are no other studies looking at the effects of daylight savings time and fertility outcomes," said Constance Liu, who conducted the research at BMC.

"We knew that we were researching an uncharted field, and it was important for us to understand the effect a one-hour change had on patients undergoing in vitro fertilisation (IVF)," said Liu, who is now at Massachusetts General Hospital in the US.

Researchers looked at the pregnancy and miscarriage rates among a sample of patients undergoing IVF prior to and during daylight savings time, in both the fall and spring.

The patients were then categorised into three groups based on the timing of their embryo transfer during daylight savings time.

An embryo transfer refers to a step in the IVF process in which an embryo is placed into the uterus of a female with the intent of establishing a pregnancy.

The study found that miscarriage rates in IVF patients who had had a prior miscarriage were significantly higher among women whose embryo transfers occurred 21 days after spring DST began, compared to patients whose embryo transfers occurred before or well outside the spring DST window.

Successful pregnancy rates did not differ between seasons or among the three groups or among the three groups during the change to standard time in the fall.

"While our findings on the impact of DST on pregnancy loss among IVF pregnancies are intriguing, they need to be replicated in larger IVF cohorts in different parts of the world that observe DST," said Wendy Kuohung from BMC.

The study was published in the journal *Chronobiology International*.

KETAMINE VACCINE MAY HELP PREVENT PTSD: STUDY

Single dose of ketamine - a drug commonly used

as general anaesthetic or a rapid-acting antidepressant - given one week before a stressful event may prevent symptoms of post-traumatic stress disorder (PTSD) and buffer against a heightened fear response, a new study claims.

The study, conducted in mice, suggests that prophylactic administration of ketamine may also prevent PTSD symptoms in soldiers and others who subsequently experience psychological trauma.

"Ketamine is a powerful drug, and we would not advocate widespread use for preventing or reducing PTSD symptoms," said study leader Christine A Denny, assistant professor at Columbia University Medical Centre (CUMC).

"However if our results in mice translate to humans, giving a single dose of ketamine in a vaccine-like fashion could have great benefit for people who are highly likely to experience significant stressors, such as members of the military or aid workers going into conflict zones," said Denny.

There are few effective therapies for preventing or treating PTSD, an anxiety disorder that occurs in about one-quarter of individuals who experience psychological trauma.

PTSD symptoms include re-living the trauma-experiencing repeated flashbacks, hyperarousal, and hyperreactivity - as well as mood changes, psychological numbing and chronic physical symptoms such as headache.

The likelihood that symptoms will develop depends on the nature and intensity of the trauma and an individual's response. Previous studies, in both humans and animals, have shown that giving ketamine before trauma can help reduce stress-related symptoms.

However, it was not clear when the drug should be administered relative to a traumatic episode in order to maximise its protective effects.

In the new study, mice were given a small dose of intravenous ketamine or a placebo either one month, one week, or one hour before they were subjected to a series of small shocks.

The mice - conditioned to associate the test environment with the shocks - were later returned to the same environment and assessed for their freezing behaviour, a measure of their conditioned fear response.

Only the mice given ketamine one week before the stressor exhibited reduced freezing when they were

returned to the test environment.

It is not known whether there is an intermediate window, between one week and one hour, where ketamine would also have a protective effect.

Researchers also found that giving ketamine immediately after the stressor did not affect the animals' fear response.

However, giving ketamine one hour after a second shock decreased fear expression, suggesting that there may be another potential window after the initial trauma when the drug may be effective.

5,000-YEAR-OLD CHINESE BEER RECIPE RECREATED

Scientists have brewed an ancient Chinese beer - a sweet, fruity concoction - using a 5,000-year-old recipe discovered by them, in a bid to understand the evolution of alcohol.

Researchers discovered the ancient recipe by studying the residue on the inner walls of pottery vessels found in an excavated site in northeast China.

The research provides the earliest evidence of beer production in China so far.

"Archaeology is not just about reading books and analysing artifacts," said Li Liu, a professor in Chinese archaeology at Stanford University in the US.

"Trying to imitate ancient behaviour and make things with the ancient method helps students really put themselves into the past and understand why people did what they did," said Liu.

The ancient Chinese made beer mainly with cereal grains, including millet and barley, as well as with Job's tears, a type of grass in Asia, researchers said. Traces of yam and lily root parts also appeared in the concoction.

Liu said she was particularly surprised to find barley - which is used to make beer today - in the recipe because the earliest evidence to date of barley seeds in China dates to 4,000 years ago.

This suggests why barley, which was first domesticated in western Asia, spread to China.

"Our results suggest the purpose of barley's introduction in China could have been related to making alcohol rather than as a staple food," Liu said.

The ancient Chinese beer looked more like porridge and likely tasted sweeter and fruitier than the clear,

bitter beers of today.

The ingredients used for fermentation were not filtered out, and straws were commonly used for drinking, Liu said.

Researchers tried to imitate the ancient Chinese beer using either wheat, millet or barley seeds.

They first covered their grain with water and let it sprout, in a process called malting. After the grain sprouted, they crushed the seeds and put them in water again.

The container with the mixture was then placed in the oven and heated to 65 degrees Celsius for an hour, in a process called mashing.

Afterward, researchers sealed the container with plastic and let it stand at room temperature for about a week to ferment.

For decades, archeologists have yearned to understand the origin of agriculture and what actions may have sparked humans to transition from hunting and gathering to settling and farming, a period historians call the Neolithic Revolution.

Studying the evolution of alcohol and food production provides a window into understanding ancient human behaviour, said Liu.

It can be difficult to figure out how the ancient people made alcohol and food from just examining artifacts because organic molecules easily break down with time. That is why experiential archaeology is so important, Liu said.

GECKOS THAT SHED SKIN TO ESCAPE FOES DISCOVERED

Scientists have discovered a new species of geckos that can easily shed all of its skin under attack, leaving its predator with a mouth full of large scales.

The species, dubbed *Geckolepis megalepis*, possesses the largest scales of any gecko.

The large scales are attached by relatively narrow region that tears with ease, and beneath them fish-scale geckos have a pre-formed splitting zone within the skin itself.

Although several other geckos are able to lose their skin like this if they are grasped really firmly, *Geckolepis* are apparently able to do it actively, and at the slightest touch.

While others might take a long time to regenerate their scales, fish-scale geckos can grow them back, scar-free, in a matter of weeks.

"A study a few years ago showed that our understanding of the diversity of fish-scale geckos was totally inadequate," said Mark D Scherz from Ludwig Maximilian University of Munich (LMU Munich) in Germany.

"It showed us that there were actually about thirteen highly distinct genetic lineages in this genus, and not just the three or four species we thought existed," said Scherz.

"One of the divergent lineages they identified was immediately obvious as a new species, because it had such massive scales," he said.

"But to name it, we had to find additional reliable characteristics that distinguish it from the other species," he said.

One of the main ways reptile species can be told apart is by their scale patterns, but these geckos lose their scales with such ease that the patterns are often lost by the time they reach adulthood.

"You have to think a bit outside the box with *Geckolepis*. They are a nightmare to identify. So we turned to micro-CT (micro-computed tomography) to get at their skeletons and search there for identifying features," Scherz said.

Micro-CT is a 3D x-ray of an object. This method allows morphologists to examine the skeletons of animals without having to dissect them.

By looking at the skeletons of the geckos, the team was able to identify some features of the skull that distinguish their new species from all others.

Geckolepis megalepis is most remarkable because of its huge scales, which are by far the largest of any gecko.

The researchers hypothesise that the larger scales tear more easily than smaller scales, because of their greater surface area relative to the attachment area, and larger friction surface.

"What is really remarkable though is that these scales - which are really dense and may even be bony, and must be quite energetically costly to produce - and the skin beneath them tear away with such ease, and can be regenerated quickly and without a scar," said Scherz.

The mechanism for regeneration, which is not well understood, could have applications in human medicine.

**BRIEF, INTENSE STAIR CLIMBING MAY
BOOST HEART HEALTH: STUDY**

Don't have time for gym? Even short, intense bursts of stair climbing at your home or office may have major benefits for heart health, scientists have claimed.

Researchers recruited 31 sedentary but otherwise healthy women and tested the effect of two different protocols, each of which required a 10-minute time commitment, including warm-up, cool down and recovery periods. The exercise sessions were conducted three times a week over the course of six weeks.

"Stair climbing is a form of exercise anyone can do in their own home, after work or during the lunch hour," said Martin Gibala, professor at McMaster University in Canada.

"This research takes interval training out of the lab and makes it accessible to everyone," said Gibala.

Previous studies have proven the benefits of vigorous stair climbing over sustained periods of time - up to 70 minutes a week - but scientists set out to determine

if sprint interval training (SIT), which involves brief bursts of vigorous exercise separated by short periods of recovery, was an effective and time-efficient alternative for improving cardiorespiratory fitness.

The first protocol involved three, 20-second bouts of continuous climbing in an 'all-out' manner.

The results were then compared and contrasted to participants who ran through the same protocol using an exercise bike which has already been shown to improve fitness. For the second experiment, participants vigorously climbed up and down one flight of stairs for periods of 60 seconds, an experiment which could be easily adopted for the home.

Both protocols, each involving a total time commitment of 30 minutes a week, increased cardiorespiratory fitness, an important healthy marker that is linked to longevity.

"Interval training offers a convenient way to fit exercise into your life, rather than having to structure your life around exercise," said Gibala.

