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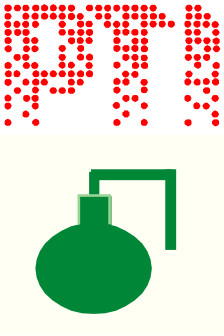

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MAKE USE OF SOLAR ROOFTOPS FOR HOUSES MANDATORY: CSE

Centre for Science and Environment (CSE) has called for installation of solar rooftops to be made mandatory for all upcoming residential societies and sought a ban on use of diesel generator sets in highly-polluted urban areas like the national capital.

The environmental watchdog has argued that decline in cost of solar panels means they are now a financially viable option and the cost of electricity generation through them, including the capital cost, is a third (Rs 10 per unit) of that generated through diesel generator (DG) sets (Rs 27- Rs 33 per unit).

The solar rooftop can also reduce monthly power bill of the consumers. The extra units generated through solar rooftop can be exported to the grid, something which cannot be done with DGs, according to CSE.

In a survey conducted in five residential societies across Delhi, Haryana, Uttar Pradesh and Rajasthan it was found that "size of the diesel generator was often not connected to outage" but was sometimes linked to the "status" of a particular society.

For instance, ICON, an upscale society in Gurugram, which experiences an outage of only 16 minutes per day on an average had "full backup" with DG size of 1,112 KW.

"DG back-up has become increasingly redundant because of reducing power outages in cities. We must realise that full back up was considered a basic need by upscale societies when the outages often lasted several hours a day," said Chandra Bhushan, director general, CSE during the launch of report 'Solar Rooftop: Replacing Diesel Generators in Residential Societies'.

"If power outage is less than an hour a day then the very definition of 'full back-up' needs to be changed. For tens of minutes of outage, even for the high-end societies 'partial load back-up' should be sufficient," Bhushan added.

As per CSE, this partial load can be easily met by solar rooftop for individual flats. DG sets though can be used to supplement additional power requirements for shared facilities in a residential society like elevators and for energy-intensive appliances such as ACs.

AIR QUALITY IN JAN RELATIVELY BETTER THAN LAST YEAR: SAFAR

Residents of the national capital have breathed "relatively better" quality air this season so far compared to last year.

According to the Ministry of Earth Science's System of Air Quality and Weather Forecasting and Research (SAFAR), this is largely due to weather conditions that have not contributed towards accumulation of suspended particulates.

"The recent spell of rain has washed out the particulates. So the city is enjoying the season's best quality of air at this moment. January till now has been relatively better than last year," Gufran Beig, Project Director of SAFAR, said.

Beig said the jury was still out and one has to wait till the end of January and analyse a larger series of data to assess the major reasons behind the relative improvement.

As per SAFAR, the day's average readings of PM 2.5 and PM 10 were 179 and 101 micrograms per cubic metre respectively.

Perusal of CPCB (Central Pollution Control Board) show that there have been five days since December when air quality breached the "severe" category.

The air quality index (24 hour running average) has been in the very poor category for around 29 days during this period while the rest has been poor.

However, Beig said the city may witness a build up of pollutants in the coming days due to dipping temperature and calm wind movement.

Prolonged exposure to severe category air may affect healthy people and seriously impact those with existing diseases while very poor category may cause respiratory illness.

The 24-hour prescribed standards of PM 2.5 and PM 10 are 60 and 100 respectively and prolonged exposure to anything beyond that harms the respiratory system and may cause cardiac complications.

Last year, the dense cover of grey haze shrouded Delhi for almost a week in early November, reminiscent of the 1952 Great Smog in London, that had plunged the city's air quality to the season's worst.

The real-time readings of respirable pollutants PM 2.5 and PM 10 had breached the safe standards by over 17 times at many places. The hourly AQI (air quality index) of monitoring stations run by CPCB and SAFAR had remained 500 plus, beyond the maximum limit.

Centre for Science and Environment (CSE) had said the spell of smog in Delhi was the worst in 17 years.

EXPERTS URGE A RETHINK IN CONSERVATION PLANS FOR LARGE MAMMALS

There is a need for a "rethink" in conservation strategies for threatened large mammal species like elephants, wildlife scientists have said.

In an article published in the international journal Frontiers in Ecology and Evolution, Varun R Goswami and Divya Vasudev have said elephant connectivity cannot be ignored while mitigating conflict and landscape connectivity is critical for their conservation.

"Asian elephant conservation provides the perfect example. Elephant survival in heterogeneous landscapes rests on their ability to move among habitats in search of food and space.

"But this movement often brings elephants into contact and potential conflict with people, especially in densely populated countries like India," said Goswami who heads the elephant program for WCS India.

The conservation biologists stressed that landscape connectivity is critical for elephant conservation and sites important for elephant connectivity often face human–elephant conflict.

They said barrier-centric conflict mitigation that come with substantial monetary costs can also adversely affect elephant conservation even as they stressed that minimising conflict without impinging on elephant connectivity is the "need of the hour".

Noting that a typical response to conflict is to prevent elephants from coming out of forests through fences and trenches, Vasudev said this strategy, however, has a direct negative impact on connectivity and as a result on elephant persistence.

"Animals do not always move through corridors that people demarcate, rather they use routes they view as least threatening," Vasudev said.

"Corridors are of course important but we still have a way to go in knowing where animals move, what stops dispersal, and which areas are most critical for maintaining connectivity," she said.

The debate becomes pertinent in light of the railway fences coming up around some of India's most important forests. The cost of these fences reportedly runs to more than Rs 1 crore per kilometre.

"These fences come at huge monetary and manpower costs, and before putting them up, we need to think hard about where we place them. It is critical that we minimise human–elephant conflict, but while simultaneously thinking about elephant movement needs between habitats," said Goswami.

The article titled 'Triage of conservation needs: The juxtaposition of conflict mitigation and connectivity considerations in heterogeneous, human-dominated landscapes'.

Vasudev said endangered species, including elephants, tigers and gibbons, are present in fragmented landscapes and conserving them in these landscapes means that there is a need to have science-based policy, long-term vision, and incorporate diverse challenges and opportunities. P

'CLOUD COMPUTING CRUCIAL TO DIGITAL INDIA,NEED SAFE PRACTICES'

Cloud computing is a critical component for ensuring success of Digital India, the flagship programme of the NDA government, and access to cloud networks is crucial and requires safe practices, experts said today.

Pamela Kumar, Vice-President, Cloud Computing Innovation Council of India, Bengaluru, said the Digital India programme has several key aspects like digital lockers where individuals can store their information online.

MeghRaj Cloud Computing- Government of India's initiative to harness the benefits of Cloud Computing-- is also a very crticial component of Digital India programme.

Speaking at plenary session on Cloud Computing and Virtualisation at the Indian Science Congress here, Kumar also emphasised on an Indian version of cloud that suits its requirements.

"We need the mangalyaan version (of data computing) and not the NASA version," she said.

Cloud computing is the practice of using a network of remote servers hosted on the Internet to store, manage, and process data, rather than on a local server or a personal computer.

For instance, dropbox, Google Drive, One Note are examples of cloud where data can be saved and accessed from different media like mobile phones, tablets and computers. One need not restrict himself to a desktop or a laptop under cloud computing.

However, cloud computing also needs right kind of security measures. Referring to the hacking of computer of Democratic National Committee, Biswanath Mukherjee, Distinguished Professor at the Department of Computer Science of University of California, said weak passwords are a major factor contributing to such incidents and it is important to follow safe practises.

In plenary session on 5G and Internet of Things (IoT), experts discussed the scope of 5G in coming years.

Rishi Bhatnagar, President of Aeris Communications, said 5G was expected to come in India by 2020. Unlike 2G, 3G and 4G, 5G will leapfrog. We can expect the 5G technology to come up by in next 3 years, he said. Bhabani Sinha, professor at the Advanced Computing and Microelectronics Unit at the Indian Statistical Institute, Kolkata, said several aspects like call drops in 4G and faster draining of battery has to be addressed before 5G arrives on the scene.

INDIA MUST BE MILITARILY STRONG TO CONCENTRATE ON DEVLPMT: PSA

India must be militarily strong so that it does not have to use strength but concentrate on development issues as development without security is vulnerable, Rajagopala Chidambaram, who was Atomic Energy Commission chief during the 1998 Pokhran tests, said.

The senior scientist said India does not want doles from other countries, but equal partnership to collaborate at international level in the field of science and technology.

"National development and national security are two sides of the same coin. The greatest advantage of recognised strength is that you don't have to use it. The greatest disadvantage of perceived weakness is that your enemy may get adventurist.

"So, we must be militarily strong so that we don't have to use our strength and concentrate on development initiatives. Development without security is vulnerable," the Principal Scientific Advisor to the government of India said delivering a lecture at the 104th Indian Science Congress.

The 80-year-old Chidambaram was the Chairman of the Atomic Energy Commission (AEC) when India conducted nuclear tests in Pokhran during Atal Bihari Vajpayee's regime in 1998. He was also the chairman of International Atomic Energy Agency(IAEA).

He is also the chairman of National Knowledge Network, aimed at establishing a strong and robust Indian network which will be capable of providing secure and reliable connectivity.

He also emphasised on mobility of scientists and international collaborations, considering the complex nature of work. Citing the 2010 report of the National Science Foundation -- a US government agency that supports fundamental research and education in science and engineering -- he said nearly 25 per cent of co-authored papers are written by scientists from two countries, which was just about 10 per cent a decade ago.

Listing out India's international collaborations, he said Indian scientists have been involved in major projects like in the discovery of gravitational waves (the LIGO project), in the International Thermo Nuclear Fusion (ITER) project, and the CERN, the world's largest nuclear physical project.

Chidambaram further added that the UNESCO has designated Indian Tsunami Early Warning System to provide warning to neighbouring countries.

"India's case is different today as it was decades ago. It has progressed technologically. India wants international partnerships as an equal partner basis. We don't want doles from other countries," he said.

Chidambaram also emphasised on doing fundamental research as it is key to innovations and developments in several rigid projects.

AFTER MARS, ISRO EYES VENUS AND JUPITER

After its successful Mars Orbiter Mission (MoM), ISRO is eyeing inter-planetary missions to Jupiter and Venus and is studying their feasibility.

"We are looking at other planets that we can explore. So, two of them are Jupiter and Venus. The mission analysis is on what type of satellite we are supposed to build and what type of rocket we need.

"Studies are going on and it may take few years from now to have a concrete plan," M Nageswara Rao, Associate Director, Indian Space Research Organisation (ISRO) said at a plenary session on science technology at the Indian Science Congress here.

He added that the chance of launching a satellite to Venus comes once in 19 months, considering the distance and earth's position.

Venus, second in order from the Sun, is nearly 162 million miles away from Earth while Jupiter, which lies between Mars and Saturn, is nearly 610 million miles away from Earth.

Rao said a follow-up mission for Mars Orbiter Mission (MoM) is also being planned.

"We want to have a follow-up Mars Mission and we want to have a mission to Venus. We want to go close, 70,000 km close (to Mars). Work for Chandrayaan 2 is also on. The project involves having a lander and a rover," he said.

So for the first time, ISRO can have its lander land on the moon, which will give the space agency minute details of the earth's natural satellite. Earlier envisaged as a joint collaboration with Russia, ISRO will now go solo on this project. Chandrayaan 2 is expected to be launched next year.

100 SHEEP OF RARE BREED DIE IN REMOTE ODISHA VILLAGE

Over a hundred sheep of a exclusive breed, found in coastal Jagatsinghpur and Kendrapara districts of Odisha, died in the past one week at a remote village, triggering worry among veterinary experts.

Reports of large scale of sheep locally called 'kuji mendha' have poured in from Subala village under Mahakalpada police station jurisdiction in Kendrapara.

The animal husbandry department has received official reports of nearly 60 cases of death from the said village, Chief District Veterinary Officer (CDVO) Chaitnya Kumar Sethy said.

However no sheep death has been reported so far from other parts of the district, he said.

As the death is localised in nature with occurrence confined to one village, it could mean that things have not assumed epidemic shape, he said adding the department is keen to curb sheep mortality in the village as the breed was conferred 'rare and singular species' tag by Union Government last year.

The National Bureau of Animal Genetic Resources (NBAGR) had accorded genetic recognition to 'kuji' breed of sheep, he said.

Veterinary surgeons have rushed to the village to take stock of the situation and collected blood and stool samples of the animals for laboratory test.

The stool samples would be tested at Kendrapara laboratory while blood samples are being sent to College of Veterinary Science and Animal Husbandry, Orissa University of Agriculture and Technology, Bhubaneswar, Sethy said.

As a precautionary measure, the animals are being vaccinated to enhance their disease immunity. In winter, the sheep are mostly afflicted with worm infection, foot and mouth and septicaemia diseases.

The 'kuji mendha' is typical breed of sheep. These breed of sheep are fast breeders and give birth multiple times while sheep in other parts of the state give single birth at a time.

As the NBAGR has recognised it as genetically rare status, the veterinary department is giving emphasis on conserving these domesticated species.

1682 CROCOS LIVE IN BHITARKANIKA NATIONAL PARK,ABOUT 12 ABLINO

Wildlife enumerators have spotted about a dozen of highly threatened albino salt- water crocodiles in the brackish water bodies and water-inlets along the wetlands of Bhitarkanika National Park in Odisha'a Kendrapara district.

Though the latest census counted a marginal rise in the number of estuarine crocodiles, the sighting of white crocs has provided them something to cheer about, wildlife lovers said.

The number of crocodiles has increased to 1,682 from last year's census figure of 1,671 such reptiles.

However, the internationally acclaimed Bhitarkanika Ramsar wetland site continues to be the congenial habitat of salt-water crocodiles with the

swampy mangrove-infested region housing the largest number of these reptiles.

The region is criss-crossed by innumerable water inlets, creeks and nullahs all forming the part of Bhitarkanika river system.

The enumerators who conducted the three-day headcount of salt-water crocodiles from January 3 to January 8 have sighted around a dozen of albino crocs ensconced along the water-bodies of this wetland.

These white species came under sub-adult and adult category with one of it tentatively measuring 14 foot long, an official said.

Besides water bodies inside the sanctuary, the enumerators also extensively covered vulnerable riverside villages where reports of man-croc conflict had reached a flashpoint in recent past.

However, sighting of these reptiles was few, they said, adding that the census team also covered the water-bodies in and around the Mahanadi deltaic region.

The spheres of headcount exercise had to be expanded in view of frequent sighting of these animals in riverside villages.

The census findings have made it clear that the species are itinerant in nature and stray into adjoining water-bodies because of its increase in hyper-salinity contents.

After a temporary sojourn, they leave for their permanent habitation corridors within the Bhitarkanika habitation corridors, said crocodile researcher Sudhakar Kar, who headed the census team.

The breakup of crocodiles is Hatchlings- 608, yearlings- 334, juvenile-266, sub adult- 172, adult- 302.

While 3 giant size crocodiles of 20 foot or above were sighted, 18 more large sized crocs of 16 to 20 foot long were spotted by the enumerators, informed Divisional Forest Officer, Rajnagar Mangrove (wildlife) Forest Division, Bimal Prasanna Acharya.

ACTIVITES RESTRICTED IN NALBANA SANCTUARY FOR BIRD COUNT

All activities, including the entry of visitors into the 15.59 sq km Nalabana bird sanctuary in Chilika have been restricted for three days in view of the annual bird count in the lagoon.

The restriction which came into force yesterday would continue till tomorrow in the famous sanctuary area. Similarly, there will be no movement of tourist boats in Mangalajodi tomorrow, officials said.

"The restriction has been imposed to keep the birds undisturbed for smooth conduct of the census," said divisional forest officer (DFO) of Chilka wildlife division Bikash Ranjan Das.

He added that fishing would not be restricted in other parts of the 1,100 sq km lake during the period.

Most migratory waterfowls visiting the lake are concentrated in Nalbana. Besides Nalbana, the migratory birds also descend upon Mangalajodi, Bhusandapur, Sorana Prikuda and Chadheighara islands.

"No restriction has been imposed in these areas as these do not come under the sanctuary," Das said.

The enumerators are being trained today, a day before the actual count scheduled tomorrow. Das said experts from the Bombay Natural History Society (BNHS), noted ornithologists, research scholars and forest and wildlife officials, forestry students of Orissa University of Agriculture and Technology (OUAT) are participting in the exercise.

For the first time ever, all 20 DFOs (wildlife) in the state are also taking part in the mammoth exercise, he added.

The annual bird census this time assumes significance in the wake of the impact of climate change on migration.

RARE BIRD SIGHTED IN CHILIKA LAKE

A rare bird was sighted in the Chilika lake, the biggest waterfowl habitat in the country, during the headcount of feathered guests conducted by the wildlife organisation in the entire lagoon.

The common shelduck, a rare migratory bird was sighted in Nalabana, the 15.59 sq km bird sanctuary area during the enumerators, said Divisional Forest Officer, Chilika wildlife division, Bikash Ranjan Das.

"This species of bird had not visited the lake for the past few years. But during survey, they spotted only one such bird in the lake," he said.

The census, conducted yesterday, showed that more number of winged gusts visited the lake this winter compared to last.

The annual bird count, conducted in 1100 sq km vast lake has revealed 9.47 lakh birds of 167 species visited the blue lagoon, the DFO said.

Around 8.58 lakh birds of 161 species had visited the lake last winter.

Around 100 persons, including ornithologists from BNHS, Mumbai, officials of wildlife organisations, several ornithologists and wildlife activists took part in the bird count in the lake held from 6 to 11 AM.

While the total number of 9,47,119 birds were counted in the lake, 3,74,757 were counted in the Nalabana. In the previous winter, 3,97,825 birds of various species had taken shelter in the bird sanctuary area.

"Less number of birds took shelter this winter in Nalabana probably due to less exposure of mudflats due to the high level of water," said the DFO.

Winged guests from far off places including the Caspian Sea, Lake Baikal, remote parts of Russia, central and South East Asia, Ladakh and the Himalayas descend on the lake in every winter for feeding and roosting. They start their homeward journey with the onset of summer.

2016:THE YEAR THAT WAS NOT FOR TIGERS AS TOLL IN MP TOUCHED 33

Once a home to tigers, Madhya Pradesh now appears to have turned into an enemy territory for them, as the state witnessed the highest number of feline deaths in 2016, when it lost 33 big cats, taking the toll to 89 in a period of last five years.

From year 2011 to 2016, as many as 89 tigers including 11 cubs died in the state due to various reasons including poaching, territorial clashes or for natural reasons as cited in the data obtained from the MP Forest Department.

The data revealed that 2012 witnessed the death of 16 felines which reduced to 11 next year (2013). Subsequent years proved more fatal for the wildcat when the state saw 14 and 15 deaths respectively in 2014 and 2015.

And, then came 2016, the worst of all when the figures (of feline deaths) were almost double the average of previous five years.

On an average, 14 tigers had died every year from 2012 to 2015, but the death toll went up to an alarming level of 33 in 2016.

As far as reasons are concerned, the death of 30 out of 89 tigers were attributed to the territorial clashes, while 22 of them have fallen prey to poachers, who killed them either by poisoning or through the electrocution.

The remaining 37 tigers are cited to die either due to their old age, illness or some other reasons.

Amid all these dismal reports about dwindling wildcats' population, state forest authorities claimed that there was some encouraging news too for tiger conservationists.

The state has recorded a growth in their population as more cubs were born during this period.

"The tiger population was reduced to 257, according to the census carried out by the National Tiger Conservation Authority (NTCA) in 2011. However in 2014, the tiger population in the state has gone up to 308," MP's Principal Chief Conservator of Forest (PCCF), Wildlife, Jitendra Agrawal told PTI.

Agrawal claimed that there are 216 tigers in only six tiger reserves of the state - Kanha, Bandhavgarh, Pench, Panna, Satpura and Sanjay National Park.

"In addition to these tiger reserves, there are a number of tigers in other forests of the state. If cubs are included, the number of tigers may go beyond 400. This data is an evidence of ongoing conservation work," he added.

He claimed that the data of union government also denotes that the number of tigers in Madhya Pradesh are rising gradually over the years.

GOOGLE BETS BIG ON ARTIFICIAL INTELLIGENCE

Technologies like artificial intelligence and machine learning can make huge difference to everyday life and Google is investing in bringing these to "as many people and as fast as possible", its India-born chief Sundar Pichai today said.

"We are making a big bet on machine learning and artificial intelligence. Advancement in machine learning will make a big difference in many many fields," Pichai said at his alma mater IIT Kharagpur campus today, while chatting with students.

He pointed out that the ability of computers to do tasks like image recognition, voice recognition or speech recognition, are reaching a tipping point.

"So, we are definitely at a point of inflexion," he said, adding that Google is investing a lot in this space and if the investments are sustained over a few years, it will pave the way for the next wave of computing.

Pointing out to a paper published by Google recently, Pichai said machine learning can be used to detect diabetic retina, which can cause blindness if treatment isn't administered on time.

"This is an early example of the kind of changes that will happen when you apply machine learning to all kinds of fields. Google alone won't do this. What I am excited about is bringing machine learning and AI (artificial intelligence) to as many people and as fast as possible," he said.

Pichai said that at Google, the aim is very high and the criterion is building technology that will apply to the lives of billions of people.

On India, he praised that the PPP model has been working well and the company is a big supporter of the Digital India campaign.

"To really make Google work in India, you need to make it available in as many languages as possible. English is spoken by only a small segment of the population," Pichai said adding Google has progressed but wants to work more in rural conditions and in the right dialects.

To improve access to digital world, he said he would love to see cheaper smartphones hit the market.

"You really need to bring the prices of entry level smartphones down at around 30 USD," he said adding connectivity is also extremely important.

He described India as the most dynamic internet market in the world and the second largest one.

"When we built for India, we built for the world," he said citing the YouTube offline feature which is now available across 80 nations.

In the next 3-4 years, Pichai expects there will be big software companies coming out of India.

When asked by students, he said "You can build for a global market from India." Pichai said he is convinced that India will become a global player soon.

"I am confident that it will compete with any player in the world. It is growing well as a country and will take few more years," he said.

NEW WOUND-DRESSING MATERIAL MADE FROM BAMBOO PLANTS

Scientists have developed a novel compound made of bamboo cellulose and silver nanoparticles that can better treat skin injuries, an advance which may lead to films and ointments for wound-healing dressing materials with antibacterial properties.

Current wound-dressing materials have drawbacks such as foul smell, low porosity and poor-healing capacity. Some are even toxic to biological cells.

"An effective wound healing or a dressing material is needed that can cater moist environment to wound, prevent microbial infection and can be readily removed from the wound site without causing much pain," Sudesh Kumar, a scientist at Centre of Innovative and Applied Bioprocessing in Punjab told PTI.

Researchers from the CSIR-Institute of Himalayan Bioresource Technology in Himachal Pradesh and Academy of Scientific and Innovative Research in New Delhi synthesised nanobiocomposites by inserting silver nanoparticles into the matrix of cellulose nanocrystals isolated from two species of bamboo leaves.

Cellulose is major component of plant cell wall. Different plants have different shape and size and this could be one of the reason for the different characteristics.

Bamboo was chosen for the research as it grows faster and has longest internode segment - allowing scientists to isolate appropriate-sized cellulose nanocrystals.

After overnight incubation with infectious bacteria, the nanocomposites showed strong antibacterial activities, researchers said.

The nanocomposites inhibited the growth of the bacteria by releasing silver nanoparticles which stuck to the cell membrane and eventually ruptured the bacterial cells.

"Among biomedical applications, wound repair has been a realm of extensive research over a past few decades. Plants are the natural largest source of cellulose, but are largely unexplored in such biomedical applications," said Kumar.

Ointment and films made from the nanocomposites completely healed skin wounds in mice.

The composite kept the wound site moist and stimulated the activities of certain enzymes, allowing the regeneration of skin cells.

The nanocomposites induced the growth of collagen fibres and stopped the proliferation of specific immune cells that trigger inflammation and delay wound healing. After two weeks, presence of few hair follicles in the mice skin wounds indicated completion of tissue repair.

"So far the developed nanocomposite has shown promising result against acute wound healing. For other kind of wound healing experiments are undergoing," said Kumar.

The research was published in the journal Carbohydrate Polymers.

80 PC OF ALL SMOKERS LIVE IN LOW- AND MIDDLE-INCOME COUNTRIES: WHO

Nearly 80 per cent of the over one billion tobacco smokers globally live in low- and middle-income countries like India, WHO said today an asserted that policies to control its use, including taxation and price increase, can generate revenues for health care and development work.

According to a new landmark global report by the World Health Organization (WHO) and the National Cancer Institute of the USA, published in 'the economics of tobacco and tobacco control', around 6 million people die annually as a result of tobacco use, with most of them living in developing countries.

"Policies to control tobacco use, including tobacco tax and price increases, can generate significant government revenues for health and development work. Such measures can also greatly reduce tobacco use and protect people's health from the world's leading killers, such as cancers and heart disease," the report said.

Left unchecked, the tobacco industry and the deadly impact of its products cost the world's economies more than USD 1 trillion annually in health care expenditures and lost productivity, it said.

The almost 700-page report examines existing evidence on two broad areas -- the economics of tobacco control, including tobacco use and growing, manufacturing and trade, taxes and prices, control policies and other interventions to reduce tobacco use and its consequences and the economic implications of global tobacco control efforts.

"Globally, there are 1.1 billion tobacco smokers aged 15 or older, with around 80 per cent living in low- and middle-income countries. Approximately 226 million smokers live in poverty," it said.

The monograph, citing a 2016 study, states that annual excise revenues from cigarettes globally could increase by 47 per cent or USD 140 billion, if all countries raised excise taxes by about USD 0.80 per pack.

Additionally, this tax increase would raise cigarette retail prices on average by 42 per cent, leading to a 9 per cent decline in smoking rates and up to 66 million fewer adult smokers, it said.

"The global health and economic burden of tobacco use is enormous and is increasingly borne by low- and middle-income countries (LMICs). Around 80 per cent of the world's smokers live in LMICs," it said. India has been classified under 'lower-middle income countrySouth Asia' by the World Bank.

India has implemented, from April 2016, large pictorial health warnings occupying 85 per cent of the principal display area of tobacco packs and on all forms of tobacco.

India is third among countries with the largest pictorial warning on tobacco products, according to a recent report.

TEEN CREATES WEBSITE ON FOOD CHOICE AFTER DIABETES DEATHS IN FAMILY

Having lost three of her family members to diabetes, a 16-year-old has created a website that has a comprehensive database on nutritional value of Indian food.

The website 'thehealthybeat' promotes awareness about the importance of preventing lifestyle disorders such as diabetes amongst the worldwide Indian community.

The US-based Indian, Avni Madhani is currently studying at Saratoga High School, US and founded the website after she lost three of her close family members to diabetes.

Through the website, which is available in Hindi and English, users can check their ideal weight, learn about food groups, and find their recommended calorie intake.

Users can also mirror their real life choices by adding different items onto a virtual platter to calculate the total calories and composition of a meal.

The Diabetic Association of India (DAI), the largest association in India for diabetes with 41 branches all over the country, has made TheHealthyBeat available to its members.

The health portal has been featured in the TiE Conference in Silicon Valley, USA.

"I observed how general unawareness about the composition of a healthy diet and lifestyle leads to problems such as diabetes, obesity, and heart disease. I also realised that society does an extremely small amount to educate its citizens about decisions affecting their health, and the information available to those who seek it is often complicated and conflicting.

"Thus, theHealthyBeat is an attempt to increase societal awareness on nutrition by offering a simple guide to nutritional education, so that people can make well-informed decisions about diet," Avni said.

Indian cuisine is high in carbohydrates and fat, which can be detrimental to health unless carefully controlled and monitored.

India has 69.2 million cases of diabetes and, with one million deaths resulting from diabetes in 2015 alone, the country contributes to 20 per cent of the worldwide diabetes-related mortality rate.

CALLING YOUR KIDS 'FAT' MAY MAKE THEM GAIN WEIGHT: STUDY

Parents, take note! Telling your children that they are 'overweight' may make them gain weight as they grow up, new research has warned.

The findings indicate that children whose parents identified them as being overweight perceived their own body size more negatively and were more likely to attempt to lose weight, factors that partly accounted for their weight gain.

"Although parents' perception that their children are overweight has been presumed to be important to management of childhood obesity, recent studies have suggested the opposite; when a parent identifies a child as being overweight, that child is at increased risk of future weight gain," said Eric Robinson from University of Liverpool in the UK.

"We argue that the stigma attached to being an overweight child may explain why children whose parents view them as being overweight tend to have elevated weight gain during development," he said.

Drawing from the Longitudinal Study of Australian Children, Robinson and and Angelina Sutin, from Florida State University College of Medicine in the US, examined data for 2,823 Australian families.

They measured the children's height and weight when they began the study as 4- or 5-year-olds.

At that time, the children's parents reported whether they thought the children were best described as underweight, normal weight, overweight, or very overweight.

Later, when they were 12 or 13, the children used a series of images depicting bodies that increased in size to indicate which image most resembled their own body size.

Children also reported whether they had engaged in any behaviours in an attempt to lose weight in the previous 12 months.

Researchers took height and weight measurements again when the children were 14 or 15 years old.

The results indicated that parents' perceptions were associated with children's weight gain 10 years later: Children whose parents considered them to be overweight at age 4 or 5 tended to gain more weight by age 14 or 15.

This association could be accounted for, at least in part, by the children's beliefs and behaviours.

Children whose parents thought they were overweight perceived their own body size more negatively and were more likely to report attempts to lose weight.

The results were the same for boys and girls, and they could not be explained by other possible factors, such as household income, presence of a medical condition and parents' weight.

The link between parents' perceptions and children's later weight gain did not depend on how much the child actually weighed when they began the study.

When researchers examined data from 5,886 Irish families participating in the Growing Up in Ireland study, they saw the same pattern of results.

The research was published in the journal Psychological Science.

NEW COMPUTER METHOD TO DISAMBIGUATE NAMESAKES

Scientists have developed a novel machine-learning method that can differentiate between people with the same name.

All individuals are unique, but millions of people share names. How to distinguish between - or disambiguate - people with common names has always perplexed researchers.

This conundrum occurs in a wide range of environments,from the bibliographic to law enforcement and other areas.

Now, scientists from the Indiana University-Purdu University Indianapolis (IUPUI) in the US have developed a novel machine-learning method to provide better solutions to this problem.

The new method is an improvement on currently existing approaches of name disambiguation because it works on streaming data that enables the identification of previously unencountered names.

Existing methods can disambiguate an individual only if the person's records are present in machine-learning training data, whereas the new method can perform non-exhaustive classification so that it can detect the fact that a new record that appears in streaming data actually belongs

to a fourth person, even if the training data has records of onl three different persons.

"Non-exhaustiveness" is a very important aspect for name disambiguation because training data can never be exhaustive, as it is impossible to include records of all living individuals.

"We can teach the computer to recognise names and disambiguate information accumulated from a variety of sources - Facebook, Twitter and blog posts, public records, and other documents - by collecting features such as Facebook friends and keywords from people's posts using the identical algorithm," said IUPUI associate professor Mohammad al Hasan.

"Our proposed method is scalable and will be able to group records belonging to a unique person even if thousands of people have the same name, an extremely complicated task.

"Our innovative machine-learning model can perform name disambiguation in an online setting instantaneously and, importantly, in a non-exhaustive fashion," said Hasan, who led the study.

"Our method grows and changes when new persons appear, enabling us to recognise the ever-growing number of individuals whose records were not previously encountered, he said.

Some names are more common than others, so the number of individuals sharing that name grows faster than other names.

While working in a non-exhaustive setting, our model automatically detects such names and adjusts the model parameters accordingly, researchers said.

MALARIA DEPENDS ON NUMBER OF PARASITES, NOT BITES: STUDY

For the first time, scientists have found that the number of parasites each mosquito carries, rather than the number of bites, determines the chance of successful malaria infection, an advance that may help develop effective vaccines for the deadly infection.

The findings, from scientists at Imperial College London, may also explain why the only registered malaria vaccine, RTS,S, has had only partial efficacy in recent trials.

Malaria is spread when mosquitoes bite humans and release microscopic parasites, which live in the salivary glands of the mosquitoes, into the person's bloodstream.

The parasites then travel to the liver, where they mature and multiply for 8-30 days before spreading throughout the bloodstream and causing the symptoms of malaria.

To determine the intensity of malaria transmission, researchers and international organisations like the World Health Organisation currently rely on a measure called the entomological inoculation rate (EIR): the average number of potentially infectious mosquito bites per person per year.

However, this does not take into account how infectious each of those bites may be - each bite is considered equally infectious.

Now, researchers have determined that the number of parasites each individual mosquito carries influences whether a person will develop malaria.

Some mosquitoes can be 'hyperinfected', making them particularly likely to pass on the disease.

In studies in mice, the researchers determined that the more parasites present in a mosquito's salivary glands, the more likely it was to be infectious, and also the faster any infection would develop.

"These findings could have significant implications for public health. We have shown that the concept of relying on the number of bites alone to predict malarial burden is flawed, and has probably hampered the successful use of control measures and the development of effective vaccines," said Andrew Blagborough, from the Department of Life Sciences at Imperial.

"It is surprising that the relationship between parasite density and infectiousness has not been properly investigated before, but the studies are quite complex to carry out," said Blagborough.

By conducting further studies with mice and human volunteers, the team was also able to explain why the malaria vaccine RTS,S is effective only around 50 per cent of the time, and why any protection rapidly drops off after three years.

"Vaccine development has come a long way, and this new insight should help future vaccine studies to be tested more rigorously," said Thomas Churcher, from the MRC Centre for Outbreak Analysis and Modelling at Imperial.

The study was published in the journal PLoS Pathogens.

OUR MOON IS MUCH OLDER THAN

The Moon is at least 4.51 billion years old - up to 140 million years older than previously thought, according to a new study of minerals called zircons brought back from the lunar body to the Earth by the Apollo 14 mission in 1971.

The Moon's age has been a hotly debated topic, even though scientists have tried to settle the question over many years and using a wide range of scientific techniques.

"We have finally pinned down a minimum age for the Moon; it is time we knew its age and now we do," said Melanie Barboni, research geochemist at University of California, Los Angeles (UCLA) in the US.

The Moon was formed by a violent, head-on collision between the early Earth and a "planetary embryo" called Theia.

The new study would mean that Moon formed "only" about 60 million years after the birth of the solar system, providing critical information for astronomers and planetary scientists who seek to understand the early evolution of the Earth and our solar system, researchers said.

That has been a difficult task, Barboni said, because "whatever was there before the giant impact has been erased."

While scientists cannot know what occurred before the collision with Theia, these findings are important because they will help scientists continue to piece together major events that followed it.

It is usually difficult to determine the age of Moon rocks because most of them contain a patchwork of fragments of multiple other rocks. However, Barboni was able to analyse eight zircons in pristine condition.

She examined how the uranium they contained had decayed to lead and how the lutetium they contained had decayed to an element called hafnium.

The researchers analysed those elements together to determine the Moon's age.

"Zircons are nature's best clocks. They are the best mineral in preserving geological history and revealing where they originated," said Kevin McKeegan, a UCLA professor of geochemistry and cosmochemistry.

The Earth's collision with Theia created a liquefied Moon, which then solidified. Scientists believe most of the Moon's surface was covered with magma right after its formation.

The uranium–lead measurements reveal when the zircons first appeared in the Moon's initial magma ocean, which later cooled down and formed the Moon's mantle and crust; the lutetium–hafnium measurements reveal when its magma formed, which happened earlier.

Previous studies concluded the Moon's age based on Moon rocks that had been contaminated by multiple collisions. McKeegan said those rocks indicated the date of some other events, "but not the age of the Moon."

The study was published in the journal Science Advances.

INDIAN PEPPER HOLDS KEY FOR NEW CANCER-FIGHTING DRUG: STUDY

The Indian long pepper, widely popular for spicing up food, may soon be used as a potential cancer treatment drug, according to a new study.

The Indian long pepper contains a chemical that could stop your body from producing an enzyme that is commonly found in tumors in large numbers, according to the study in Journal of Biological Chemistry.

UT Southwestern Medical Center scientists have uncovered the chemical process behind anti-cancer properties of a spicy Indian pepper plant called the long pepper, whose suspected medicinal properties date back thousands of years.

The secret lies in a chemical called Piperlongumine (PL), which has shown activity against many cancers including prostate, breast, lung, colon, lymphoma, leukemia, primary brain tumors and gastric cancer.

Using x-ray crystallography, researchers were able to create molecular structures that show how the chemical is transformed after being ingested.

PL converts to hPL, an active drug that silences a gene called GSTP1. The GSTP1 gene produces a detoxification enzyme that is often overly abundant in tumors, the study said.

"We are hopeful that our structure will enable additional drug development efforts to improve the potency of PL for use in a wide range of cancer therapies," said Dr Kenneth

Westover, Assistant Professor of Biochemistry and Radiation Oncology.

"This research is a spectacular demonstration of the power of x-ray crystallography."

The long pepper, a plant native to India, is found in southern India and southeast Asia. Although rare in European fare, it is commonly found in Indian stores and used as a spice or seasoning in stews and other dishes.

It dates back thousands of years in the Indian subcontinent tied to Ayurveda, one of the world's oldest medical systems.

"This study illustrates the importance of examining and

re-examining our theories. In this case we learned something fundamentally new about a 3,000-year-old medical claim using modern science," said Westover.

X-ray crystallography allows scientists to determine molecular structures that reveal how molecules interact with targets – in this case how PL interacts with GSTP1.

This work is supported by the V Foundation for Cancer Research, founded by ESPN and legendary basketball coach Jim Valvano, The Welch Foundation, and the Cancer Prevention and Research Institute of Texas.

US ARMY PLANS TO USE BIODEGRADABLE BULLETS THAT SPROUT PLANTS

The US Army is planning to use biodegradable bullets loaded with special seeds that sprout into plants which can eliminate ammunition debris and contaminants, reducing soil pollution in training grounds.

Spent shells litter US Army training facilities around the world as there is no efficient way to clean them up.

The shells, which contain metal and other chemicals, can rust and pollute soils and groundwater.

The US Department of Defense (DoD) are soliciting proposals for biodegradable bullets loaded with seeds to grow environmentally beneficial plants that eliminate ammunition debris and contaminants.

According to the request for proposal, the US Army Corps of Engineers' Cold Regions Research and Engineering Laboratory has already developed and tested seeds that can be embedded into a biodegradable composite.

They have been bioengineered to only germinate after they have been in the ground for several months, 'Seeker' reported.

Proposals are being solicited until February 8, after which the chosen contractors will produce the biodegradable bullets as part of a three-phase process.

In phase one, the contractor will focus on making 40 mm to 120 mm training rounds.

Phase II includes developing a prototype and the means to manufacture it and phase III has the biodegradable round transitioning to use at the Army training facilities.

The plants that grow from the seeds could also help remove soil contaminants or feed local wildlife.

According to the proposal, "animals should be able to consume the plants without any ill effects."

MILKY WAY'S BLACK HOLE SPEWS OUT COSMIC 'SPITBALLS'

A supermassive black hole in the centre of the Milky Way galaxy flings out planet-sized 'spitballs' formed from fragments of stars shredded by it, scientists have found.

Every few thousand years, an unlucky star wanders too close to the black hole whose powerful gravity rips the star apart, sending a long streamer of gas whipping outwards.

New research shows that not only can the gas gather itself into planet-size objects, but those objects then are flung throughout the galaxy in a game of cosmic "spitball."

"A single shredded star can form hundreds of these planet-mass objects. We wondered: Where do they end up? How close do they come to us? We developed a computer code to answer those questions," said Eden Girma, undergraduate student at Harvard University in the US.

Calculations show that the closest of these planet-mass objects might be within a few hundred light-years of Earth.

It would have a weight somewhere between Neptune and several Jupiters. It would also glow from the heat of its formation, although not brightly enough to have been detected by previous surveys.

Future instruments like the Large Synoptic Survey Telescope and James Webb Space Telescope might spot these far-flung oddities, researchers said.

She also finds that the vast majority of the planet-mass objects - 95 per cent - will leave the galaxy entirely due to their speeds of about 10,000 kilometres per second.

Since most other galaxies also have giant black holes at their cores, it is likely that the same process is at work in them.

"Other galaxies like Andromeda are shooting these 'spitballs' at us all the time," said James Guillochon of the Harvard-Smithsonian Centre for Astrophysics (CfA).

Although they might be planet-size, these objects would be very different from a typical planet.

They are literally made of star-stuff, and since different ones would develop from different pieces of the former star, their compositions could vary.

They also form much more rapidly than a normal planet. It takes only a day for the black hole to shred the star (in a process known as tidal disruption), and only about a year for the resulting fragments to pull themselves back together.

This is in contrast to the millions of years required to create a planet like Jupiter from scratch.

Once launched, it would take about a million years for one of these objects to reach Earth's neighbourhood.

The challenge will be to tell it apart from free-floating planets that are created during the more mundane process of star and planet formation.

"Only about one out of a thousand free-floating planets will be one of these second-generation oddballs," said Girma.

OLDEST EVIDENCE OF SILK FOUND IN 8,500-YEAR-OLD CHINESE TOMBS

Researchers have found the oldest evidence of silk in 8,500-year-old tombs in China, which shows that people may have used the luxurious material thousands of years earlier than thought.

Previously at this site, scientists had unearthed bone flutes that are the earliest known playable musical instruments on Earth, as well as what may be the earliest Chinese writing.

Scientists studied ruins dating back 9,000 years at Jiahu in the middle of Henan Province in China.

Old tales suggested that silkworm breeding and silk weaving began around this area, said Decai Gong, archaeologist at the University of Science and Technology of China.

Prior work at Jiahu showed that the area's warm and humid climate favoured the growth of mulberry trees, whose leaves are the sole food of silkworms.

The scientists collected soil samples from three tombs at Jiahu. Chemical analyses unveiled evidence of silk proteins in two of the three tombs, one of which dated back 8,500 years.

This is "the earliest evidence of silk in ancient China,"Gong told 'Live Science'.

Previously, the oldest evidence of silk dated back 5,000 years from China, researchers said.

Researchers found bone needles and weaving tools which suggests that these people has basic weaving and sewing skills, and perhaps buried their dead in silk garments.

MOON SAVING PLUTO'S ATMOSPHERE FROM DECAY

Pluto's moon Charon may be significantly reducing the loss of atmosphere of the icy dwarf planet by creating a shield and redirecting much of the solar wind around and away, according to a new study.

Pluto's relationship with its moon Charon is one of the more unusual interactions in the solar system due to Charon's size and proximity. It is more than half of Pluto's diameter and orbits only 19,312 kilometres away.

To put that into perspective, picture our moon three times closer to Earth, and as large as Mars, researchers said.

The study by researchers from the Georgia Institute of Technology in the US provides additional insight into this relationship and how it affects the continuous stripping of Pluto's atmosphere by solar wind.

When Charon is positioned between the Sun and Pluto, the research indicates that the moon can significantly reduce atmospheric loss.

"Charon does not always have its own atmosphere. But when it does, it creates a shield for Pluto

and redirects much of the solar wind around and away," said Carol Paty, a Georgia Tech associate professor.

This barrier creates a more acute angle of Pluto's bow shock, slowing down the deterioration of the atmosphere.

When Charon does not have an atmosphere, or when it is behind or next to Pluto, then Charon has only a minor effect on the interaction of the solar wind with Pluto.

The study's predictions, performed before the New Horizons probe collected and returned data to Earth, is consistent with the measurements made by the spacecraft about Pluto's atmospheric loss rate.

Previous estimates at the time of the study were at least 100 times higher than the actual rate.

According to John Hale, the Georgia Tech student who co-led the study with Paty, the Pluto system is a window into our origins because Pluto has not been subjected to the same extreme temperatures as objects in closer orbits to the Sun.

"As a result, Pluto still has more of its volatile elements, which have long since been blown off the inner planets by solar wind," Hale said.

"Even at its great distance from the Sun, Pluto is slowly losing its atmosphere. Knowing the rate at which Pluto's atmosphere is being lost can tell us how much atmosphere it had to begin with, and therefore what it looked like originally. From there, we can get an idea of what the solar system was made of during its formation," he said.

The study affirms a popular hypothesis of Charon. The areas of discolouration near its lunar poles are likely caused by magnetised particles that have been shorn from Pluto's atmosphere, researchers said.

These particles have accumulated and settled on Charon over billions of years, particularly when it is downstream of Pluto.

The research was published in the journal Icarus.

20-CENT, HAND-POWERED BLOOD CENTRIFUGE DEVELOPED

Stanford engineers, including those of Indian origin, have built an ultra-low-cost, human-powered centrifuge that separates blood into its individual components in only 1.5 minutes, and may enable precise diagnosis and treatment of diseases such as malaria, HIV and tuberculosis.

Created from 20 cents of paper, twine and plastic, a "paperfuge" can spin at speeds of 125,000 revolutions per minute (rpm) and exert centrifugal forces of 30,000 Gs.

"To the best of my knowledge, it is the fastest spinning object driven by human power," said Manu Prakash, an assistant professor of bioengineering at Stanford University in the US.

A centrifuge is critical for detecting diseases such as malaria, African sleeping sickness, HIV and tuberculosis. This low-cost version will enable precise diagnosis and treatment in the poor, off-the-grid regions where these diseases are most prevalent, researchers said.

When used for disease testing, a centrifuge separates blood components and makes pathogens easier to detect. A typical centrifuge spins fluid samples inside an electric-powered, rotating drum.

As the drum spins, centrifugal forces separate fluids by density into layers within a sample tube. In the case of blood, heavy red cells collect at the bottom of the tube, watery plasma floats to the top and parasites, like those that cause malaria, settle in the middle.

Inspired by spinning toys, Prakash and Saad Bhamla, a postdoctoral research fellow in his lab, explored ways to convert human energy into spinning forces. They focused on toys invented before the industrial age - yo-yos, tops and whirligigs.

"One night I was playing with a button and string, and out of curiosity, I set up a high-speed camera to see how fast a button whirligig would spin. I could not believe my eyes," said Bhamla, when he discovered that the whirring button was rotating at 10,000 to 15,000 rpms.

After two weeks of prototyping, he mounted a capillary of blood on a paper-disc whirligig and was able to centrifuge blood into layers.

The team created a computer simulation to capture design variables like disc size, string elasticity and pulling force.

They also borrowed equations from the physics of supercoiling DNA strands to understand how hand-forces move from the coiling strings to power the spinning disc.

Once the engineers validated their models against real-world prototype performance, they were able to create

a prototype with rotational speeds of up to 125,000 rpm, a magnitude significantly higher than their first prototypes.

"From a technical spec point of view, we can match centrifuges that cost from USD 1,000 to 5,000," said Prakash.

From lab-based trials, researchers found that malaria parasites could be separated from red blood cells in 15 minutes.

By spinning the sample in a capillary precoated with acridine orange dye, glowing malaria parasites could be identified by simply placing the capillary under a microscope.

The research was published in the journal Nature Biomedical Engineering.

RISE IN TEMP AFFECTS INSECTS' ABILITY TO REPRODUCE: STUDY

With 2016 set to be the warmest year on record, scientists have discovered insects are already feeling the effects of climate change as a rise in temperature is shown to damage their ability to reproduce.

The study, conducted by researchers from the University of Sheffield in the UK, found that being exposed to mild heat as a juvenile negatively affects their chances of producing offspring as an adult.

The research also revealed the extent of the negative effects varied depending on where the insect population is based.

Insects which evolve in countries at low latitudes -- such as Spain -- cope better with above average temperature compared to those living at high latitudes, such as Sweden.

This means insects in high latitude countries are more vulnerable to climate change, which could lead to a decline in population.

Dr Rhonda Snook, lead investigator of the study from the University of Sheffield's Department of Animal and Plant Sciences, said, "We already knew that insects are feeling the effect of climate change but we now know they are felt at much lower temperatures."

"Our study is unique as we only exposed the insects to mild heat but tested the long-term impact this had on them as both juveniles and when they reached adulthood. The results show that even small increases in temperature may still cause populations to decline because -- while these insects don't die because of the mild heat -- they produce fewer offspring," Snook said.

"Juvenile insects are extremely susceptible to environmental changes as they don't move around much because they are either larvae -- like butterfly caterpillars -- or they don't yet have wings to fly away," she said.

The study, published in the Journal of Evolutionary Biology, was carried out on fruit flies and researchers strongly suspect the findings will be the same for other insects.

Snook, who is a Royal Society Leverhulme Trust Senior Research Fellow, said, "We are now interested in finding out what genes differ between Spanish and Swedish populations that allow the Spanish flies to cope better."

"Identifying genes that are linked to increased and decreased reproduction is something which may be very useful not only in understanding how insects will cope with climate change but from the perspective of controlling insect pests," she said.

MINIATURE BRAIN, SKULL FOUND IN YOUNG GIRL'S OVARY

A miniature brain, along with partially developed skull bone and matted, greasy hair were found teenager's ovaries, when she was undergoing a routine appendix surgery in Japan.

Teratomas, also known as dermoid cysts, are not uncommon.

However, ones that have brain-like structures are extremely rare, according to surgeons Shiga Medical Centre for Adults in Japan.

The surgeons also found and removed a tumour they noticed growing on the ovaries of the 16-year-old patient during a routine appendectomy.

Subsequent analysis of the tumour showed that the tumour contained a teratoma with a brain-like structure along with a partially developed skull bone and hair fragments.

The teratoma, which is Greek for the word monster, held a brain-like structure that was so advanced it had partially developed into a cerebellum with a brain stem and was able to transmit electrical pulses delivered by the research team.

The tumour was about 10 centimetres wide and held a mat of greasy hair and a brain-like structure that was covered by skull-like bone material.

Teratomas are actually a type of tumour that develop most often in organs such as the thyroid, liver, lung, brain and ovaries - their defining characteristic is the development of bodily material that is out of character for the location in which it is found.

Like cancerous tumours, they result from a malfunction during cell division, often in ways that resemble abnormal stem-cell growth.

Such tumours can cause symptoms due to the immune system being activated, but the patient in this case had no symptoms before her surgery and recovered quickly after removal of both appendix and tumour, the researchers said.

The details of the case was published in the journal Neuropathology.

WARMING OF INDIAN OCEAN BEHIND GROUNDWATER DECLINE IN INDIA

Changes in precipitation, which are linked to the warming of the Indian Ocean, is the main reason for recent decline in groundwater storage in India, a new study led by researchers of IIT Gandhinagar has warned.

Agriculture in India relies heavily on groundwater for irrigation, particularly in the dry northern regions where precipitation is scarce.

Groundwater withdrawals in the country have increased over tenfold since the 1950's, from 10-20 cubic kilometres per year in 1950, to 240-260 cubic kilometres per year in 2009.

Satellite measurements have shown major declines in groundwater storage in some parts of the country, particularly in northern India.

"Groundwater plays a vital role in food and water security in India. Sustainable use of groundwater resources for irrigation is the key for future food grain production," said study leader Vimal Mishra from Indian Institute of Technology (IIT) Gandhinagar.

"With a fast-growing population, managing groundwater sustainably is going become even more important," said Mishra.

"The linkage between monsoon rainfall and groundwater can suggest ways to enhance groundwater recharge in India and especially in the regions where rainfall has been declining, such as the Indo-Gangetic Plain," Mishra added.

Groundwater acts like a bank for water storage, receiving deposits from surface water and precipitation and withdrawals as people pump out water for drinking, industry and irrigating fields.

If withdrawals add up to more than the deposits, eventually the accounts could run dry, which could have disastrous consequences.

"This study adds another dimension to the existing water management framework. We need to consider not just the withdrawals, but also the deposits in the system," said Yoshihide Wada, deputy director of the Water program at the International Institute for Applied Systems Analysis (IIASA) in Austria.

The issue of groundwater depletion has been a topic of much discussion in India, but most planning has focused on pumping or the demand side, rather than the deposit side.

By looking at water levels in wells around the country, the researchers could track groundwater replenishment following the monsoons.

They found that in fact, variability in the monsoons is the key factor driving the changing groundwater storage levels across the country, even as withdrawals increase.

In addition, the researchers found that the monsoon precipitation is correlated with Indian Ocean temperature, a finding which could potentially help to improve precipitation forecasts and aid in water resource planning.

"Weather is uncertain by nature and the impacts of climate change are extremely difficult to predict at a regional level," said Wada.

The study was published in the journal Nature Geoscience.

MOON MAY HAVE FORMED FROM COLLISION OF TINY 'MOONLETS'

Small 'moonlets' may have collided to form the Moon as we see it today, according to a new study which contradicts the prevalent theory that our natural satellite resulted from a giant impact between a small Mars-like planet and the ancient Earth.

The study also claims that the Moon we see now is not Earth's first moon, but rather the last in a series of moons that orbited our planet.

The newly proposed theory by researchers at the Technion – Israel Institute of Technology and Weizmann Institute of Science in Israel counter to the commonly held "giant impact" paradigm that the moon is a single object that was formed following a single giant collision between a small Mars-like planet and the Earth.

"Our model suggests that the ancient Earth once hosted a series of moons, each one formed from a different collision with the proto-Earth," said Hagai Perets from the Technion.

"It is likely that such moonlets were later ejected, or collided with Earth or with each other to form bigger moons," said Perets.

To check the conditions for the formation of such mini-moons or moonlets the researchers ran 800 simulations of impacts with Earth.

The new model is consistent with science's current understanding of the formation of Earth.

In its last stages of the growth, Earth experienced many giant impacts with other bodies.

Each of these impacts contributed more material to the proto-Earth, until it reached its current size.

"We believe Earth had many previous moons, a previously formed moon could therefore already exist when another moon-forming giant impact occurs," said Perets.

The tidal forces from Earth could cause moons to slowly migrate outwards - the current Moon is slowly doing that at a pace of about one centimetre a year.

A pre-existing moon would slowly move out by the time another moon forms.

However, their mutual gravitational attraction would eventually cause the moons to affect each other and change their orbits.

"It is likely that small moons formed through the process could cross orbits, collide and merge," said lead author Raluca Rufo from Weizmann.

"A long series of such moon-moon collisions could gradually build-up a bigger moon - the Moon we see today," said Rufo.

The study was published in the journal Nature Geoscience.

'SHADOW PLAY' SPOTTED BY NASA'S HUBBLE POINTS TO NEW PLANET

A shadow spotted by NASA's Hubble telescope sweeping across the face of a vast pancake-shaped gas-and-dust disk surrounding a young star may point to a new planet located 192 light-years away, scientists say.

Although the planet itself is not casting the shadow, it is doing some heavy lifting by gravitationally pulling on material near the star and warping the inner part of the disk, researchers said.

The twisted, misaligned inner disk is casting its shadow across the surface of the outer disk.

Astronomers led by John Debes of the Space Telescope Science Institute in in the US said this scenario is the most plausible explanation for the shadow they spotted in the stellar system TW Hydrae, located 192 light-years away in the constellation Hydra, also known as the Female Water Snake.

The star is roughly 8 million years old and slightly less massive than our Sun. The researchers uncovered the phenomenon while analysing 18 years' worth of archival observations taken by NASA's Hubble Space Telescope.

"This is the very first disk where we have so many images over such a long period of time, therefore allowing us to see this interesting effect," Debes said.

"That gives us hope that this shadow phenomenon may be fairly common in young stellar systems," he said.

Debes' first clue to the phenomenon was a brightness in the disk that changed with position. Astronomers using Hubble's Space Telescope Imaging Spectrograph (STIS) first noted this brightness asymmetry in 2005.

However, they had only one set of observations and could not make a definitive determination about the nature of the mystery feature.

Searching the archive, researchers put together six images from several different epochs.

The observations were made by STIS and by Hubble's Near Infrared Camera and Multi-Object Spectrometer (NICMOS).

STIS is equipped with a coronagraph that blocks starlight to within about 1 billion miles from the star, allowing Hubble to look as close to the star as Saturn is to our sun.

Over time, the structure appeared to move in counterclockwise fashion around the disk, until in 2016, it was in the same position as it was in images taken in 2000.

This 16-year period puzzled the researchers. They originally thought the feature was part of the disk, but the short period meant that the feature was moving way too fast to be physically in the disk.

Under the laws of gravity, disks rotate at glacial speeds. The outermost parts of the TW Hydrae disk would take centuries to complete one rotation.

"The fact that I saw the same motion over 10 billion miles from the star was pretty significant, and told me that I was seeing something that was imprinted on the outer disk rather than something that was happening directly in the disk itself," Debes said.

"The best explanation is that the feature is a shadow moving across the surface of the disk," he said.

NEW STAR PREDICTED TO ADORN NIGHT SKY BY 2022

A pair of binary stars is set to merge and explode in 2022, increasing in brightness by ten thousand times to become one of the brighter objects in the night sky for a time, scientists have predicted.

Researchers including those from Apache Point Observatory and the University of Wyoming in the US said that the change to the night sky will be visible to the naked eye.

"It's a one-in-a-million chance that you can predict an explosion. It's never been done before," said Larry Molnar, professor at Calvin College in the US.

Molnar's prediction is that a binary star (two stars orbiting each other) he is monitoring will merge and explode in 2022, give or take a year. The star will increase its brightness ten thousand fold, becoming one of the brighter stars in the heavens for a time.

The star will be visible as part of the constellation Cygnus, and will add a star to the recognisable Northern Cross star pattern.

Molnar's exploration into the star known as KIC 9832227 began back in 2013.

Researchers looked at how the colour of the star correlated with brightness and it was a contact binary system, in which the two stars share a common atmosphere, like two peanuts sharing a single shell.

They then determined a precise orbital period from Kinemuchi's Kepler satellite data (just under 11 hours) and found that the period was slightly less than that shown by earlier data.

Upon observing the period change to continue through 2013 and 2014, Molnar determined the orbital timing spanning 15 years, making the prediction that KIC 9832227 is likely to merge and explode.

Researchers have have also performed two strong observational tests of the alternative interpretations.

First, spectroscopic observations ruled out the presence of a companion star with an orbital period greater than 15 years.

Second, the rate of orbital period decrease of the past two years followed the prediction made in 2015 and now exceeds that shown by other contact binaries.

"Bottom line is we really think our merging star hypothesis should be taken seriously right now and we should be using the next few years to study this intensely so that if it does blow up we will know what led to that explosion," said Molnar.

Researchers will be observing KIC 9832227 in the next year over the full range of wavelengths: using the Very Large Array, the Infrared Telescope Facility, and the XMM-Newton spacecraft to study the star's radio, infrared and X-ray emission, respectively.

NASA'S MARS ORBITER CAPTURES STUNNING VIEW OF EARTH, MOON

The most powerful telescope aboard NASA's Mars orbiter has captured a stunning view of Earth and the Moon, showing continent-size detail on the planet and the relative size of its natural satellite.

The image combines two separate exposures taken on November 20 last year by the High Resolution

Imaging Science Experiment (HiRISE) camera on NASA's Mars Reconnaissance Orbiter.

The images were taken to calibrate HiRISE data, since the reflectance of the moon's Earth-facing side is well known.

For presentation, the exposures were processed separately to optimise detail visible on both Earth and the moon. The moon is much darker than Earth and would barely be visible if shown at the same brightness scale as Earth.

The combined view retains the correct positions and sizes of the two bodies relative to each other. The distance between Earth and the moon is about 30 times the diameter of Earth.

Earth and the moon appear closer than they actually are in the image as the observation was planned for a time at which the moon was almost directly behind Earth, from Mars' point of view, to see the Earth-facing side of the moon.

In the image, a reddish feature seen near the middle of the face of Earth is Australia.

When the component images were taken, Mars was about 205 million kilometers from Earth.

With HiRISE and five other instruments, the Mars Reconnaissance Orbiter has been investigating Mars since 2006.

STARDUST MAKES UP 97 PER CENT OF OUR BODIES!

Ninety-seven per cent of the humanbody consists of stardust, claim scientists who have measured the distribution of essential elements of life in over 150,000 stars in the Milky Way galaxy.

The six most common elements of life on Earth - including more than 97 per cent of the mass of a human body - are carbon, hydrogen, nitrogen, oxygen, sulphur and phosphorus.

It is an undeniable fact that most of the essential elements of life are made in stars, researchers said.

"For the first time, we can now study the distribution of elements across our Galaxy," said Sten Hasselquist of New Mexico State University in the US.

"The elements we measure include the atoms that make up 97 per cent of the mass of the human body," Hasselquist said.

The new results come from a catalogue of more than 150,000 stars; for each star, it includes the amount of each of almost two dozen chemical elements.

The new catalogue includes all of the "CHNOPS elements" - carbon, hydrogen, nitrogen, oxygen, phosphorous, and sulphur - known to be the building blocks of all life on Earth.

This is the first time that measurements of all of the CHNOPS elements have been made for such a large number of stars. Researchers used spectroscopy to make measurements.

Astronomers in the Sloan Digital Sky Survey have made these observations using the APOGEE (Apache Point Observatory Galactic Evolution Experiment) spectrograph on the 2.5 metre Sloan Foundation Telescope at Apache Point Observatory in New Mexico.

This instrument collects light in the near-infrared part of the electromagnetic spectrum and disperses it, like a prism, to reveal signatures of different elements in the atmospheres of stars.

A fraction of the almost 200,000 stars surveyed by APOGEE overlap with the sample of stars targeted by the NASA Kepler mission, which was designed to find potentially Earth-like planets.

"By working in the infrared part of the spectrum, APOGEE can see stars across much more of the Milky Way than if it were trying to observe in visible light," said Jon Holtzman of New Mexico State University.

"Infrared light passes through the interstellar dust, and APOGEE helps us observe a broad range of wavelengths in detail, so we can measure the patterns created by dozens of different elements," said Holtzman.

Many of the atoms which make up your body were created sometime in the distant past inside of stars, and those atoms have made long journeys from those ancient stars to us.

While humans are 65 per cent oxygen by mass, oxygen makes up less than one per of the mass of all of elements in space.

Stars are mostly hydrogen, but small amounts of heavier elements such as oxygen can be detected in the spectra of stars.

With these new results, APOGEE has found more of these heavier elements in the inner galaxy.

Stars in the inner galaxy are also older, so this means more of the elements of life were synthesised earlier in the inner parts of the Galaxy than in the outer parts.

NEW FAULT IN INDIAN OCEAN MAY TRIGGER QUAKES IN FUTURE: STUDY

A new plate boundary may be forming on the floor of the Indian Ocean as a result of the largest earthquake that shook the Andaman-Sumatran region in 2012, according to scientists who warn that the new fault system could trigger more quakes in the future.

Researchers, including those from Nanyang Technological University in Singapore and Indonesian Institute of Sciences, has found evidence of a possible new plate boundary forming on the floor of the Indian Ocean in the Wharton Basin.

A slip-strike quake occurs when two plates slide horizontally against one another. Such quakes can be caused by deformations that occur in plates distant from fault lines as pressure builds up across a plate.

They can lead to interplate earthquakes and cause a plate to break, resulting in a new boundary, which in turn can lead to even more quakes.

It is this scenario that the researchers believe happened in 2012 when two earthquakes struck the Andaman-Sumatran region (northwest part) of the Indian Ocean - the largest interplate earthquakes ever recorded.

Researchers studied seismic data that was recorded before, during and after the 2012 quakes and conducted sea floor depth analysis by venturing into the ocean aboard a research vessel.

They created a high-resolution imagery of the sea floor, which unveiled deformations that had occurred, 'Phys.org' reported.

The analysis showed a new fault system had developed in the area off the coast of Sumatra that was involved in the 2012 quakes.

The data also showed that the plate had broken along a 1,000 km fracture zone, resulting in a new plate boundary - one that is likely to be the site of future fault-slip quakes.

The study was published in the journal Science Advances.

NEW SILVER CATALYST TO FIGHT SMOG IN CITIES

Scientists are creating a new silver catalyst to purify the air that can decompose toxic carbon monoxide and other harmful substances into harmless components, an advance that could help fight smog in cities like New Delhi and Beijing.

This nanostructure catalyst may be effective even at room temperature and could be used as a filter for ventilation.

"Silver catalysts are less studied than other catalysts made with particles of precious metals—gold, platinum, and palladium," said Gregory Mamontov, senior researcher at the Laboratory of Catalytic Research at Tomsk State University in Russia.

"However, they can be just as effective in the oxidation of harmful volatile substances and cheaper by a factor of 10," said Mamontov.

The researchers have synthesised a particular type of silica gel—SBA-15, which consists of 6-10 nanometres diameter nanotubes of silicon oxide, and used it as a basis for preparing the catalyst.

"Each nanotube is used as a nanoscale reactor. Inside, we conduct the synthesis of silver particles and cerium oxide smaller than three nanometres," said Mamontov.

"After that, each nanotube with particles becomes the catalyst. Our task is to distribute the particles inside the nanotubes and to organise special interactions between them that will provide a high catalytic activity in the oxidation of harmful substances," he said.

"It is assumed that the catalyst obtained in the form of powder or granules can be put into air-cleaning devices in homes, offices or production halls," Mamontov said.

"In this case, it is not necessary to heat it, because this catalyst, in contrast to many analogues, is active and stable at room temperature," he said.

This catalyst will primarily be effective against carbon monoxide and formaldehyde, but can also degrade other harmful, volatile substances into harmless components, researchers said.

"First of all, such a catalyst will be in demand in industrial areas and cities to fight industrial emissions and

smog from forest fires, which also contains a large amount of carbon monoxide," said Mamontov.

"In addition, the catalyst can be adapted to neutralise the gas discharges of chemical plants and the exhaust systems of automobiles," he said.

'MONSTER' BLACKHOLES HIDING IN COSMIC BACKYARD SPOTTED

Scientists, using data from NASA telescopes, have spotted two supermassive black holes, located at the centres of galaxies close to our Milky Way, that were hidden behind shrouds of gas and dust until now.

Monster black holes sometimes lurk behind gas and dust, hiding from the gaze of most telescopes. However, they give themselves away when material they feed on emits high-energy X-rays that NASA's Nuclear Spectroscopic Telescope Array (NuSTAR) mission can detect.

Both of the black holes are the central engines of what astronomers call "active galactic nuclei," a class of extremely bright objects that includes quasars and blazars.

"These black holes are relatively close to the Milky Way, but they have remained hidden from us until now," said Ady Annuar, graduate student at Durham University in the UK.

Depending on how these galactic nuclei are oriented and what sort of material surrounds them, they appear very different when examined with telescopes.

Active galactic nuclei are so bright because particles in the regions around the black hole get very hot and emit radiation across the full electromagnetic spectrum - from low-energy radio waves to high-energy X-rays.

However, most active nuclei are believed to be surrounded by a doughnut-shaped region of thick gas and dust that obscures the central regions from certain lines of sight.

The active galactic nuclei that NuSTAR recently studied appear to be oriented such that astronomers view them edge-on.

That means that instead of seeing the bright central regions, our telescopes primarily see the reflected X-rays from the doughnut-shaped obscuring material.

"Just as we can't see the Sun on a cloudy day, we can't directly see how bright these active galactic nuclei really are because of all of the gas and dust surrounding the central engine," said Peter Boorman, graduate student at University of Southampton in the UK, who led the study of an active galaxy called IC 3639, which is 170 million light years away.

Researchers analysed NuSTAR data from this object and compared them with previous observations from NASA's Chandra X-Ray Observatory and the Japan-led Suzaku satellite.

The findings from NuSTAR confirm the nature of IC 3639 as an active galactic nucleus.

Annuar studied the spiral galaxy NGC 1448. The black hole in its centre was discovered in 2009, even though it is only 38 million light years away.

Researchers discovered that this galaxy also has a thick column of gas hiding the central black hole, which could be part of a doughnut-shaped region.

X-ray emission from NGC 1448 suggests for the first time that there must be a thick layer of gas and dust hiding the active black hole in this galaxy from our line of sight.

Researchers also found that NGC 1448 has a large population of young (just 5 million year old) stars, suggesting that the galaxy produces new stars at the same time that its black hole feeds on gas and dust.

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