Rs. 275/-
ISSN 0970-6488

Science Service

www.ptinews.com
Vol 37 No. 16 (20 pages including cover)

CONTENTS

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 uptodate 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

ISRO plans to launch TV channel to promote scientific temper

The Indian Space Research Organisation (ISRO) is planning to launch a TV channel to promote scientific temper among people and conduct training camps for school students.

"ISRO will organise capacity building programmes for students from class 8 to 10 to inculcate scientific temper among them," ISRO chief K Sivan told reporters here today.

The space agency will select students and organise training camps for 25 to 30 days, he said, adding during this period the students will be allowed to visit laboratory and make their small satellite.

On plans to launch ISRO TV to expand its outreach across the country, the space agency chief said, "We don't have any science TV channel. This channel will inculcate scientific temper among people."

Besides, ISRO was planning to set up an incubation centre for startups with ideas in the field of space technology.

"We want to have an incubation centre. Our aim is that the best brain and the research and development should be utilised.

Govt, industry must work togesther to promote R&D: Watal

Government and industry must synergise their efforts to promote R&D and innovation in the country, Principal Adviser to Niti Aayog Ratan P Watal said.

The culture of spending on research and development is growing in India and we are seeing the results in the form of improvements in rankings such as the Global Innovation Rank (GII), Watal said at a CII event on release of the GII report.

India has improved its ranks on the Global Innovation Index by three places to 57th in 2018 from 60th position last year, according to the 'Global Innovation Index 2018, Energizing the World with Innovation' report.

India ranked well in several important innovation inputs, including graduates in science and engineering, expenditures of major R&D-intensive global companies, and capital formation, the report said.

Switzerland, the Netherlands, Sweden, the UK, Singapore, the US, Finland and Denmark lead the 2018 rankings in GII.

Among the indicators of innovation outputs, India ranked first in the world in ICT services exports, whereas labour productivity growth, where it is fourth globally.

Task force set up to develop early warning system for air pollution in Del-NCR: Sharma

A task force has been set up to devise a strategy to develop an early warning system for air pollution in Delhi-NCR region, the government said today.

Minister of State for Environment Mahesh Sharma said the task force, which met in July, has representatives from expert institutions.

"A task force under the chairmanship of Secretary, Ministry of Earth Science with representatives of expert institutions has been set up to build a strategy for developing an early warning system on air quality as well as the dissemination of warning to public," Sharma said in a written reply to the Rajya Sabha.

The minister said a meeting of the task force was convened on July 28 this year and accordingly, "MoES is coordinating the development of an early warning system for air quality over Delhi and NCR region."

He said the development of an early warning system for air pollution is aimed at further strengthening the air quality forecast.

"Establishing early warning system and dissemination protocol to inform public and

enforcing agencies about episodic high pollution events in advance is amongst the priorities identified for improving management of air pollution," he added.

Next-gen fabric selected for 'Nexus' incubation

A next-generation fabric that clean itself from stains was among the three innovative ideas that were selected today for long-term incubation under the 'Nexus' programme hosted at the American Center here.

The fourth cohort of entrepreneurs (11 teams) chosen from 130-odd applications also graduated today after undergoing an intense 10-week training programme that featured workshops conducted by expert and industry leaders from the two countries.

'Nexus' is an entrepreneurial platform to encourage Indian start-ups and help them grow in the industry. It is funded primarily by the US State Department and executed by University of Texas at Austin's IC2 institute — an interdisciplinary research unit of the university, with support from TiE (The Indus Entrepreneurs), FICCI, Indian School of Business, the department of science and technology, USAID among other partners.

The first batch of Nexus had graduated in July last year, which had 10 start-ups chosen from over 113 applications from all over India.

Among the 11 innovations which were shortlisted for the fourth edition of the programme, three were chosen for long-term incubation, said Nexus director Erik Azulay, who moved to Delhi from Austin to set up and run the centre.

Tata Trusts plans to support 1,000 innovations in tech sector

Tata Trusts, through its Foundation for Innovation and Social Entrepreneurship (FISE), plans to support around 1,000 innovations in the tech sector which can solve social problems, a company official said.

Tata Trusts is working with some leading organisations to find and build a pipeline of such projects which need incubation support.

"Our plan is to support 1,000 innovations. Currently, we already have 30-odd innovations incubated and our plan is to increase the number 8 to 10 fold by 2020," Ganesh Neelam, Associate Director, Tata Trusts, told PTI.

Tata Trusts is trying to create an ecosystem for such projects.

It provides the support they need, which includes risk coverage by the startups, he added.

"The numbers which we are planning are fairly huge because we want to build an overall ecosystem for innovators to actually come and then work on technology which are really capable of solving social problems," he added.

"We are going ahead and talking with lots of partners and trying to see as how we can build all that pipeline," Neelam said.

The Department of Science and Technology, Lockheed Martin and Tata Trusts today announced the winners of India Innovation Growth Programme 2018.

Agri lands surrounding protected areas support guilds of wintering bird community: Study

Trees on agricultural lands surrounding a 4 protected forest support multiple guilds of a wintering bird community, a new study has found.

The study builds on the premise that while efforts to protect biodiversity in tropical forests have largely relied on establishment of protected areas (PAs), there are limits to how much such areas can expand, a Wildlife Conservation Society India statement said.

Thus there is need to also evaluate agricultural land usage for their potential to supplement biodiversity conservation.

The results provide insights into the role of mixed agricultural–forest landscapes in the conservation of different facets of biodiversity.

The paper, titled "In a tree by the brook, there's a songbird who sings: Woodlands in an agricultural matrix maintain functionality of a wintering bird community", explores the potential of an agricultural landscape in Meghalaya to support a wintering bird community.

The study was conducted by Biang La Nam Syiem of WCS India, National Centre for Biological Sciences and Centre for Wildlife Studies, and Divya Vasudev and Varun R Goswami of the WCS India Program, Centre for Wildlife Studies and Conservation Initiatives. It appears in the international journal PLOS ONE.

'Indians may live 4 yrs longer if country achieves WHO air quality standards'

Indians would live for about four years longer on an average if the country meets the WHO's air quality standards, according to a new study.

Noting that ambient air pollution alone may cost India more than USD 500 billion per year, it said it is causing hundreds of millions of people in the country to lead shorter and sicker lives.

A group of researchers has proposed a slew of measures to overcome the issue that includes applying monetary charges for excess emissions.

Indians would be able to live for about four years longer on an average if the country meets the WHO's air quality standards, the study said.

Under the World Health Organisation quality standards, fine particulate matter (PM2.5) should be 10 ìg/m3 annual mean and 25 ìg/m3 24-hour mean while the coarse particulate matter (PM10) 20 ìg/m3 annual mean and 50 ìg/m3 24-hour mean.

To help improve India's air quality, researchers from the University of Chicago and Harvard Kennedy School have laid out five key evidence-based policy recommendations in a new report titled 'A Roadmap Towards Cleaning India's Air', the Energy Policy Institute at the University of Chicago said in a statement.

The study noted more than 660 million Indians live in areas that exceed the country's standard for what is considered safe exposure to fine particulate matter(PM2.5).

Urbanisation, tree felling leading to surge in lightning strikes: IITM scientist

Unplanned urbanisation and felling of trees were behind a recent surge in lightning strikes and the number of deaths in such incidents in the country, a meteorologist of a Pune-based institute said.

These days, lightning is more in the cities than in the rural areas of India, the senior meteorologist of the Indian Institute of Tropical Meteorology (IITM), said.

"Around 3,000 to 3,500 people die every year in the country due to lightning. But the trend is little higher since the last five years. And this year we are expecting more lightning at stations over the foothills of Himalayas (starting from Jammu and Kashmir till the Darjeeling foothills) central and eastern part of the country," scientist of the Atmospheric Electricity Aerosol Physics of the IITM, Dr S D Pawar told PTI.

Though there is no past official record on the number of deaths because of lightning strikes in India, Dr Pawar said a study conducted by them in this connection in the last 20 years shows that it is "definitely" on the rise.

He said this is a natural phenomenon. Though lightning depends mostly on the moisture content of a particular region there is no exact reason behind the recent rise of lightning.

"However, urbanisation is one of the main causes behind the rise which is mostly witnessed in the metro areas," he said, adding global warming is also another reason behind the recent surge in the incidents of lightning.

Country lost one-third of its coastline from erosion, gained almost as much: Report

Natural causes such as cyclones and waves, as well as human activities like construction have led to nearly one-third of a large part of India's coastline to be eroded in the last 26 years, but almost an equal area has been added because of new sediment deposits, according to a government report.

The National Centre for Coastal Research surveyed 6,031 kilometres of India's 7,517-kilometre coastline from 1990 to 2016, and found that 33 per cent of it has witnessed erosion, most of it along the eastern coast facing the Bay of Bengal, with West Bengal recording the highest erosion. At the same time, 29 per cent of the surveyed coastline saw an accretion, or gain in deposits.

"Erosion and accretion are complementary to each other. If the sand and sediments have drifted from one side, it must accumulate somewhere," said M V Ramana Murthy, director of NCCR and one of the authors of the report.

The report says that 2,156.43 kilometres of the country's surveyed coastline faced erosion, while 1,941.24 kilometres saw accretion on shore.

It has long been known that the coastline is eroding, but officials needed to map and document it so that various agencies could take corrective measures, said M Rajeevan, Secretary in the Ministry of Earth Sciences and another co-author of the report.

Supersonic interceptor missile successfully test-fired

India successfully test-fired its indigenously developed supersonic interceptor missile, capable of destroying any incoming hostile ballistic missile, from a test range off Odisha coast.

"DRDO conducted the successful test of the Ballistic Missile Interceptor Advanced Area Defence (AAD) from Abdul Kalam Island, Odisha," a Defence Ministry statement said.

Describing the trial as a success, it said, "The mission objectives were successfully met".

Defence Minister Nirmala Sitharaman congratulated the Defence Research and Development (DRDO) on the successful flight test for further boosting the defence capabilities of the country. ". @DRDO_India successfully tested Ballistic Missile Interceptor Advanced Air Defence (AAD) at 11:30 hrs today from Abdul Kalam Island, Odisha & all mission objectives were accurately met. The missile is capable of destroying incoming hostile targets at altitude of 15 to 25 kms," she tweeted.

The endo-atmospheric missile, capable of intercepting incoming targets at an altitude of 15 to 25 km was launched against multiple simulated targets of 1,500 km class ballistic missile, the release said.

One target among simultaneously incoming multipletargets was selected on real time, the weapon system radars tracked the target and the missile locked on to it and intercepted the target with a high degree of accuracy, it said.

The complete event, including the engagement and interception was tracked by a number of electro-optical tracking systems, radars and telemetry stations, the statement said.

The interceptor is a 7.5-metre long single stage solid rocket propelled guided missile equipped with a navigation system, a hi-tech computer and an electro-mechanical activator, sources said.

High salt intake calls for salt reduction strategy: PHFI

Salt intake among adult Indians has been found to be high and exceeding the levels recommended by the World Health Organisation, according to a recent study conducted by the Public Health Foundation of India (PHFI).

Scientific evidence indicates that high dietary salt intake has detrimental effects on blood pressure and associated cardiovascular disease (CVD), said Dr Sailesh Mohan, additional professor at PHFI, who led the study.

The study, which was conducted in Delhi, Haryana and Andhra Pradesh, covered around 1,395 adults in rural and urban areas.

The study found that salt intake in Delhi and Haryana was 9.5 gms per day and 10.4 gms per day in Andhra Pradesh as against less than 5 gms recommended by WHO.

The researchers examined salt excretion by collecting 24 hours urine samples from the study participants over a period from 2016-17.

The researchers of the study reported that high salt intake requires a India-specific salt reduction strategy by the government to control the rising burden of high blood pressure or hypertension.

Limited information is available on how to implement salt reduction in low and middle-income countries (LMICs) such as India, where the burden of hypertension and CVD is increasing rapidly.

AIIA signs MoU with IIT to boost research in traditional medicine

A premier institute of Ayurveda under the AYUSH Ministry today signed an MoU with the Indian Institute of Technology here to boost research in traditional medicine and streamline hospital care facilities in the country.

The memorandum of understanding was signed at a two-day conference of heads of the AYUSH National Institutes organised by the All India Institute of Ayurveda (AIIA) aimed at upgrading the national institutes of traditional medicine at par with the IITs and IIMs.

Minister of State (Independent Charge) for Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy (AYUSH), Shripad Yesso Naik said that the AYUSH Ministry envisioned developing the AYUSH National Institutes as "light house" institutions.

"In view of the worldwide changing healthcare system, it has become abundantly clear that there is a need for comprehensive review of traditional systems of medicine in terms of policy, legislation, regulation, research, development, financing, training and professional development, quality control and safety regulations of these systems of medicine," Naik said.

The minister said that Ayurveda is more oriented towards the management of lifestyle disorders, which are in prominence due to stress-related phenomena and some other reasons among certain age groups in the society.

NIPER's faculty members included in CDSCO's expert panel to evaluate herbal drugs

Two faculty members of National Institute of Pharmaceutical Education and Research (NIPER) here have been included in an expert panel set up by the Central Drugs Standard Control Organisation (CDSCO) to evaluate new herbal drugs for their regulatory approval.

Arvind K Bansal, the head of NIPER's Pharmaceutics Department and Saranjit Singh, the head of its Pharmaceutical Analysis Department are among the 12 experts who will evaluate the manufacturing, purification, quality control and toxicological data of the new herbal drugs, also called phyto-pharmaceuticals, said NIPER in a statement.

The expert panel is mandated to advise the Drugs Controller General of India (DCGI) on evaluation of "chemistry-manufacturing control data" including identification, authentication and source of plants used for extraction, purification, formulation and manufacturing of herbal drugs for their approval.

The expert committee would also be engaged in the preparation of guidelines for marketing approval

of new phyto-pharmaceuticals of different therapeutic categories, the NIPER's release said.

Other experts include Delhi Pharmaceutical Sciences & Research University's Vice Chancellor Ramesh K Goyal, Indian Institute of Integrative Medicine Director Ram Viswakarma and IIT-BHU's Professor Siva Hemalatha of its Department of Pharmaceutical Engineering.

International Science Briefs

NASA administrator supports Trump 'space force' proposal

NASA Administrator Jim Bridenstine has expressed full support for President Donald Trump's proposed military "Space Force" but added that it will have a role separate from NASA.

Bridenstine said in New Orleans yesterday that NASA's responsibilities involve science, space exploration and technology development.

As for defense and national security, he told reporters in New Orleans: "We want to be an agency that maintains its independence from those capabilities."

Bridenstine was touring the Michoud Assembly Center, where workers are putting together major parts of systems that are planned to return Americans to the moon and, eventually, take them to Mars.
In a towering building, Boeing workers are building parts of the 322-foot (98-meter) rocket known as the Space Launch System.

Lockheed Martin workers are building the spacecraft called Orion.

Bridenstine, a former Republican congressman, was nominated by Trump to head NASA last year and confirmed by the Senate in April.

Corals reefs could survive global warming

There may be hope for marine reefs to survive modern-day global warming, say scientists who have found that coral-algal partnerships have endured numerous climate change events since the age of dinosaurs.

The relationship between corals and the mutualistic micro-algae that enable them to build reefs is considerably older and more diverse than previously assumed, according to a study published in the journal Current Biology.

"Past estimates placed the initiation of these symbiotic relationships at 50 to 65 million years ago," said Todd LaJeunesse, an associate professor at Pennsylvania State University in the US.

"Our research indicates that modern corals and their algal partners have been entwined with each other for much longer - since the time of the dinosaurs, approximately 160 million years ago," said LaJeunesse.

"During their long existence, they have faced severe episodes of environmental change, but have managed to bounce back after each one," he said.

The micro-algae, commonly called zooxanthellae, live inside the cells of corals, allowing them to acquire energy from sunlight and to build the massive, economically valuable reef formations upon which countless marine organisms rely for habitat.

AP Exclusive: Google tracks your movements, like it or not

Google wants to know where you go so badly that it records your movements even when you explicitly tell it not to.

An Associated Press investigation found that many Google services on Android devices and iPhones store your location data even if you've used privacy settings that say they will prevent it from doing so.

Computer-science researchers at Princeton confirmed these findings at the AP's request.

For the most part, Google is upfront about asking permission to use your location information. An app like Google Maps will remind you to allow access to location if you use it for navigating.

If you agree to let it record your location over time, Google Maps will display that history for you in a "timeline" that maps out your daily movements.

Storing your minute-by-minute travels carries privacy risks and has been used by police to determine the location of suspects - such as a warrant that police in Raleigh, North Carolina, served on Google last year to find devices near a murder scene.

So the company will let you "pause" a setting called Location History.

Google says that will prevent the company from remembering where you've been. Google's support page on the subject states: "You can turn off Location History at any time.

Spinning heat shield for spacecraft could aid future Mars mission

Scientists have developed a flexible, spinning heat shield for spacecraft that could reduce the cost of space travel and aid future space missions to Mars.

Heat shields are essentially used as the brakes to stop spacecraft burning up and crashing on entry and re-entry into a planet's atmosphere.

The design is the first in the world to utilise centrifugal forces that stiffen lightweight materials to prevent burnup.

Current spacecraft heat shield methods include huge inflatables and mechanically deployed structures that are often heavy and complicated to use.

Rui Wu, from the University of Manchester in the UK, said as well as being lightweight in design is prototype is also "self-regulating".

This means there is no need for any additional machinery, reducing the weight of spacecraft even further and allowing for low-cost scientific research and recovery of rocket parts.

"Spacecraft for future missions must be larger and heavier than ever before, meaning that heat shields will become increasingly too large to manage," Wu said.

Researchers have developed a flexible heat shield that is shaped like a skirt and spins like a sycamore seed.

Amazon droughts reducing forest's CO2 absorption: NASA

A single season of drought in the Amazon rainforest can reduce its capacity to absorb carbon dioxide for years after the rains return, a NASA study has found.

The study, published in the journal Nature, is the first to quantify the long-term legacy of drought in Amazon, the largest tropical forest on Earth.

Researchers from NASA's Jet Propulsion Laboratory (JPL) in the US, and other institutions used satellite data to map tree damage and mortality caused by a severe drought in 2005.

In years of normal weather, the undisturbed forest can be a natural carbon "sink," absorbing more carbon dioxide from the atmosphere than it puts back into it.

However, starting with the drought year of 2005 and running through 2008 - the last year of available data - the Amazon basin lost an average of 270 million metric tonnes per year of carbon, with no sign of regaining its function as a carbon sink.

At about 2.3 million square miles, the Amazon is the largest tropical forest on Earth.

Scientists estimate that it absorbs as much as one-tenth of human fossil fuel emissions during photosynthesis.

NASA launches world's first mission to 'touch' the Sun

NASA's Parker Solar Probe, mankind's first mission to 'touch' the Sun, was successfully launched today on an unprecedented, seven-year long journey to unlock the mysteries of the star's fiery outer atmosphere and its effects on space weather.

Liftoff of the USD 1.5 billion mission took place from Space Launch Complex 37 at Cape Canaveral Air Force Station in the US at 3:31 am EDT (1:01 pm Indian Standard Time).

The launch of the United Launch Alliance Delta IV Heavy rocket carrying the spacecraft was scrubbed yesterday due to a violation of a launch limit, resulting in a hold.

"The spacecraft is in good health and operating on its own. Parker Solar Probe has begun its mission to 'touch' the Sun," NASA said in a blog post, about two hours after the lift off.

The mission is the first to be named after a living scientist — 91-year-old Eugene N Parker, who first predicted the existence of the solar wind in 1958.

The heliophysics pioneer watched the liftoff from NASA's Kennedy Space Center. A plaque dedicating the mission to Parker was attached to the spacecraft in May. It includes a quote from the physicist, "Let's see what lies ahead."

Fake, low-quality medicines prevalent in developing countries

Sale of substandard and falsified medicines - including those used to treat deadly diseases like malaria - are prevalent in the developing world, say scientists who found that 13 per cent of the sampled medicines in low and middle-income countries were below par.

When looking specifically at African countries, almost 19 per cent of the essential medicines that satisfy the priority health care needs of the population was found to fall in this category, according to a study by researchers from the University of North Carolina (UNC) at Chapel Hill in the US.

Falsified medicines are medical products that deliberately and fraudulently misrepresent their identity, composition or source.

Substandard medicines are real medical products that fail to meet quality standards or specifications for a variety of reasons, including poor manufacturing, shipping or storage conditions, or because the drug is sold beyond its expiration date.

Researchers analysed 96 previous studies of falsified and substandard medicines and each of the studies tested more than 50 medications.

The team found that antimalarials and antibiotics were the medicines most commonly sold in substandard or falsified conditions.

Smartphone use making us more distracted: Study

Our digital lives and excessive smartphone use may be making us more distracted, distant and drained, a study has found.

For instance, even minor phone use during a meal with friends was enough to make the diners feel distracted and reduced their enjoyment of the experience, researchers said.

"People who were allowed to use their phones during dinner had more trouble staying present in the moment," said Ryan Dwyer, of the University of British Columbia in Canada.

"Decades of research on happiness tell us that engaging positively with others is critical for our well-being. Modern technology may be wonderful, but it can easily sidetrack us and take away from the special moments we have with friends and family in person," Dwyer said.

Researchers conducted two studies - a field experiment in a restaurant and a survey. The restaurant experiment included more than 300 adults and university students in Vancouver, British Columbia.

Participants were either asked to keep their phones on the table with the ringer or vibration on or to put their phones on silent and place them in a container on the table during the meal.

NASA poised to blast off first spacecraft to explore Sun

The first ever spacecraft to fly directly toward the Sun is poised to blast off today, on a mission to plunge into our star's sizzling atmosphere and unlock the mysteries of the centre of the solar system.

NASA's car-sized, USD 1.5 billion Parker Solar Probe is scheduled to launch on a Delta IV Heavy rocket from Cape Canaveral, Florida during a 65-minute launch window that opens at 3:33 am (0733 GMT).

By coming closer to the Sun than any spacecraft in history, the unmanned probe's main goal is to unveil the secrets of the corona, the unusual atmosphere around the Sun.

"We are going to be in an area that is so exciting, where solar wind — we believe — will be accelerating," said NASA planetary science division director Jim Green.

"Where we see huge magnetic fields that are passing by us, as coronal mass ejections make their way out into the solar system."

Not only is the corona about 300 times hotter than the Sun's surface, but it also hurls powerful plasma and energetic particles that can unleash geomagnetic space storms, wreaking havoc on Earth by disrupting the power grid.

But these solar outbursts are poorly understood.

China successfully tests first hypersonic aircraft that can carry nuclear warheads

China today announced that it has successfully tested its first hypersonic aircraft which could carry nuclear warheads and penetrate any current generation anti-missile defence systems, seen as a breakthrough in developing cutting-edge weapons.

The Xingkong-2 or Starry Sky-2, was launched in a target range located in Northwest China on Friday last, the state-run China Academy of Aerospace Aerodynamics (CAAA) said in a statement. The United States and Russia have been carrying out similar experiments.

It flew independently, made large-angle turning maneuvers, and landed in the targeted area as planned, the statement said.

The flight vehicle reached 30 kms in altitude at Mach 5.5-6, the statement quoted by the official media today said.

The hypersonic aircraft was designed by the CAAA in collaboration with the China Aerospace Science and Technology Corporation.

Waverider is a flight vehicle that flies in the atmosphere and uses shockwaves generated by its own hypersonic flight with the air to glide at high speed, Song Zhongping, a military expert told state-run Global Times.

NASA's Curiosity rover completes six years on Mars

NASA's Curiosity rover - a mission that has spotted evidence of liquid water as well as potential signs life and habitability on Mars - has completed six years on the red planet.

"I touched down on #Mars six years ago. Celebrating my 6th landing anniversary with the traditional gift of iron… oxide. (It puts the red in Red Planet.)," the rover's social media handle tweeted.

The Mars Science Laboratory mission's Curiosity rover landed on the red planet's Gale Crater on August 6 using a series of complicated landing manoeuvres never before attempted.

Curiosity's mission is to determine whether the red planet ever was, or is, habitable to microbial life.

The rover, which is about the size of a car, is equipped with 17 cameras and a robotic arm containing a suite of specialised laboratory-like tools and instruments.

The specialised landing sequence, which employed a giant parachute, a jet-controlled descent vehicle and a bungee-like apparatus called a "sky crane," was devised because tested landing techniques used during previous rover missions could not safely accommodate the much larger and heavier rover.

The Curiosity rover is currently experiencing a global storm that has been raging in Mars for weeks.

Humans can be emotionally manipulated by robots

Interactive robots can emotionally manipulate people, say scientists who found that we have a strong tendency to ascribe human-like attributes to machines.

Researchers from the University of Duisburg-Essen in Germany asked 89 volunteers to interact with a human-like robot under the guises of helping it become more intelligent.

At the end of the interaction, the volunteers were asked to turn off the robot. However, the robot was programmed to beg volunteers to not do so.

The robot also displayed bodily actions meant to bolster their request, 'Tech Xplore' reported.

Some volunteers served as controls - they were asked to turn off the robot but did not experience begging from the humanoid.

As many as 43 of the volunteers were confronted with the decision between complying with the researchers' request, or the robot's.

Thirteen volunteers chose to heed the robot's wishes, and all the others took longer to turn off the robot than volunteers in the control group.

The findings indicate that humans have such a strong tendency to anthropomorphise robots that we can fall prey to emotional manipulation, researchers said.

Soft, underwater robots can help study sea creatures

Scientists have developed a soft, flexible underwater robot that can gently grab different types of organisms from the sea and study them without inflicting any damage.

The device can even add 3D-printed modifications to itself without the need to return to a land-based laboratory.

The deep ocean is notoriously inhospitable to humans, yet it teems with organisms that manage to thrive in its harsh environment.

Studying those creatures requires specialised equipment mounted on remotely operated vehicles (ROVs) that can withstand those conditions in order to collect samples.

This equipment, designed primarily for the underwater oil and mining industries, is clunky, expensive, and difficult to maneuver with the kind

of control needed for interacting with delicate sea life.

Picking a delicate sea slug off the ocean floor with these tools is akin to trying to pluck a grape using pruning shears.

Scientists from Harvard University in the US have developed an alternative sampling device that is soft, flexible, and customisable, allowing scientists to gently grab different types of organisms from the sea without damaging them.

"When interacting with soft, delicate underwater creatures, it makes the most sense for your sampling equipment to also be soft and gentle," said Rob Wood, from the Harvard John A Paulson School of Engineering and Applied Sciences (SEAS).

Earth mini-moons may provide testing grounds for space missions

Earth's mini-moons - small asteroids temporarily captured in the planet's orbit - could used as test-beds for research and commercial space activities in the future, say scientists.

These small and fast-moving visitors have so-far evaded detection by existing technology, with only one confirmed mini-moon discovery to date.

The Large Synoptic Survey Telescope (LSST), which is currently under construction will verify their existence and track their paths around our planet, presenting exciting scientific and commercial opportunities, according to study published in the journal Frontiers in Astronomy and Space Science.

"Mini-moons can provide interesting science and technology testbeds in near-Earth space. These asteroids are delivered towards Earth from the main asteroid belt between Mars and Jupiter via gravitational interactions with the Sun and planets in our solar system," said lead author Robert Jedicke, based at the University of Hawaii in the US.

"The challenge lies in finding these small objects, despite their close proximity," Jedicke said.

"At present we don't fully understand what asteroids are made of," said Mikael Granvik, affiliated with Lulea University of Technology in Sweden and University of Helsinki in Finland.

Wearable electronic mesh can help monitor heart health

Scientists have developed a soft mesh that can record signals from the heart and muscles, paving the way for a new generation of flexible wearable health monitoring devices.

The implantable device, provides information on muscle and cardiac dysfunctions, and thus could be implemented for pain relief, rehabilitation, and prosthetic motor control.

It is the first soft implant that can record the cardiac activity in multiple points of a swine heart, according to a study published in the journal Nature Nanotechnology.

Researchers from the Institute for Basic Science (IBS) in South Korea used the device on human skin to record the electrical activity of heart and muscles, that is electrocardiogram (ECG) and electromyogram (EMG) respectively.

Its softness, elasticity and stretchability, allows the device to follow the contours of flexible joints, such as the wrist.

Worn on a forearm, it simultaneously monitored EMG signals, and delivered electrical and/or thermal stimulations that could be employed in therapeutic applications.

The research team has also produced a customised large mesh that fits the lower part of a swine heart.

Wrapped around the heart, the implant can read signals from the entire organ to identify possible lesions and help recovery. For example, it was able to register the change of ECG signal caused by an acute heart attack.

The mesh is stable during repetitive heart movemet ad does not interfere with the heart's pumping activity.

E-cigarette vapour disables lung's protective cells

E-cigarette vapour disables key immune cells in the lung that keep the air spaces clear of potentially harmful particles, say scientists who warn that vaping may be more harmful than traditional smoking.

The vapour impairs the activity of alveolar macrophages, which engulf and remove dust particles, bacteria, and allergens that have evaded the other mechanical defences of the respiratory tract.

The findings, published online in the journal Thorax, suggest that while further research is needed to better understand the long term health impact of vaping, e-cigarettes may be more harmful than we think, as some of the effects were similar to those seen in regular smokers and people with chronic lung disease.

Vaping is increasing in popularity, but most of the current body of research has focused on the chemical composition of e-cigarette liquid before it is vaped.

Researchers from University of Birmingham and Swansea University in the UK devised a mechanical procedure to mimic vaping and produce condensate from the vapour.

They extracted alveolar macrophages from lung tissue samples provided by eight non-smokers who had never had asthma or chronic obstructive pulmonary disease (COPD).

'New 3D-printed device may help treat spinal cord injuries'

Scientists have developed a 3D-printed device that could potentially help patients with long-term spinal cord injuries regain some function.

A three-dimensional (3D) printed guide, made of silicone, serves as a platform for specialised cells that are then printed on top of it, said researchers at the University of Minnesota in the US.

The guide would be surgically implanted into the injured area of the spinal cord where it would serve as a type of "bridge" between living nerve cells above and below the area of injury, according to the research published in the journal Advanced Functional Materials.

The hope is that this would help patients alleviate pain as well as regain some functions like control of muscles, bowel and bladder, researchers said.

"This is the first time anyone has been able to directly 3D print neuronal stem cells derived from adult human cells on a 3D-printed guide and have the cells differentiate into active nerve cells in the lab," said Michael McAlpine, an associate professor at the University of Minnesota.

"This is a very exciting first step in developing a treatment to help people with spinal cord injuries," said Ann Parr, an assistant professor at the University of Minnesota Medical School.

"Currently, there are not any good, precise treatments for those with long-term spinal cord injuries," Parr said.

Soon, clothes that can 'talk' to devices

Scientists at MIT have incorporated electronics into soft fabrics, potentially making it possible to produce clothing that communicates optically with other devices.

Researchers at Massachusetts Institute of Technology (MIT) in the US embedded high speed optoelectronic semiconductor devices, including light-emitting diodes (LEDs), within fibres that were then woven into soft, washable fabrics and made into communication systems.

This marks the achievement of a long-sought goal of creating "smart" fabrics by incorporating semiconductor devices - the key ingredient of

modern electronics - which until now was the missing piece for making fabrics with sophisticated functionality, researchers said.

Optical fibres have been traditionally produced by making a cylindrical object called a "preform," which is essentially a scaled-up model of the fibre, then heating it.

Softened material is then drawn or pulled downward under tension and the resulting fibre is collected on a spool, according to the study published in the journal Nature.

The "breakthrough" for producing these new fibres was to add to the preform light-emitting semiconductor diodes the size of a grain of sand, and a pair of copper wires a fraction of a hair's width.

Biodegradable, paper-based batteries developed

Scientists have created a biodegradable, paper-based battery that is more efficient than previously possible, and could help reduce electronic waste generated in the future.

For years, there has been excitement in the scientific community about the possibility of paper-based batteries as an eco-friendly alternative.

However, the proposed designs were never quite powerful enough, they were difficult to produce and it was questionable whether they were really biodegradable.

The biobattery, developed by researchers from Binghamton University in the US, uses a hybrid of paper and engineered polymers.

The polymers - poly (amic) acid and poly (pyromellitic dianhydride-p-phenylenediamine) - were the key to giving the batteries biodegrading properties.

There's been a dramatic increase in electronic waste and this may be an excellent way to start reducing that," said Seokheun Choi, associate professor at Binghamton University.

"Our hybrid paper battery exhibited a much higher power-to-cost ratio than all previously reported paper-based microbial batteries," said Choi, one of the authors of the study published in the journal Advanced Sustainable Systems.

Indian telescope discovers most distant radio galaxy ever

Astronomers have used an Indian telescope to discover the most distant radio galaxy ever known, located at a distance of 12 billion light-years.

The galaxy from a time when the universe was only seven per cent of its current age was found using the Giant Meter-wave Radio Telescope (GMRT) in Pune.

GMRT is an array of thirty fully steerable parabolic radio telescopes of 45 metre diameter. It is operated by the National Centre for Radio Astrophysics.

The distance to this galaxy was then determined using the Gemini North telescope in Hawaii and the Large Binocular Telescope in Arizona.

The galaxy is perceived as it looked when the universe was only a billion years old, according to the study appearing in the journal Monthly Notices of the Royal Astronomical Society.

This also means that the light from this galaxy is almost 12 billion years old.

"It is very surprising how these galaxies have built up their mass in such a short period of time," said Aayush Saxena from Leiden Observatory in the Netherlands.

"Bright radio galaxies harbour supermassive black holes. It is amazing to find such objects as early in the history of the universe; the time for these supermassive black holes to form and grow must have been very short," said Huub Rottgering, also from Leiden Observatory.

UK university collaborates with Indian scientists to combat eye infections

Scientists from a leading British university are collaborating with their Indian counterparts to launch pioneering a research aimed at helping thousands of people across the globe at the risk of losing their sight to a "silent epidemic" of eye infections.

The multi-disciplinary team of scientists and clinicians from the University of Sheffield are working with a team of doctors of the Hyderabad-based LV Prasad Eye Institute to develop a new treatment for eye infections that does not rely on conventional antibiotics – to which many microbes are becoming rapidly resistant, the university announced.

"This 'silent epidemic' affects 840,000 people a year in India," said Professor Pete Monk from the university's Department of Infection, Immunity and Cardiovascular Disease.

Monk is leading the revolutionary research that has been awarded grants of almost 1.4 million pounds from the UK's Medical Research Council (MRC).

"Infections are often treated incorrectly, if at all. This increases sight loss, frequently in men and women in their working years," he said.

The team, which includes Dr Prashant Garg, Dr Sanhita Roy and Dr Varsha Rathi from the LV Prasad Institute, began work on serious eye infections that could lead to the loss of sight in the developing world.

Quick meditation can boost brain skills

Just a short session of meditation can significantly boost one's ability to quickly and accurately complete cognitive tasks, even if they have never meditated before, a study has found.

Researchers from Yale University and Swarthmore College in the US found that college students who listen to a 10-minute meditation tape perform better on cognitive tests than peers who listen to a "control" recording on a generic subject.

The study, published in the journal Frontiers of Neuroscience, shows even people who have never meditated before can benefit from even a short meditation practice.

"We have known for awhile that people who practice meditation for a few weeks or months tend to perform better on cognitive tests, but now we know you don't have to spend weeks practicing to see improvement," said Hedy Kober, associate professor at Yale.

The research team randomly divided college students into two groups. One group listened to a 10-minute recording on meditation prior to performing cognitive tests and the second group listened to a similarly produced tape about sequoia trees.

Both groups were then given simple tasks designed to measure cognitive dexterity. Those who listened to the meditation recording performed significantly better, across two studies.

Novel nanoparticles can help detect cancer without biopsy

Scientists have developed nanoparticle-based imaging technique that can detect various types of breast cancer, and other diseases, without the need for extracting tissue samples from the patient.

The research, published in the journal Nature Nanotechnology, opens up a new avenue in minimally invasive disease diagnosis.

"The use of nanoparticles for bio-imaging of disease is an exciting and fast-moving area of science," said Yiqing Lu from Macquarie University in Australia.

"Specially designed nanoparticles can be placed in biological samples or injected into specific sites of the body and then 'excited' by introduced light such as that from a laser or an optical fibre," Lu said.

"Disease biomarkers targeted by these nanoparticles then reveal themselves, by emitting their own specific wavelength signatures which are able to be identified and imaged," he said.

A major limitation however is that only a single disease biomarker at a time is able to be distinguished and quantified in the body using this type of detection technique.

"The tissue environment is extremely complex - full of light absorbing and scattering elements such as blood, muscle and cartilage. And introducing multiple nanoparticles to a site, operating at multiple wavelengths to detect multiple biomarkers, produces too much interference," Lu said.

"It makes it extremely difficult to determine accurately if a range of disease biomarkers are present," he added.

NASA's planet-hunting probe catches comet inaction

NASA's latest planet-hunting probe has beamed back a stunning sequence of images showing a comet in motion 48 million kilometers from Earth.

Taken over the course of 17 hours on July 25, the day the Transiting Exoplanet Survey Satellite (TESS) started science operations, the images helped demonstrate the satellite's ability to collect a prolonged set of stable periodic images covering a broad region of the sky - all critical factors in finding transiting planets orbiting nearby stars.

Over the course of these tests, TESS took images of C/2018 N1, a comet discovered by NASA's Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE) satellite on June 29.

The comet, located about 48 million kilometres from Earth in the southern constellation Piscis Austrinus, is seen to move across the frame from right to left as it orbits the Sun.

The comet's tail, which consists of gases carried away from the comet by an outflow from the Sun called the solar wind, extends to the top of the frame and gradually pivots as the comet glides across the field of view.

In addition to the comet, the images showed a treasure trove of other astronomical activity. The stars appear to shift between white and black as a result of image processing.

The shift also highlights variable stars - which change brightness either as a result of pulsation, rapid rotation, or by eclipsing binary neighbours.

'New AI device identifies objects at speed of light'

Scientists have created a 3D printed artificial neural network - a device modelled on how the human brain works - that can analyse large volumes of data and identify objects at the speed of light.

Several devices in everyday life use computerised cameras to identify objects, such as internet search engines that can quickly match photos to other similar images, said researchers at the University of California, Los Angeles (UCLA) in the US.

However, those systems rely on a piece of equipment to image the object, first by "seeing" it with a camera or optical sensor, then processing what it sees into data, and finally using computing programmes to figure out what it is.

The new device, called a "diffractive deep neural network," uses the light bouncing from the object itself to identify that object in as little time as it would take for a computer to simply "see" the object.

The device, described in the journal Science, does not need advanced computing programmes to process an image of the object and decide what the object is after its optical sensors pick it up.

No energy is consumed to run the device because it only uses diffraction of light, researchers said.

Chinese scientists create first single-chromosome yeast

Chinese scientists claimed to have created the first single-chromosome yeast while not affecting the

majority of its functions, a breakthrough that could help in furthering research related to aging and diseases in humans.

Brewer's yeast, one-third of whose genome is said to share ancestry with humans, has 16 chromosomes. However, Chinese scientists have managed to fit nearly all its genetic material into just one chromosome while not affecting the majority of its functions, according to a paper released yesterday on the website of the journal Nature.

Qin Zhongjun, a molecular biologist at the Centre for Excellence in Molecular Plant Sciences of the Shanghai Institute of Plant Physiology and Ecology under the Chinese Academy of Sciences, and his team used CRISPR-Cas9 genome-editing to create a single-chromosome yeast strain, state-run Xinhua news agency quoted the research paper as saying.

Yeast is a type of eukaryote, which also includes humans, plants, and animals. Humans have 46 chromosomes, whereas male jack jumper ants have just one. It seems that the number of chromosomes of a eukaryote has no correlation with the amount of genetic information they possess, the paper said.

"Our research shows that all the genetic information can be concentrated in just one chromosome," Qin said.

Novel sponge-like material can remove harmful dyes from water

Scientists have created a sponge-like material using wood pulp and small bits of metal that can remove harmful dyes in water in a matter of seconds.

Globally, about 700,000 metric tonnes of dye is produced each year to colour our clothing, eye shadow, toys and vending machine candy.

During manufacturing, about a tenth of all dye products are discharged into the waste stream.

Most of these dyes escape conventional wastewater-treatment processes and remain in the environment, often reaching lakes, rivers and holding ponds, and contaminating the water for the aquatic plants and animals that live there.

Even just a little added colour can block sunlight and prevent plant photosynthesis, which disrupts the entire aquatic ecosystem.

"A small amount of dye can pollute a large volume of water, so we needed to find a way to very quickly and efficiently remove the colour," said Anthony Dichiara, an assistant professor at University of Washington in the US.

"We were pretty impressed with what we were able to achieve," said Dichiara.

The researchers developed a method that removes colour from water using a sponge-like material they created from wood pulp and small bits of metal.

Psychedelic drugs could treat mental disorders: experts

Psychedelics drugs – often misused by ravers and music festival-goers - may one day be used to treat disorders ranging from social anxiety to depression, researchers say.

Hallucinogens have been studied in the US for their potential healing benefits since the discovery of LSD in the 1940s. However, research has mostly stalled since psychedelics were outlawed in the late 1960s.

A shift may be coming soon though, as MDMA, commonly known as ecstasy, is beginning its third and final phase of clinical trials in an effort to win US Food and Drug Administration approval for treatment of post-traumatic stress disorder, said Adam Snider, of Alliant International University in the US.

Findings from a study presented at the annual convention of the American Psychological Association suggested that symptoms of social anxiety in autistic adults may be treatable with a combination of psychotherapy and MDMA.

Twelve autistic adults with moderate to severe social anxiety were given two treatments of pure MDMA plus ongoing therapy and showed significant and long-lasting reductions in their symptoms, the research found.

"Social anxiety is prevalent in autistic adults and few treatment options have been shown to be effective," said Alicia Danforth, from the Los Angeles Biomedical Research Institute in the US, who conducted the study.

Edited, printed and published by M. R. MISHRA on behalf of the PRESS TRUST OF INDIA, at 4, Parliament Street, New Delhi -110001 .