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IT TO BRING TRANSPARENCY IN POLLUTION CONTROL EFFORTS: VARDHAN

There is a need to clear the “pollution of corruption” in addition to addressing air and water pollution, Environment Minister Harsh Vardhan said today as he stressed the need for using information technology (IT) to bring transparency in efforts to contain pollution.

Expressing concern over the poor air quality in Delhi, the minister stressed the need for making a holistic action plan for air quality management at the local level, while directing pollution control boards to ensure strict adherence to timeline to achieve reduction in waste generation.

The use of information technology will enhance transparency and efficiency in efforts to contain and mitigate pollution, he said.

The environment minister called for implementation of the concept of 4 Rs — Reduce, Reuse, Recycle and Recover — for the proper management of solid waste and sewage.

“There is a need to clear the pollution of corruption from the system, besides clearing air and water pollution,” he said while addressing the inaugural session of the 62nd conference of Chairmen and Member Secretaries of Pollution Control Boards and Committees.

He emphasised that the use of IT will ensure better compliance, as well as enhance the interaction and outreach between various stakeholders.

“IT will also help in resolving issues with State Pollution Control Boards,” the minister said, while pointing to the urgent need for innovative thinking and an out-of-the-box approach to resolve various issues.

“Our government is committed to promote economic well-being, along with environmental well-being,” said Harsh Vardhan, as he expressed concern over the air quality status of Delhi. He called for substantive action at the local level, along with a holistic action plan for air quality management.

Referring to the flagship schemes such as Swachh Bharat Abhiyaan, Make in India campaign, Smart Cities Project and Digital India Campaign, the minister said that ‘Make in India’ will adopt a ‘zero effect, zero defect’ policy, which will leave ‘zero effect’ on the environment.

Harsh Vardhan stressed the need to address the gaps in the disposal of solid waste management as 50 per cent of the waste collected is dumped “unscientifically”.

While 2,59,000 tonnes of plastic waste is generated every day, only 14 states or Union Territories have banned plastic carry-bags, he said.

The minister said that while the estimated quantity of e-waste generated is about 1.70 million TPA (tonnes per annum), the quantity of e-waste that is recycled is about 4,62,896 TPA.

He also expressed dissatisfaction that e-waste inventories had been completed by only Jammu and Kashmir, Himachal Pradesh, Goa, Madhya Pradesh and Punjab.

The minister urged the remaining states to complete the process of inventories of e-waste at the earliest.

“He directed the Boards to ensure strict adherence to timelines to achieve a reduction in waste generation, as incorporated in the amended Solid Waste Management Rules, 2016 and Plastic Waste Management Rules, 2016,” an official statement said.

The environment minister also sought inputs for creation of a data bank of good environmental actions and deeds that can be taken by individuals as their contribution towards protection of environment.

The minister also said he had asked the science and technology ministry and the environment ministry to work together closely so that they can benefit from the scientific innovations in the field of science and technology.

PATRIARCHY AND POOR CONVICTION, POLICING BEHIND RAPE: EXPERTS

Three men rape a woman, flinging her child to a pavement. Another three rape a woman for eight hours in a vehicle. A jilted lover and his friend abduct, rape and kill a woman. A neighbour lures a child to a secluded spot, rapes, burns and kills her.

Who are these seemingly ordinary people who turn into brutal violators and killers?

Psychologists, lawyers and the police have been struggling to make sense of what is being described as a culture of rape, especially in Delhi and its neighbourhood.

In Delhi, over six women are raped every day. According to the National Crime Records Bureau (NCRB), 95 per cent of all rapes in 2015 in the country were committed by a person known to the victim. A seven-year-old Chennai girl, for instance, was raped, burnt and killed by her neighbour in February.

A spate of rapes in recent weeks - including in Manesar, where a 19-year-old woman was raped in a van and her 9-month-old baby killed, in Sonapat, where the former lover raped, mutilated and killed the victim and the recent case of a woman who was picked up from Gurgaon and raped for almost eight hours in a moving vehicle - has turned the spotlight on the mind of the rapist, capable of unthinkable violence.

The director of the Institute of Human Behaviour & Allied Sciences, Nimesh Desai, attributes such criminal behaviour to factors like ingrained patriarchy and lack of gender sensitivity, as well as the internal distress and isolation of young men.

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Referring to gang rapes, he says a “high risk behaviour” functions in groups, encouraging negative instincts.

“Anti-social and criminal behaviour happens more in groups. Groups provide the comfort, courage and a false sense of bravado and masculinity, resulting in a compromise in judgement,” he says.

The senior psychiatrist, however, warns against theories on the “psychology of the rapist”, stressing that these can give the impression of the crime being justified.

“When we try and explain the psychology of a rapist, the intentions are usually good, but what it does to the public mind is that it kind of sanctifies or justifies the act,” he told PTI.

But the sheer numbers of rapes in the country - the NCRB states 2,199 rape cases were reported in Delhi and 34,651 in India in 2015 - trigger questions on what makes rapists commit the most horrendous of acts - grievously molesting a child, mutilating a woman’s body and raping her for hours in a gang. Sometimes, the rapists act under the influence of alcohol or substance abuse, which Desai describes as “a ready recipe” for such crimes.

But the experts stress there are larger issues at play here - such as ingrained patriarchal values.

A male-dominated society “is not comfortable around an independent woman”, says Supreme Court lawyer Shilpi Jain.

“When men see an independent woman, it hurts their ego.

So this is a way of overpowering her, to show her that ‘you are under our control’, to send a message to women that they may lead independent lives but if men want to control them, they can,” says the defence lawyer, who fought the Bitti Mohanty case, in which a senior police officer’s son was convicted of raping a German woman.

What confounds activists and law-enforcement agencies is that strict laws - which include death - do not seem to deter the perpetrators.

Mumbai-based psychologist Harish Shetty blames delayed convictions for this.

“If you hear that for a rape, a person is convicted in a month’s time, then it has an impact. But a death sentence after 20 years makes no sense,” Shetty says.

He adds that while there is more awareness about the law, “it has no teeth” unless judgements are on time.

“Acquittals are very high and convictions are very low,” he adds.

The NCRB report shows a conviction rate of 21.7 per cent in crimes against women in India during 2015. It means more than 7 out of 10 people accused of such crimes walked free.

The December 16, 2012, case - when a physiotherapy intern was brutally raped and killed by a gang of men - evoked such nationwide horror that a court had sentenced the adult men to death in nine months.

But this was a rare instance. A 13-year-old girl from Lucknow, who was gang raped in 2005, waited for 11 years for a verdict. The rape of a minor by two presidential guards in 2003 reached a trial court only in 2009.

Jain believes the situation can change only if there is a “complete overhaul” of police structures that allow probes by the lowest rungs of officials. She also suggests expedition of cases in courts. Former Mumbai Police Joint Commissioner (Crime) M N Singh stresses the need for a “systemic change” to instill fear which he believes will act as a deterrent.

To prevent cases such as the gang rape in May of a group of women on the Jewar-Bulandshahr highway, he suggests increased police patrolling.

“If social control and policing are lacking, then howsoever strict the law is, it will only have a limited impact,” Singh says.

GOOGLE MAPS NOT AUTHENTIC, SAYS COUNTRY’S TOP SURVEYOR

Google maps are not considered “authentic” since they are not charted by the government, the country’s top surveyor has said.

Swarna Subba Rao, the Surveyor General of India, said yesterday that maps prepared by the Survey of India, a 250-year-old institute in Dehradun, were used for vital infrastructure projects.

“Google maps are not authentic. They are not produced by the government so they don’t stand any authentication,” he said.

The head of the institute which has the mandate to prepare maps for defence purposes said many people used Google maps “for low end” applications.

“The maps produced by the Survey of India are used for serious applications,” he said, responding to a question at an event organised to release a commemorative stamp to mark 250 years of the institute.

The Survey of India’s topography maps are needed for “very accurate and engineering quality data” essential for something like a new rail line or a canal, Rao said.

The Survey of India falls under the Department of Science and Technology.

DST secretary Ashutosh Sharma, however, added that it would be wrong to disregard satellite mapping, as the maps prepared by the Survey of India and companies such as Google served different purposes.

Manoj Sinha, Minister of State for Communication, said the Survey of India had the “distinct honour” of printing India’s first postage stamp and the first copy of the Constitution of India.

He added that any developmental work could only start after proper survey and mapping had been done.

INDIANS WORKING ON WORLD'S BIGGEST TELESCOPE: MINISTER

Union minister Harsh Vardhan lauded Indian scientists' contribution to the world's biggest telescope which would enable astronomers to observe the intricacies of the universe from the comfort of the earth.

Vardhan said the site for the telescope — a multi-million dollar project being developed by an international consortium including India— was still being finalised.

Hanle in Ladakh was one of the sites being explored.

"The sites would be evaluated for technical and logistical suitability," the minister of Science and Technology said, hailing Indian scientists as among the best in the world.

India's contribution to the Thirty Metre Telescope (TMT) project would be "more in terms of hardware" than money, he said, adding that India would spend Rs 1,300-crore on it.

The ambitious next-generation TMT is to be built at an estimated cost of USD 1.47 billion by an international consortium consisting of institutions from India, the United States, Canada, Japan and China.

"India is collaborating with the US, Japan, and other countries for the world's biggest telescope project. It's a matter of great pride for us that our material would be used in it," Vardhan said.

Addressing a gathering at a workshop for journalists at the CSIR's Anusandhan Bhawan here, he said construction was expected to start at Mauna Kea, Hawaii, but protests by locals in that part of the US had stalled the project.

India is a 10 per cent partner in this global project. On the Indian side, the project is being handled by the Ministry of Science and Technology and the Department of Atomic Energy.

The gigantic telescope, scheduled to be ready by 2020, will provide astronomers with unparalleled power to observe the universe.

From the Indian side, the project would be led by the Indian Institute of Astrophysics (IIA), Bangalore, with the help of the Aryabhata Research Institute of Observational Sciences (ARIES), Nainital, and Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune.

"I have been to several scientific laboratories and research centres in the country and have met top scientists in the US too. But, I can tell you, our scientists are a notch above and not a notch less than those people," Vardhan said.

At the day-long workshop jointly organised by his ministry and the Delhi Journalists Association, the minister

lamented that reportage on science-related subjects was being elbowed out by "sensational news items" driven by politics and other issues.

In his address, Vardhan reiterated that India was a world leader historically in various fields and that Prime Minister Narendra Modi had reposed "extraordinary faith" in the abilities of Indian scientists.

"We should look to our ancient wisdom and knowledge to draw inspiration. But the moment I say something like that some people and the media start accusing us of saffronisation," he said.

To drive home the point, Vardhan recounted how the "grandson of (Italian inventor) Marconi had acknowledged the contribution of J C Bose on wireless transmission".

The minister also recalled the contribution of Jawaharlal Nehru, Rajendra Prasad and Syama Prasad Mookerjee in building "great institutions" after Independence.

"In many institutions, I see foundation stones laid by first prime minister Nehru, first president Dr Rajendra Prasad and Syama Prasad Mookerjee, whose death anniversary we are observing today. These institutions are a testimony to their vision and contribution," Vardhan said.

Describing the work of the 75-year-old Council of Scientific & Industrial Research (CSIR) as the "tip of the iceberg", he hailed its contribution to science, saying the CSIR ranked 12th among some 1,200 government-funded research institutions globally.

IN RARE SURGERY, EGG-SHAPED CYST REMOVED FROM WOMAN'S BRAIN

In a rare surgery, doctors at a hospital here successfully removed an egg-shaped cyst weighing 200gm from the brain of a woman.

Forty-one-year-old Shanti Devi, a native of Ballabgarh in Haryana, had approached the doctors with complaints of severe headache and weakness on the right side of her body. She was unable to stand or walk without support.

The doctors at the Asian Institute of Medical Sciences (AIMS) advised MRI of her head and she was diagnosed to be having a large hollow stone like cyst inside her brain.

It had taken the shape of an egg whose external structure was hard. It was surrounded by the brain all over, said Dr Kamal Verma, Director, Department of Neurosurgery at AIMS.

"It was a challenging surgery as we had to remove this egg-shaped cyst completely and in one piece, without causing any damage to the brain. It was about 200gm in weight," Verma said.

The doctors termed it as a high-risk surgery as the cyst was on the left side of the frontal brain that controls speech and movement. The surgery last for four hours.

“The laboratory tests confirmed it to be benign,” Verma added.

Tests revealed the cyst was caused by some parasite.

Such parasites in the brain are known to cause soft balloon like cysts in some patients, but this type of hard structure and size has never been reported in medical literature, said Dr Mukesh Panday, Senior consultant, neurosurgeon at AIMS.

Doctors had to be extra careful in removing the cyst as it contained thousands of parasites and toxic fluids.

“Had the fluid leaked out into the brain it could have caused severe reactions or formed more cysts which could have killed the patient,” said Pandey.

Shanti Devi is recovering well and now carries out her daily chores smoothly. Her speech has also improved.

PLASMA PHYSICIST P K KAW PASSES AWAY

Internationally recognised plasma physicist and pioneer of thermo-nuclear fusion in India, Prof P K Kaw died at his residence here.

He passed away yesterday after suffering a cardiac arrest. He was 69.

Predhiman Krishan Kaw was the founder director of the Institute of Plasma Research (IPR), Gandhinagar, and served as the Professor of Department of Science and Technology (DST) at the institute till he breathed his last.

The veteran scientist was honoured with Padma Shri in 1985 for his contribution in the field of producing energy through thermonuclear fusion.

“It is a huge and irreparable loss to the whole nation at large and IPR in particular. His contribution to plasma and fusion sciences, and his tireless efforts in nurturing the IPR since its inception will be remembered for long,” said Dean (R&D), IPR, D Chenna Reddy.

According to the acting Chief Administrative Officer of IPR, P K Atrey, Kaw died after suffering a cardiac arrest at his home.

“He was the founder director of IPR and was serving as DST-Professor at the institute since 2013. He was very much active in research and other academic work at the institute till his end,” said Atrey.

Prof Kaw is internationally known for his outstanding contribution to the physics of non-linear collective phenomena in plasmas with special emphasis on applications to thermonuclear fusion.

Born in January 1948, Kaw did his Ph.D in 1966 from the Indian Institute of Technology, Delhi. He was just 18 when he achieved this academic milestone.

After completing his Ph.D, Kaw went to Princeton University, USA as a post doctoral fellow and later joined the university as an assistant professor.

From 1971-75, Kaw was back in India as associate professor and then as professor at the Physical Research Laboratory (PRL), Ahmedabad.

In this period he extended the theory of parametric instabilities to magnetised plasmas. He also made important contributions to the theory of ionospheric irregularities in the equatorial electro jet.

In early 80s, Kaw and some of his former colleagues at PRL succeeded in persuading the DST to set up a major programme of plasma physics at PRL.

He returned to India in 1982 to direct this programme. The programme was separated from PRL in 1986 and became the DST-funded Institute for Plasma Research.

Kaw was IPR’s director between 1986 and 2012.

In 1996, IPR was taken over by the Department of Atomic Energy (DAE) with a considerable upscaling of the experimental efforts on thermonuclear fusion.

Under his leadership, the institute has carried out the design/fabrication of an advanced steady-state superconducting tokamak SST-1. This machine is undergoing commissioning trials now and is one of the first machine of this kind anywhere in the world.

Kaw also guided the the institute in spearheading India’s case for participation in the prestigious ITER (fusion) experiment and is now the nodal domestic agency looking after this participation.

RAO ASKS IIT GRADUATES TO WORK FOR DEVELOPMENT OF THE COUNTRY

Prof C N R Rao exhorted the graduates of the Indian Institute of Technology here to be proud of the brand ‘IIT’ and use it for the development of the country.

Delivering the 19th Convocation address of IIT-G as chief guest, the National Research Professor said, “IIT is the only brand that India created after Independence. Be proud of it and use it for the development of India”.

“If IIT students decide to use this education in India, they will make a great future for this country”, said Rao who is also the Linus Pauling Research Professor and Honorary President of the Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru.

Asking the students to decide now what they want to do in life, he said, “decide what your mission is. With dedication, doggedness and tenacity success will be yours. Mahatma Gandhi and Nelson Mandela won Independence for their countries through these qualities”.

Speaking about China making huge monetary investments in education and development of science and technology producing 23,000 PhDs annually and generating the same amount of research work, he said, “China and South Korea

are coming up with quality students so that they can compete with the best and become number one as the future depends on science and technology”.

He said “this is the role of IITs and other institutes to make India number one. That is the effort you have to make. There will be a lot of challenges, don’t ever think you cannot succeed. You have to succeed. it depends on you.”

Stating that if government has healthy policies and society gives more support then India will succeed, he said that in the pre-Independence era when there was no IIT or government support for research, India produced eminent scientists like J C Bose, Noble Laureate C V Raman and mathematical genius Srinivasa Ramanujan because of their passion for research.

Speaking about himself, Prof Rao said, “I am 84 years old and have been researching for the last 68 years. I am doing research to do what I can for this great country till my last breath”.

He also exhorted the IIT graduates to always remain humble as “greatness and simplicity go together. Have your feet on the ground. Make India on top of the world”.

Altogether 1,308 students – including 583 B-Tech and 36 B-Des, 20 MA, 119 MSc, 363 M-Tech and 27 MDes, and 155 PhDs – received their degrees at the Convocation.

Prof Rao also gave away the President of India gold medal to the Institute toppers among the B-Tech and B-Des programme students and Dr Shankar Dayal Sharma gold medal to the student adjudged best in general proficiency.

Presenting his report on the activities and achievements of the Institute during 2016-17, IIT-G Director Prof Gautam Biswas said as per the National Institutional Ranking Framework (NIRF), India Ranking 2017, the Institute was placed in the 8th rank among all the participating universities and institutions and 7th among the top engineering institutions in the country.

IIT-HYDERABAD TO LAUNCH TWO NEW COURSES

The Indian Institute of Technology (IIT) Hyderabad will launch two new courses from the academic year 2017-18 to meet the growing demand of student community and the industry.

B Tech (Minor in Design) and B Tech (Engineering Mathematics) courses are being introduced following interest from students as well as employers who are increasingly looking for these skills, a release from IIT- Hyderabad said.

IIT-Hyderabad Director U B Desai said “Multi-disciplinary areas are constantly emerging not just within the academic world but also within the industry. These areas require new ways of thinking and new skills. These new courses aim to fulfill such emergent requirements.”

Department of Mathematics, IIT-Hyderabad Head Prof D Sukumar said “The B Tech (Engineering Mathematics) will

enable students to pursue higher studies in Math, such as a PhD in world class universities.”

Further, it will also help students to take up research and development work in national as well as international laboratories, he said.

There are also many industry and multi-national company jobs which require math analytical skills, he said adding the intake for the course is 10 students.

Students taking B Tech (Engineering Mathematics) course in IIT-Hyderabad will be exposed, from the first semester, to the foundations and fundamentals required for higher Mathematics.

Speaking about the B Tech (Minor in Design), Department of Design, IIT Hyderabad assistant professor Neelkantan said, “The advantage of the Minor in Design Course is not just about employability but also supporting the students to be creative thinkers and begin initiatives of their own.”

The students intake will be between 15 and 20.

The minor courses that would be offered include creative product design, principles of animation and moving images, digital heritage, visual communication and digital imaging, built-environment/ urban space design, special topics on design, introduction to ergonomics and design, word and image immersion, movement art, technology and environmental installations and performances, the release added.

AIR AMBULANCE LANDMARK ACHIEVEMENT IN TRAUMA SURGERY:IAF CHIEF

Indian Air Force has recognised the need for speed for limiting mortality and morbidity while transporting the critically ill from the battlefield, Chief of IAF, Air Chief Marshal B S Dhanoa said today.

He was speaking after inaugurating an Air Ambulance of the private Ganga Hospital here.

“This is a landmark achievement in the field of trauma surgery. During the Kargil war in 1999 IAF Mi-17 and Mi-8 helicopters were sent to evacuate casualties from the icy Himalayan heights to airfields of Srinagar and Awantipur from where critical patients were transported to Command Hospital at Chandigarh and Research and Referral Army Hospital in New Delhi,” he said.

Subsequently, IAF formulated its own Critical Care Air Transport Team (CCATT) in 2007, using an indigenously designed Patient Transfer Unit), which could be retrofitted in either fixed wing or rotary wing aircraft, he said.

As many as 17 transport aircraft of IAF can be converted into Air Ambulances, Dhanoa said.

CCATT has the expertise and wherewithal to air transport the critically ill from remote corners of the country to tertiary care centre of the Armed Forces while providing critical care in flight, he said.

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“They have indeed done us proud and Air Ambulance such as that of Ganga Hospital will further aero-medical treatment in our country,” Dhanoa said.

INNOVATIONS MADE IN PSLV-C38 MISSION

Space scientists have made some innovations in the PSLV-C38 mission which would help the Indian Space Research Organisation (ISRO) launch satellites in multiple orbits in a cost effective manner.

Today’s launch was not a “regular routine” mission for ISRO as the scientists undertook some innovation in it, Vikram Sarabhai Space Director K Sivan said.

“We have some innovation in this mission. After the satellite separation, PS4 - the fourth upper stage - will be active for 10 more orbits and it is going to provide a very good and very cost effective platform for carrying out very costly experiments”, he said.

Already such experiments were conducted and the desired results obtained, he said, adding, “many such wonders are going to be there.”

ISRO’s workhorse rocket, the Polar Satellite Launch Vehicle, in its 40th flight (PSLV-C38), successfully launched the Cartosat-2 series satellite, a dedicated one for the defence forces, along with 30 nano satellites from the Satish Dhawan Space Centre here.

Cartosat-2 is a remote sensing satellite and it is similar in configuration to earlier satellites in the series with the objective of providing high-resolution scene specific spot imagery.

PSLV-C38 Mission Director B Jayakumar said ISRO demonstrated for the third time the restart of PS4 (fourth stage of the rocket) upper stage.

“With that I am sure we will be able to put satellites into multiple orbits as required by the satellite team. This month — June 2017 — is going to be historical month for ISRO as two major launches the GSLV MkIII (on June 5) and PSLV-C38 were accomplished that too in a span of 18 days,” he said.

Sivan said making history was a way of life in ISRO. “For the last 50 days, starting from May 5, this is the 50th day. We have launched three major missions, the PSLV, GSLV, GSLV MkIII, ranging a variety of satellites,” he said.

“Everything happened in a short span of 50 days. All these happened mainly because of the hard work by team ISRO,” he said at the Mission Control Centre.

Satish Dhawan Space Centre (SHAR) Director, Kunhi Krishnan said the successful launch of PSLV-C38 “clearly demonstrated its commendable position as one of the most reliable launch vehicles.”

“With this launch we have completed 61 launch vehicle missions from the spaceport of India, Sriharikota,” he said.

ISRO Satellite Centre Director Mayilsami Annadurai said, “Initial signals are good (received from the Cartosat-2 Series satellite) and two panels are deployed from the satellite.”

“Subsequently, I think, third day from now, we have to enable the payloads and get the initial pictures,” he said.

INDIA’S MARS MISSION COMPLETES 1,000 EARTH DAYS IN ORBIT

The country’s low-cost Mars mission spacecraft that is on a rendezvous with the Red planet for an extended period completed 1,000 earth days in its orbit today.

“MOM completes 1,000 earth days in its orbit, today (June 19, 2017) well beyond its designed mission life of six months. 1,000 earth days corresponds to 973.24 Mars Sols (Martian Solar day) and MOM completed 388 orbits,” ISRO said.

The satellite is in good health and continues to work as expected, it said, adding that scientific analysis of the data received from the Mars Orbiter spacecraft is in progress.

India on September 24, 2014 successfully placed the Mars Orbiter Mission (MOM) spacecraft in orbit around Mars in its very first attempt, breaking into an elite club.

ISRO had launched the spacecraft on its nine-month-long odyssey on a homegrown PSLV rocket from Sriharikota in Andhra Pradesh on November 5, 2013 and it had escaped the earth’s gravitational field on December 1, 2013.

Citing surplus fuel as the reason, ISRO in March, 2015 had first announced that the spacecraft’s life was extended for another six months. Later in June, 2015 its Chairman A S Kiran Kumar had said it has enough fuel for it to last “many years”.

The Rs 450-crore MOM mission is to study the Martian surface and mineral composition, and scan its atmosphere for methane, an indicator of life on Mars.

The Mars Orbiter has five scientific instruments - Lyman Alpha Photometer (LAP), Methane Sensor for Mars (MSM), Mars Exospheric Neutral Composition Analyser (MENCA), Mars Colour Camera (MCC) and Thermal Infrared Imaging Spectrometer (TIS).

The Mars Colour Camera, one of the scientific payloads onboard MOM, has produced more than 715 images so far, ISRO said.

During its journey so far, MOM has gone through a communication ‘blackout’ as a result of solar conjunction from June 2, 2015 to July 2, 2015.

It experienced the ‘whiteout’ geometry (when the Earth is between the Sun and Mars and too much solar radiation may make it impossible to communicate with Earth) during May 18 to May 30, 2016.

An orbital manoeuvre was also performed on MOM spacecraft to avoid the impending long eclipse duration for the satellite.

ISRO had also launched MOM Announcement of Opportunity (AO) programmes for researchers in the country to use MOM data for R&D.

To expand inter-planetary research, ISRO is seeking scientific proposals for Mars Orbiter Mission-2, the government said in November last year.

NO COUNTRY FOR OLD: ONE IN TWO ELDERLY PEOPLE LONELY

In a country of one billion and plus almost every second elderly person suffers from loneliness, reveals a new study titled 'Changing Needs & Rights of Older People in India'.

Working on a sample size of 15,000 older people, the survey by Agewell foundation says that 47.49 per cent elderly people in India suffers from loneliness.

The condition is worse in urban regions with 3,205 elderly people out of 5000 feeling lonely.

"In urban areas 64.1 per cent elderly were found suffering from loneliness, whereas as in rural areas 39.19 per cent elderly (3919 elderly out of 10000 rural elderly) claimed that they are suffering from loneliness," the survey said.

But what are the factors responsible for loneliness in old age?

According to the survey, for majority of the respondents, it was living alone or with their spouses. For others it was "less interaction with family members" (27.3 per cent), "poor health" (19.06 per cent) and "facing isolation and non-availability of social-interaction" (12 per cent).

"36.78 per cent elderly suffering from loneliness claimed that living alone or with their spouses only is the most responsible factor for their condition," the survey noted.

The study also noted how every fifth elderly in India needs some kind of psychological counseling.

"Out of the 15,000 total respondents, 2,955 admitted that they seek counseling or advice from their relatives or friends, when they undergo psychological problems," it said.

Among those affected, the share of urban elderly (63.86 per cent) was seeking psychological counseling was higher than those in rural areas (36.14 per cent).

Conducted during the months of April- June 2017, the survey was spread across 300 districts of 25 states and Union Territories of India.

GOOGLE DIGITISES DELHI'S BAOLIS

As Delhi's historical stepwells lie in ruins with the ongoing urbanisation drive, a new initiative seeks to preserve seven baolis across the city.

The baolis which were once a major source of water for civilisations that sprung up around them, are being digitised by

The Indian National Trust for Art and Cultural Heritage (INTACH) in collaboration with Google.

Titled "Baolis of Delhi - Stepping into Step Wells", the project features baolis constructed between 1210 - 1540 and offers a virtual tour of the structures through specially curated photographs.

"The effort would help to reach out to more people and provide them information about the architectural heritage of our city.

"By reaching out to more and more people we are creating public awareness which is the first step towards conservation," Swapna Liddle, Convenor of INTACH's Delhi chapter, told PTI.

With over 20 baolis spread across the city, most of these structures, Liddle said, have been neglected due to lack of awareness among people.

Besides documenting the popular stepwells — Agrasen Ki Baoli in Lutyen's and the baoli at Hazrat Nizamuddin Dargah, the project also introduces the lesser known baolis along with interesting narratives around them.

Viewers will also get a virtual experience that enables them to have a look at the reservoirs which no longer have public access.

These include the baoli at Feroz Shah Kotla and Purana Qila among others.

The photographs can be viewed on the website — Google Art and Culture (GAC), and also on the corresponding application on both iOS as well as Android.

Talking about the need for collaborating with governments for initiatives to conserve historical structures, Liddle noted how a baoli in Dwarka is being restored by the Delhi government.

"We need to work in collaboration. The INTACH Delhi Chapter in fact has had a very fruitful partnership with Delhi government through which we are studying and restoring several heritage structures for the Delhi State Department of Archaeology," she said.

When asked why only seven baolis were shortlisted for the project, Liddle said, the material picked up by Google was part of tourist literature and not a comprehensive list.

Simon Rein, programme manager - India, GAC said that the initiative is inclined towards making India's rich heritage and culture more accessible to people at home and abroad.

"It stems from Google's broader mission to organise and make information about world heritage more accessible to people. We want to enable users to discover artworks in new ways and help the cultural sector make the most of the digital opportunities," he said.

HUMANS COULD REGENERATE HEART CELLS IN FUTURE: STUDY

Scientists have discovered genetic interactions that may allow heart cells to regenerate, an advance that could lead to new therapies to treat cardiac diseases.

Researchers from the University of Florida (UF) in the US found genes known to form hearts cells in humans and other animals in the gut of a muscle-less and heartless sea anemone.

The sea anemone can regenerate into a new animal if it is cut into many pieces. Researchers analysed the function of its “heart genes,” and discovered a difference in the way these genes interact with one another, which may help explain its ability to regenerate, said Mark Martindale, a professor at UF.

The findings, published in the journal *Proceedings of the National Academy of Sciences*, point to potential for tweaking communication between human genes and advancing our ability to treat heart conditions and stimulate regenerative healing, he said.

“Our study shows that if we learn more about the logic of how genes that give rise to heart cells talk to each other, muscle regeneration in humans might be possible,” Martindale said.

These heart genes generate what engineers calls lockdown loops in vertebrates and flies, which means that once the genes are turned on, they tell each other to stay on in an animal’s cells for its entire lifetime.

In other words, animals with a lockdown on their genes cannot grow new heart parts or use those cells for other functions.

“This ensures that heart cells always stay heart cells and cannot become any other type of cell,” Martindale said.

However, in sea anemone embryos, the lockdown loops do not exist. The finding suggests a mechanism for why the gut cells expressing heart genes in sea anemones can turn into other kinds of cells, such as those needed to regenerate damaged body parts, Martindale said.

The study supports the idea that definitive muscle cells found in the majority of animals arose from a bifunctional gut tissue that had both absorptive and contractile properties.

While the gut tissue of a sea anemone might not look like a beating heart, it does undergo slow, rhythmic peristaltic waves of contraction, much like the human digestive system.

Researchers argue that the first animal muscle cells might have been very heart-like, Martindale said.

“The idea is these genes have been around a long time and preceded the twitchy muscles that cover our skeleton,” Martindale said.

Continued research could one day allow scientists to coax muscles cells into regenerating different kinds of new cells, including more heart cells, Martindale said.

HUMAN ENZYME CAN REDUCE DEMENTIA SYMPTOMS

Scientists have identified a naturally occurring human enzyme that can reduce protein aggregates in the brain which contribute to Alzheimer’s and Parkinson’s disease, paving the way for novel therapies against the disorders.

In most neurodegenerative diseases, misfolded proteins aggregate to form an insoluble clump called amyloid.

Many amyloid-forming proteins, including tau in Alzheimer’s disease and alpha-synuclein in Parkinson’s disease, contain the amino acid proline, whose unique structure induces a bend in the amino acid chain.

Those bends contribute to stacking of adjacent regions of the protein, thus promoting amyloid formation.

During normal protein folding, CyP40 latches on to prolines, orienting them into their characteristic chain-bending conformation, but like most enzymes, it can also operate in reverse, helping to unbend the chain.

Researchers from University of South Florida in Tampa, US found that the enzyme called cyclophilin 40 (CyP40) could reduce the amount of aggregated tau, converting it into a more soluble form.

In a mouse model of an Alzheimer’s-like disease, experimental expression of CyP40 preserved brain neurons and rescued cognitive deficits.

The same enzyme also disaggregated alpha-synuclein, an aggregate associated with Parkinson’s disease. This is the first time that CyP40 has been shown to disaggregate an amyloid responsible for a neurodegenerative disease.

Exactly how CyP40 reduces aggregation is not yet clear, and researchers provide two possibilities.

The enzyme may bind to aggregated protein and, by reversing the proline bend, help unstack and separate the amino acid chain. Support for this model comes from the observation that the enzyme was less effective at reducing aggregates when its action was inhibited.

Alternatively, the enzyme may bind to the protein before it forms aggregates, sequestering it and thus preventing it from clumping.

Understanding more about the exact mechanism of the enzyme may help point toward a therapeutic strategy centered on proline’s role in amyloid formation.

“The finding that Cyp40 can untangle clumps of tau and alpha-synuclein suggests that it, or one of the more than 40 other human proteins with similar activity, may have a role to play in treating neurodegenerative disease,” said Laura Blair, from University of South Florida.

The research was published in the journal *PLOS Biology*.

HOW LONELINESS CAN TRIGGER DISEASES DECODED

Social isolation can cause sleep loss and age-related diseases such as Alzheimer's, say scientists including one of Indian origin who have found why loneliness causes ill health.

Researchers at the University of Pennsylvania in the US observed that in the fruit fly *Drosophila melanogaster*, social isolation leads to sleep loss, which in turn leads to cellular stress and the activation of a defense mechanism called the unfolded protein response (UPR).

Although its short-term activation helps protect cells from stress, chronic activation can harm cells. Long-term, harmful activation of the UPR is suspected as a contributor to the ageing process and to specific age-related diseases such as Alzheimer's and diabetes.

"A lot of elderly people live alone, and so we suspect that stresses from the combination of ageing and social isolation creates a double-whammy at the cellular and molecular level," said Nirinjini Naidoo, a research associate at University of Pennsylvania in the US.

"If you have an age-related disruption of the UPR response, compounded by sleep disturbances, and then you add social isolation, that may be a very unhealthy cocktail," Naidoo said.

While evaluating the effects of ageing on the UPR in fruit flies, researchers noticed that molecular markers of UPR activation were at higher levels in flies kept singly in vials, compared to same-aged flies kept in groups.

"Ultimately, we realised that keeping animals isolated induces a cellular stress response and a higher level of UPR activation," Naidoo said.

UPR is supposed to protect against this cellular catastrophe.

However, when it fails to work efficiently to restore proper protein-folding conditions, and stays activated, it can trigger harmful inflammation, suppress normal, healthy cellular activity, and ultimately force the death of the cell.

Scientists have found evidence that this inefficient, chronic response becomes more likely with ageing.

The findings were published in the journal *Sleep*.

PROTECTING PANDAS MAY SAVE THE PLANET: STUDY

Efforts to safeguard pandas not only benefit the beloved bears, but can also help protect other species, boost biodiversity and fight climate change, a study has found.

"Sometimes unintended consequences can be happy ones – and give us ways to do even better as we work toward

sustainability. Pandas are leading us to even greater ways to care for nature and health of humans and the planet," said Jianguo Liu from Michigan State University in the US.

Over several decades, the China has introduced programmes to convert farmlands back to forests, ban logging and harvesting of wood products and replant acres of trees.

Researchers analysed the data and found that not only are the forests in the reserves thriving, and in ways that benefit more than the iconic pandas.

They found that the forests inside the reserves, and in areas outside the reserves' borders, are providing critical canopy materials – the leaves and branches – that soak up carbon dioxide, a greenhouse gas that contributes to climate change.

"Forests outside of reserves, are often growing faster than in the reserves. But that isn't a downfall of reserves," said Andres Vina, Assistant Professor at MSU.

"Rather, reserves usually had a head start in forest preservation, and in many cases have reached their maximum growth and density," Vina added.

The researchers also have found that not all forests are created equal – both in panda appeal and for biodiversity.

Many of those forests come with an under story rich with bamboo – a necessity for pandas.

The team noted that the types of forest present opportunities to improve. In some areas, the original goal of reforestation was to retain soil and water.

"We are seeing efforts that are moving in the right direction and showing positive results for nature and for humans," Vina said.

"Now it's time to continue those efforts and fine tune them to continue to get even more benefits," Vina added.

The study was published in the journal *Ecosphere*.

TOO MUCH OF 'GOOD FATS' MAY BE BAD FOR HEALTH: STUDY

Consuming excessive amounts of 'good fats' such as those found in olive oil and avocados may lead to fatty liver disease and increase the risk of diabetes and hypertension, a study warns.

Researchers from University of California San Francisco (UCSF) in the US found that a diet high in monounsaturated fat, combined with high starch content, caused the most severe fatty liver disease, a risk factor for metabolic disorders.

Researchers emphasised that simply counting calories does not guarantee a healthy diet.

They paired a fat, saturated or monounsaturated, with a carbohydrate, sucrose or starch, to create four different high-calorie diets in mice.

The diets were roughly 40 per cent carbohydrate, 40 per cent fat, and 20 per cent protein by calorie, a ratio on par with the

average American diet.

Four groups of 10 mice were fed the experimental diets for six months and compared to mice fed regular mouse chow, which is much lower in fat.

Researchers noted that all the mice on the experimental diets, free to eat as much as they wanted, grew obese by the end of six months, and all developed some degree of fatty liver.

The team noted that the mice on the starch-monounsaturated fat diet had the most severe disease, accumulating 40 per cent more liver fat than mice on the other three diets.

Their livers swelled with extra weight and, when seen under a microscope, appeared crowded with globules of fat.

Researchers also noted that these mice lost fat around their testes, an area of their bodies normally used for fat storage.

When they examined this visceral fat tissue, they saw an unusual degree of fat cell death and signs of inflammation.

Perhaps the starch-monounsaturated fat diet somehow induces the fat from these areas to be shuttled into the liver at an abnormally high rate, fattening the liver, researcher said.

The study was published in the journal Cellular and Molecular Gastroenterology and Hepatology.

ARTISTS, ARCHITECTS WIRED TO THINK DIFFERENTLY: STUDY

Artists and architects think differently compared to other people, and use elaborate, detailed descriptions when they talk about spaces, scientists say.

Researchers found that when asked to talk about images of places, painters are more likely to describe the depicted space as a two-dimensional image, while architects are more likely to focus on paths and the boundaries of the space.

“We found that painters, sculptors and architects consistently showed signs of their profession when talking about the spaces we showed them, and had more elaborate, detailed descriptions than people in unrelated professions,” said Hugo Spiers from University College London in the UK.

Researchers brought in 16 people who were either painter, sculptors or architects.

The participants were presented with a Google Street View image, a painting of St Peter’s Basilica, and a computer-generated surreal scene.

They were then asked to describe the environment and explain how they would explore the space, and suggest changes to the environment in the image.

The researchers categorised elements of the responses for both qualitative and quantitative analyses using a novel technique called Cognitive Discourse Analysis, designed to highlight aspects of thought that underlie linguistic choices, beyond what speakers are consciously aware of.

“By looking at language systematically we found some consistent patterns, which turned out to be quite revealing,” said Thora Tenbrink from Bangor University in the UK.

Researchers found that the painters tended to shift between describing the scene as a 3D space or as a 2D image.

Architects were more likely to describe barriers and boundaries of the space, and used more dynamic terms, while sculptors’ responses were between the two, researchers said.

Painters and architects also differed in how they described the furthest point of the space, as painters called it the ‘back’ and architects called it the ‘end.’

The control participants gave less elaborate responses, which the authors say went beyond just a lack of expert terminology.

“Our study has provided evidence that your career may well change the way you think,” Spiers said.

The study was published in the journal Cognitive Science.

ORBITING SUPERMASSIVE BLACK HOLES DISCOVERED FOR FIRST TIME

In a major breakthrough, astronomers including one of Indian origin have discovered two supermassive black holes orbiting each other 750 million light years away from Earth - a finding that may help better understand how gravitational waves are formed.

Last year, an international team of researchers detected the existence of gravitational waves, confirming German physicist Albert Einstein’s 100-year-old prediction and astonishing the scientific community.

These gravitational waves were the result two stellar mass black holes of about 30 solar masses colliding in space.

Scientists will now be able to start to understand what leads up to the merger of supermassive black holes that creates ripples in the fabric of space-time and begin to learn more about the evolution of galaxies and the role these black holes play in it.

“For a long time, we’ve been looking into space to try and find a pair of these supermassive black holes orbiting as a result of two galaxies merging,” said Professor Greg Taylor from University of New Mexico in the US.

“Even though we’ve theorised that this should be happening, nobody had ever seen it until now,” said Taylor.

Researchers have been studying the interaction between these black holes for 12 years.

“When Dr Taylor gave me this data I was at the very beginning of learning how to image and understand it,” said Karishma Bansal, first-author of the study published in The Astrophysical Journal.

“As I learned there was data going back to 2003, we plotted it and determined they are orbiting one another. It’s very

exciting,” said Bansal.

Using the Very Long Baseline Array (VLBA), a system made up of 10 radio telescopes across the US, researchers have been able to observe several frequencies of radio signals emitted by these supermassive black holes (SMBH).

Over time, astronomers have essentially been able to plot their trajectory and confirm that these black holes are in orbit with one another.

At roughly 750 million light years from Earth, the galaxy named 0402+379 and the supermassive black holes within it, are incredibly far away, but are also at the perfect distance from Earth and each other to be observed.

Bansal said these supermassive black holes have a combined mass of 15 billion times that of our Sun, or 15 billion solar masses.

The unbelievable size of these black holes means their orbital period is around 24,000 years, so while the team has been observing them for over a decade, they have yet to see even the slightest curvature in their orbit.

Continuing to observe the orbit and interaction of these two supermassive black holes could also help us gain a better understanding of what the future of our own galaxy might look like.

Right now, the Andromeda galaxy, which also has a SMBH at its centre, is on a path to collide with our Milky Way. The event that the researchers are studying may occur in our galaxy in a few billion years.

NEW ROBOTIC DRONES CAN TRAVEL BY LAND AND AIR

MIT scientists have developed a system of eight robotic drones that can fly through the air as well as drive on ground, efficiently navigating cityscapes with parking spots, no-fly zones and landing pads.

Robots that are good at one mode of transportation are usually bad at another.

Airborne drones are fast and agile, but generally have too limited of a battery life to travel for long distances. Ground vehicles, on the other hand, are more energy efficient, but slower and less mobile. Researchers from Massachusetts Institute of Technology (MIT) Computer Science and Artificial Intelligence Laboratory (CSAIL) are aiming to develop robots that can both manoeuvre around on land and take to the skies.

“The ability to both fly and drive is useful in environments with a lot of barriers, since you can fly over ground obstacles and drive under overhead obstacles,” said Brandon Araki, PhD student at MIT.

“Normal drones can’t manoeuvre on the ground at all. A drone with wheels is much more mobile while having only a slight reduction in flying time,” said Araki.

The project builds on Araki’s previous work developing a “flying monkey” robot that crawls, grasps, and flies.

While the monkey robot could hop over obstacles and crawl about, there was still no way for it to travel autonomously.

To address this, the team developed various “path-planning” algorithms aimed at ensuring that the drones do not collide.

To make them capable of driving, they put two small motors with wheels on the bottom of each drone. In simulations, the robots could fly for 90 metres or drive for 252 metres, before their batteries ran out.

Adding the driving component to the drone slightly reduced its battery life, meaning that the maximum distance it could fly decreased 14 per cent to about 300 feet.

However, since driving is still much more efficient than flying, the gain in efficiency from driving more than offsets the relatively small loss in efficiency in flying due to the extra weight.

The team also tested the system using everyday materials such as pieces of fabric for roads and cardboard boxes for buildings.

They tested eight robots navigating from a starting point to an ending point on a collision-free path, and all were successful.

Researchers suggest a better approach creating safe and effective flying cars is not to simply “put wings on cars,” but to build on years of research in adding driving capabilities to drones.

“While there are obviously still big challenges to scaling up to vehicles that could actually transport humans, we are inspired by the potential of a future in which flying cars could offer us fast, traffic-free transportation,” said CSAIL Director Daniela Rus.

YOGA NOT AS SAFE AS THOUGHT: STUDY

Yoga may not be as safe as popularly believed, say scientists who have found that the ancient Indian meditative practice may cause muscle and bone pain and even exacerbate existing injuries.

The findings, published in the *Journal of Bodywork and Movement Therapies*, come from the first prospective study to investigate injuries caused from recreational participation in yoga.

Yoga is an increasingly popular complementary or alternative therapy for musculoskeletal disorders, with millions of people practicing worldwide.

“While yoga can be beneficial for musculoskeletal pain, like any form of exercise, it can also result in musculoskeletal pain,” said Evangelos Pappas from the University of Sydney in Australia.

“Our study found that the incidence of pain caused by yoga is more than 10 per cent per year, which is comparable to the injury rate of all sports injuries combined among the physically active population,” said Pappas.

“We also found that yoga can exacerbate existing pain,

with 21 per cent of existing injuries made worse by doing yoga, particularly pre-existing musculoskeletal pain in the upper limbs,” he said.

However people consider it to be a very safe activity. This injury rate is up to 10 times higher than has previously been reported.

“In terms of severity, more than one-third of cases of pain caused by yoga were serious enough to prevent yoga participation and lasted more than three months,” Pappas said

However, 74 per cent of participants in the study reported that existing pain was improved by yoga, highlighting the complex relationship between musculoskeletal pain and yoga practice.

“Pain caused by yoga might be prevented by careful performance and participants telling their yoga teachers of injuries they may have prior to participation, as well as informing their healthcare professionals about their yoga practice,” Pappas said.

“Yoga participants are encouraged to discuss the risks of injury and any pre-existing pain, especially in the upper limbs, with yoga teachers and physiotherapists to explore posture modifications that may result in safer practice,” he said.

RARE SPECIES OF BLUE COLOURED PARROTS DISCOVERED

Scientists have discovered a rare species of parrot in Mexico with blue covert feathers, a unique green crown and a distinctive call.

The parrot, referred to as the Blue-winged Amazon, occupies a similar area in the Yucatan Peninsula as the Yucatan Amazon and the White-fronted Amazon but it does not hybridise with them, said researchers from the University of Florida in the US.

A very distinctive feature of this new species is its call, which is loud, sharp, short, repetitive and monotonous; one particular vocalisation is more reminiscent of an Accipiter than of any known parrot, they said.

The duration of syllables is much longer than in other Amazon parrot species. In flight, the call is a loud, short, sharp and repetitive yak-yak-yak. While perched, the call is mellow and prolonged.

The species lives in small flocks of less than 12 individuals. Pairs and their offspring have a tendency to remain together and are discernible in groups.

Like all members of the genus *Amazona*, this parrot is a herbivore. Its diet consists of seeds, fruits, flowers and leaves obtained in the tree canopy.

The analysis of mitochondrial DNA genes indicates that the blue-winged Amazon has emerged quite recently, or about 120,000 years ago, from within the *A. albifrons* population.

Miguel A Gomez Garza from the Autonomous University of Nuevo Leon in Mexico had first come across the species in 2014.

The study was published in the journal *PeerJ*.

NEW BAND-AID-LIKE PATCH TO REPLACE PAINFUL FLU INJECTIONS

A disposable skin patch with micro needles can safely deliver influenza vaccines to the body, eliminating the need for painful injections, scientists said today after successfully completing human trials.

The skin patch can be self-administered and stored without refrigeration, making it significantly cheaper than traditional vaccines, researchers said.

It can also be easily transported and disposed after use.

Researchers including those from Georgia Institute of Technology in the US conducted a clinical trial and found that influenza vaccination using Band-Aid-like patches with dissolvable microneedles was safe and well-tolerated by participants.

The study, published in *The Lancet* journal, showed that it was just as effective in generating immunity against influenza, and was strongly preferred by study participants over vaccination with a hypodermic needle and syringe, researchers said.

“Despite the recommendation of universal flu vaccination, influenza continues to be a major cause of illness leading to significant morbidity and mortality,” said Nadine Rouphael, associate professor at Emory University in the US.

“Having the option of a flu vaccine that can be easily and painlessly self-administered could increase coverage and protection by this important vaccine,” Rouphael said.

Participants were randomised into four groups: vaccination with micro needle patch given by a health care provider; vaccination with micro needle patch self-administered by study participants; vaccination with intramuscular injection given by a health care provider; and placebo micro needle patch given by a health care provider.

Researchers found that vaccination with the micro needle patches was safe, with no adverse events reported.

Local skin reactions to the patches were mostly faint redness and mild itching that lasted two to three days.

No new chronic medical illnesses or influenza-like illnesses were reported with either the patch or the injection groups.

Antibody responses generated by the vaccine, as measured through analysis of blood samples, were similar in the groups vaccinated using patches and those receiving intramuscular injection, and these immune responses were still present after six months, researchers said.

The team found more than 70 per cent of patch recipients reported they would prefer patch vaccination over injection or intranasal vaccination for future vaccinations.

'WILDLIFE SPECIES CAUSING LIFE, PROPERTY LOSSES ACROSS INDIA'

Up to 32 wildlife species are causing significant damage to life and property across India, say scientists who urge that the country must strengthen human-wildlife conflict management to reduce the losses.

The study examined the patterns of human-wildlife conflict and mitigation use by 5,196 families from 2011 to 2014 from 2,855 villages neighbouring 11 wildlife reserves across western, central, and southern India.

It was designed to help inform better policies to mitigate human-wildlife conflict.

The researchers, including Krithi Karanth, conservation scientist with the Wildlife Conservation Society in the US are calling for the identification of effective prevention techniques, strengthening existing compensation schemes, and an open inclusive dialogue between local communities, governments, and conservationists.

Researchers found that of over 5,000 households surveyed around 11 reserves in India, crops were lost by 71 per cent of households, livestock by 17 per cent, and human injury and death were reported by three per cent of households.

Rural families use up to 12 different mitigation techniques to protect their crops, livestock and property.

Night-time watch, scare devices, and fencing are the most common mitigation techniques used by rural families in the periphery of reserves.

Families near reserves in Karnataka and Madhya Pradesh were most likely to use mitigation.

In recent years, these states have recorded high levels of damage by wildlife, and are among states that provide the highest compensation payments across India, researchers said.

In contrast, families in Rajasthan were least likely to protect crops and property.

Across wildlife reserves, people reported average crop losses amounting to Rs 12,559 and Rs 2,883 of livestock losses annually.

Such losses constitute a significant chunk of India's rural economy, where the majority of the population earns less than Rs 5,000 per month.

"Resolving human-wildlife conflict requires revisiting the goals of conservation policies and investments by people and organisations," said Karanth.

"This is especially true with respect to effort and money deployed associated with mitigation and protection. People may be better served by deploying early warning, compensation and

insurance programmes rather than by focusing heavily on mitigation," she said.

"Combined with high poverty, and low awareness regarding government compensation, such families may be most vulnerable to impacts of wildlife damage upon their livelihoods," said Sahila Kudalkar, research associate with the Centre for Wildlife Studies in Karnataka.

The study was published in the journal *Human Dimensions of Wildlife*.

NASA'S QUIETER SUPERSONIC JET CLOSER TO REALITY

NASA has achieved a significant milestone in developing a quieter supersonic passenger jet that can safely travel over land.

The US space agency completed the preliminary design review (PDR) of its Quiet Supersonic Transport (QueSST) aircraft design.

QueSST is the initial design stage of NASA's planned Low Boom Flight Demonstration (LBFD) experimental airplane, otherwise known as an X-plane.

The QueSST design is capable of fulfilling the LBFD aircraft's mission objectives, which are to fly at supersonic speeds, but create a soft "thump" instead of the disruptive sonic boom associated with supersonic flight today.

The LBFD X-plane will be flown over communities to collect data necessary for regulators to enable supersonic flight over land.

NASA partnered with lead contractor, Lockheed Martin, in February 2016 for the QueSST preliminary design.

Last month, a scale model of the QueSST design completed testing in the 8x6-foot supersonic wind tunnel at NASA's Glenn Research Centre in Cleveland.

"Managing a project like this is all about moving from one milestone to the next," said David Richwine, manager for the preliminary design effort under NASA's Commercial Supersonic Technology Project.

"Our strong partnership with Lockheed Martin helped get us to this point. We're now one step closer to building an actual X-plane," said Richwine.

After the success of completing the PDR, NASA can start the process of soliciting proposals and award a contract early next year to build the piloted, single-engine X-plane.

HANDWRITING MAY REVEAL YOUR PERSONALITY TRAITS: STUDY

Your handwriting can tell if you have a personality similar to Isaac Newton or Queen Victoria, say scientists who have decoded character traits of some of Britain's most famous names by decoding their writing style.

Researchers from Royal Mail in the UK along with Tracey Trussell, a leading handwriting analyst studied letters and notes from UK's defining figures such as Rosalind Franklin, Isaac Newton, Queen Victoria, Florence Nightingale, Millicent Fawcett, Charles Darwin and Elizabeth Fry.

The subjects were chosen as they were all keen letter writers and appeared in the 100 Greatest Britons or 100 Great Black Britons lists.

"Handwriting is like 'brain writing' because it comes through the central nervous system. It's a snapshot in time," said Tracey Trussell, handwriting analyst in the UK.

Slant is an emotional barometer that measures people's social stance. A marked right slant such as that in the writing style of Queen Victoria and Isaac Newton indicates that a person is enthusiastic, responsive and that they do not want to hold back and tend to be highly proactive.

Writing consists of three zones – upper, middle and lower. The upper zone focuses on the parts of the letters that extend upwards like b, d, f, h and k, researchers said.

People with a large and dominant upper zone have rich imaginations, creative mind-sets and big aspirations. They are also intellectually savvy, ethical and have high standards, like Claudia Jones, Ignatius Sancho and Charles Darwin, researchers said.

A person with long and high t-bars is a take-charge sort of person, like Queen Victoria and feminist leader Millicent Fawcett. They are decision makers and perfectionists, they said.

Narrow or non-existent right margin is when the end of a sentence leaves no space on the right hand side of the page. Words appear to fall off the edge of the page or dip down like in the cases of Isaac Newton and Charles Darwin.

The size of the right hand margin shows the writer's real feelings towards the future. Those that leave no right margin are outgoing and engaging. They are also impulsive, goal-orientated and driven, researchers said.

A noticeably large (or inflated) letter 'k' shows people who are resourceful and defiant like Charles Darwin, Ignatius Sancho and Claudia Jones. They like to get their own way and follow their own path in life, researchers said.

"It is amazing to think that something we do every day can reveal so much about us," said David Gold from Royal Mail - a postal and delivery provider service.

GM PURPLE RICE THAT CAN CUT CANCER, DIABETES RISK DEVELOPED

Chinese scientists have created genetically modified purple rice that can reduce the risk of certain cancers, cardiovascular disease, diabetes and other chronic disorders.

Researchers developed approach capable of delivering many genes at once and used it to make rice endosperm - seed

tissue that provides nutrients to the developing plant embryo - produce high levels of antioxidant-boosting pigments called anthocyanins.

"We have developed a highly efficient, easy-to-use transgene stacking system called TransGene Stacking II that enables the assembly of a large number of genes in single vectors for plant transformation," said Yao-Guang Liu of the South China Agricultural University.

"We envisage that this vector system will have many potential applications in this era of synthetic biology and metabolic engineering," said Liu.

To date, genetic engineering approaches have been used to develop rice enriched in beta-carotene and folate, but not anthocyanins.

Although these health-promoting compounds are naturally abundant in some black and red rice varieties, they are absent in polished rice grains because the husk, bran, and germ have been removed, leaving only the endosperm.

Previous attempts to engineer anthocyanin production in rice have failed because the underlying biosynthesis pathway is highly complex, and it has been difficult to efficiently transfer many genes into plants.

To address this challenge, researchers first set out to identify the genes required to engineer anthocyanin production in the rice endosperm.

To do so, they analysed sequences of anthocyanin pathway genes in different rice varieties and pinpointed the defective genes in japonica and indica subspecies that do not produce anthocyanins.

Based on this analysis, they developed a transgene stacking strategy for expressing eight anthocyanin pathway genes specifically in the endosperm of the japonica and indica rice varieties.

The resulting purple endosperm rice had high anthocyanin levels and antioxidant activity in the endosperm.

"This is the first demonstration of engineering such a complex metabolic pathway in plants," Liu said.

In the future, this transgene stacking vector system could be used to develop plant bioreactors for the production of many other important nutrients and medicinal ingredients.

For their own part, the researchers plan to evaluate the safety of purple endosperm rice as biofortified food, and they will also try to engineer the biosynthesis of anthocyanins in other crops to produce more purple endosperm cereals.

"Our research provides a high-efficiency vector system for stacking multiple genes for synthetic biology and makes it potentially feasible for engineering complex biosynthesis pathways in the endosperm of rice and other crop plants such as maize, wheat, and barley," Liu said.

CHILDHOOD ASTHMA MAY UP HEART FAILURE RISK IN ADULTHOOD: STUDY

Children with asthma are at greater risk suffering from heart failure later in life, a study warns.

Scientists found that young adults with a history of asthma are at a greater risk of thickening of the left ventricle, which can cause shortness of breath, chest pain, fainting, and eventually lead to heart failure.

The prevalence of asthma has been growing during the past decade, occurring in an estimated 8.6 per cent of children and 7.4 per cent of adults.

Researchers from Tulane University in the US examined about 1,118 patients who answered a questionnaire on their asthma history.

During about 10 years of follow-up, subjects with a history of asthma had a higher adjusted mean left ventricular mass and left ventricular mass index compared to those without asthma.

Systolic blood pressure significantly modified the association of asthma with left ventricular mass and left ventricular mass index, as the association was more prominent in patients with prehypertension and hypertension.

While previous studies have found asthma to be related to other cardiovascular conditions, this is the first study to find an association between a history of asthma from childhood and left ventricular mass in adulthood, researchers said.

“Our findings suggest aggressive lifestyle modifications or even pharmacological treatment may be applied to people with a history of asthma, especially those also affected by high blood pressure, in order to lower cardiovascular risk,” said Lu Qi, from Tulane University.

The study was published in the journal *JACC: Heart Failure*.

URANUS' MAGNETIC FIELD FLIPS ON AND OFF LIKE A SWITCH: STUDY

Scientists have found that Uranus' magnetic field gets flipped on and off like a light switch every day as the planet rotates.

Researchers from Georgia Institute of Technology in the US made the discovery based on the data from NASA's Voyager 2 spacecraft that sped past Uranus in 1986.

“The magnetosphere is ‘open’ in one orientation, allowing solar wind to flow into the magnetosphere; it later closes, forming a shield against the solar wind and deflecting it away from the planet,” researchers said.

This is much different from Earth's magnetosphere, which typically only switches between open and closed in response to changes in the solar wind.

Since the same alignment of Earth's magnetosphere is always facing toward the sun, the magnetic field threaded in the ever-present solar wind must change direction in order to reconfigure Earth's field from closed to open. This frequently occurs with strong solar storms.

Uranus lies and rotates on its side, and its magnetic field is lopsided - it's off-centred and tilted 60 degrees from its axis.

Those features cause the magnetic field to tumble asymmetrically relative to the solar wind direction as the icy giant completes its 17.24-hour full rotation.

Rather than the solar wind dictating a switch like here on Earth, Uranus' rapid rotational change in field strength and orientation lead to a periodic open-close-open-close scenario as it tumbles through the solar wind, researchers said.

“Uranus is a geometric nightmare. The magnetic field tumbles very fast, like a child cartwheeling down a hill head over heels,” said Carol Paty associate professor at Georgia Institute of Technology.

“When the magnetised solar wind meets this tumbling field in the right way, it can reconnect and Uranus' magnetosphere goes from open to closed to open on a daily basis,” she added.

Reconnection of magnetic fields is a phenomenon throughout the solar system. It is one reason for Earth's auroras.

Researchers used numerical models to simulate the planet's global magnetosphere and to predict favourable reconnection locations.

They plugged in data collected by Voyager 2 during its five-day flyby in 1986. It's the only time a spacecraft has visited.

“Perhaps what we see on Uranus and Neptune is the norm for planets: very unique magnetospheres and less-aligned magnetic fields,” said Xin Cao from Georgia Institute of Technology.

“Understanding how these complex magnetospheres shield exoplanets from stellar radiation is of key importance for studying the habitability of these newly discovered worlds,” Cao added.

The study was published in the *Journal of Geophysical Research*.

TEN MILLION TONNES OF FISH GET WASTED EVERY YEAR: STUDY

Industrial fishing fleets dump nearly 10 million tonnes of good fish back into the ocean every year - enough to fill about 4,500 Olympic sized swimming pools - a study has found.

Researchers from University of British Columbia in Canada and the University of Western Australia found that almost 10 per cent of the world's total catch in the last decade was discarded due to poor fishing practices and inadequate management.

"In the current era of increasing food insecurity and human nutritional health concerns, these findings are important," said Dirk Zeller, professor at the University of Western Australia.

Fishers discard a portion of their catch because fishing practices damage the fish and make them unmarketable, the fish are too small, the species is out of season, only part of the fish needs to be harvested - as with the Alaska pollock roe - or the fishers caught species that they were not targeting, something known as bycatch.

"Discards also happen because of a nasty practice known as high-grading where fishers continue fishing even after they've caught fish that they can sell," said Zeller.

"If they catch bigger fish, they throw away the smaller ones; they usually can't keep both loads because they run out of freezer space or go over their quota," he said.

The study, published in the journal *Fish and Fisheries*, examined the amount of discarded fish over time.

In the 1950s, about five million tonnes of fish were discarded every year, in the 1980s that figure grew to 18 million tonnes.

It decreased to the current levels of nearly 10 million tonnes per year over the past decade.

The decline in discards in recent years could be attributed to improved fisheries management and new technology, but researchers said that it may also be an indicator of depleted fish stocks.

Catches have been declining at a rate of 1.2 million tonnes of fish every year since the mid-1990s, researchers said.

"Discards are now declining because we have already fished these species down so much that fishing operations are catching less and less each year, and therefore there's less for them to throw away," he said.

The study also shows how industrial fleets move to new waters once certain fisheries decline.

"The shift of discards from Atlantic to Pacific waters shows a dangerous trend in fisheries of exporting our fishing needs and fishing problems to new areas," said Tim Cashion, University of British Columbia.

CLIMATE CHANGE MAY LEAD TO 2 BILLION REFUGEES BY 2100: STUDY

One-fifth of the world's population - about two billion people - could become climate change refugees by the year 2100 due to rising ocean levels, a study warns.

Those who once lived on coastlines will face displacement and resettlement bottlenecks as they seek habitable places inland, researchers said.

"We're going to have more people on less land and sooner than we think," said Charles Geisler, professor at Cornell University in the US.

"The future rise in global mean sea level probably won't be gradual. Yet few policy makers are taking stock of the significant barriers to entry that coastal climate refugees, like other refugees, will encounter when they migrate to higher ground," Geisler said.

Earth's escalating population is expected to top nine billion people by 2050 and climb to 11 billion people by 2100, according to a UN report. Feeding that population will require more arable land even as swelling oceans consume fertile coastal zones and river deltas, driving people to seek new places to dwell.

By 2060, about 1.4 billion people could be climate change refugees, according to the study. Geisler extrapolated that number to two billion by 2100.

"The colliding forces of human fertility, submerging coastal zones, residential retreat, and impediments to inland resettlement is a huge problem," he said.

"We offer preliminary estimates of the lands unlikely to support new waves of climate refugees due to the residues of war, exhausted natural resources, declining net primary productivity, desertification, urban sprawl, land concentration, 'paving the planet' with roads and greenhouse gas storage zones offsetting permafrost melt," Geisler said.

The study, published in the journal *Land Use Policy*, describes tangible solutions and proactive adaptations in places like Florida and China, which coordinate coastal and interior land-use policies in anticipation of weather-induced population shifts.

Beyond sea level rise, low-elevation coastal zones in many countries face intensifying storm surges that will push sea water further inland.

Historically, humans have spent considerable effort reclaiming land from oceans, but now live with the opposite - the oceans reclaiming terrestrial spaces on the planet," said Geisler.

In the study, researchers explored a worst-case scenario for the present century.

They note that the competition of reduced space will induce land-use trade-offs and conflicts. This could mean selling off public lands for human settlement.

“The pressure is on us to contain greenhouse gas emissions at present levels. It’s the best ‘future proofing’ against climate change, sea level rise and the catastrophic consequences likely to play out on coasts, as well as inland in the future,” said Geisler.

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EXTINCTION EVENT 2 MLN YRS AGO WIPED OUT THIRD OF MARINE LIFE

Scientists have discovered a major extinction event that wiped out around a third of marine species and reduced their diversity by 55 per cent between two to three million years ago.

The disappearance of a large part of the terrestrial megafauna such as saber-toothed cat and the mammoth during the ice age is well known.

Researchers at the University of Zurich in Switzerland and the Naturkunde Museum in Berlin, Germany have shown that a similar extinction event had taken place earlier in the oceans.

The team investigated fossils of marine megafauna from the Pliocene and the Pleisto-cene epochs - 5.3 million to around 9,700 years BC.

“We were able to show that around a third of marine megafauna disappeared about three to two million years ago. Therefore, the marine megafaunal communities that humans inherited were already altered and functioning at a diminished diversity,” said Catalina Pimiento from the University of Zurich.

Above all, the newly discovered extinction event affected marine mammals, which lost 55 per cent of their diversity.

As many as 43 per cent of sea turtle species were lost, along with 35 per cent of sea birds and nine per cent of sharks.

On the other hand, the new forms of life developed during the subsequent Pleistocene epoch.

Around a quarter of animal species, including the polar bear *Ursus*, the storm petrel *Oceanodroma* or the penguin *Megadyptes*, had not existed during the Pliocene.

Overall, however, earlier levels of diversity could not be reached again, researchers said.

In order to determine the consequences of this extinction, researchers concentrated on shallow coastal shelf zones, investigating the effects that the loss of entire functional entities had on coastal ecosystems.

Functional entities are groups of animals not necessarily related, but that share similar characteristics in terms of the function they play on ecosystems.

Researchers found that seven functional entities were lost in coastal waters during the Pliocene.

This led to an erosion of functional diversity - 17 per cent of the total diversity of ecological functions in the ecosystem disappeared and 21 per cent changed.

Previously common predators vanished, while new competitors emerged and marine animals were forced to adjust.

In addition, the researchers found that at the time of the extinction, coastal habitats were significantly reduced due to violent sea levels fluctuations.

The researchers propose that the sudden loss of the productive coastal habitats, together with oceanographic factors such as altered sea currents, greatly contributed to these extinctions.

EATING TOFU, SOY PRODUCTS MAY STAVE OFF EARLY MENOPAUSE RISK

Eating high amounts of whole grains, soy, tofu and other foods rich in vegetable proteins may prevent early menopause and prolong reproductive function in women, a study claims.

Researchers also found that consuming enriched pasta, dark bread and cold cereal were especially associated with lower risk, while they observed no similar relation to eating animal sources of protein.

“A better understanding of how dietary vegetable protein intake is associated with ovarian ageing may identify ways for women to modify their risk of early onset menopause and associated health conditions,” said Maegan Boutot from the University of Massachusetts Amherst in the US

Researchers evaluated the relationship between diet and risk of early menopause among members of the Nurses’ Health Study II (NHS2), an ongoing prospective study of 116,000 women aged 25-42.

Participants were asked to report how often they ate a single serving of about 131 foods, beverages and supplements over the previous year, from “never or less than once a month” to “over 6 per day.”

Researchers observed that women consuming about 6.5 per cent of their daily calories as vegetable protein had a significant 16 per cent lower risk of early menopause compared to women whose intake was approximately four per cent of calories.

For a woman with a 2,000 calorie per day diet, this is equal to three to four servings of such foods as enriched pasta, breakfast cereal, tofu and nuts, or about 32.5 grammes a day.

“Though relatively few women in our study consumed very high levels of vegetable protein and our power for analyses of more extreme intake levels was limited, women consuming nine or more per cent of their calories from vegetable protein had a hazard ratio of 0.41,” Boutot said.

The study was published in the American Journal of Epidemiology.

NIGHT SHIFTS MAY HAMPER DNA REPAIR: STUDY

Working in night shifts may hinder the body’s ability to repair DNA damage caused by normal cellular processes, scientists including one of Indian origin warn.

Researches including those from Duke University in the US had previously had found that day sleep was associated with lower levels in their urine of a chemical by-product of active DNA tissue repair called 8-OH-dG than night sleep-potentially indicating reduced capacity to repair cellular damage.

In the new study, they measured 8-OH-dG levels in the stored urine samples of 50 night out of the 223 night shift workers.

These 50 people had exhibited the widest discrepancies in levels of circulating melatonin between night work and night sleep.

Analysis of the urine samples showed that melatonin levels were much lower when taken during a night shift than when taken during a normal night’s sleep, researchers said.

After taking account of potentially influential factors, such as alcohol consumption and shorter sleep duration (average 5.5 hours) during the day preceding a night shift, 8 -OH-dG levels were only 20 per cent of those observed during a normal night’s sleep (average 7.5 hours).

“Our results indicate that, relative to night sleep, reduced melatonin production among shift workers during night work is associated with significantly reduced urinary excretion of 8-OH-dG,” researchers including Parveen Bhatti from Fred Hutchinson Cancer Research Centre in the US said.

A particular pathway called NER is thought to be involved in the repair of DNA damage caused by oxygen free radicals, which are produced during normal cellular activity, researchers said.

Research has shown that melatonin production boosts the activity of the genes involved in the NER pathway, they said.

The study was published in the British Medical Journal.

NEW AI SYSTEM CAN READ YOUR MIND!

Scientists have developed a new ‘mind reading’ artificial intelligence system that can decode complex human thoughts just by measuring brain activity.

The AI system indicates that the mind’s building blocks for constructing complex thoughts are formed by the brain’s various sub-systems and are not word-based.

“We have finally developed a way to see thoughts of that complexity in the fMRI signal. The discovery of this correspondence between thoughts and brain activation patterns tells us what the thoughts are built of,” said Marcel Just

from Carnegie Mellon University (CMU) in the US.

Researchers demonstrated that the brain's coding of 240 complex events, sentences like the shouting during a trial scenario uses an alphabet of 42 meaning components, or neurally plausible semantic features.

These consists of features, like person, setting, size, social interaction and physical action.

Each type of information is processed in a different brain system - which is how the brain also processes the information for objects, researchers said.

By measuring the activation in each brain system, the programme can tell what type of thoughts are being contemplated.

"One of the big advances of the human brain was the ability to combine individual concepts into complex thoughts, to think not just of 'bananas,' but 'I like to eat bananas in evening with my friends,'" researchers said.

"Our method overcomes the unfortunate property of fMRI to smear together the signals emanating from brain events that occur close together in time, like the reading of two successive words in a sentence," Just said.

"This advance makes it possible for the first time to decode thoughts containing several concepts. That's what most human thoughts are composed of," Just added.

Researchers used a computational model to assess how the brain activation patterns for 239 sentences corresponded to the neurally plausible semantic features that characterised each sentence in seven adult participants.

The programme was then able to decode the features of the 240th left-out sentence. They went through leaving out each of the 240 sentences in turn, in what is called cross-validation.

The model was able to predict the features of the left-out sentence, with 87 per cent accuracy, despite never being exposed to its activation before, researchers said.

It was also able to work in the other direction, to predict the activation pattern of a previously unseen sentence, knowing only its semantic features.

The study was published in the journal *Human Brain Mapping*.

TWITTER CAN DETECT RIOTS FASTER THAN POLICE: STUDY

Twitter posts can help track riots and other violent events much before they are reported to the police, according to a study which shows that social media can be an invaluable source of information for law-enforcement officials.

An analysis of data taken from the London riots in 2011 showed that computer systems could automatically scan through Twitter and detect serious incidents, such as shops being

broken into and cars being set alight, before they were reported to the UK Metropolitan Police Service.

The system, developed by researchers at Cardiff University in the UK, could also discern information about where the riots were rumoured to take place and where groups of youths were gathering.

The research, published in the journal *ACM Transactions on Internet Technology*, showed that on average the computer systems could pick up on disruptive events several minutes before officials and over an hour in some cases.

Researchers believe that their work could enable police officers to better manage and prepare for both large and small scale disruptive events.

"We have previously used machine-learning and natural language processing on Twitter data to better understand online deviance, such as the spread of antagonistic narratives and cyber hate," said Pete Burnap from Cardiff University.

"In this research we show that online social media are becoming the go-to place to report observations of everyday occurrences - including social disorder and terrestrial criminal activity," Burnap said.

"This research could augment existing intelligence gathering and draw on new technologies to support more established policing methods," he said.

Researchers analysed 1.6 million tweets relating to the 2011 riots in England, which began as an isolated incident in Tottenham on August 6 but quickly spread across London and to other cities in England, giving rise to looting, destruction of property and levels of violence not seen in England for more than 30 years.

They used a series of machine-learning algorithms to analyse each of the tweets from the dataset, taking into account a number of key features such as the time they were posted, the location where they were posted and the content of the tweet itself.

Results showed that the machine-learning algorithms were quicker than police sources in all but two of the disruptive events reported.

When the first reports of disorder occurring in Enfield were received by the police, the researchers showed that their system could have picked up this information from Twitter one hour and 23 minutes earlier.

Scientists are continually looking to the swathes of data produced from Twitter, Facebook and YouTube to help them to detect events in real-time.

Estimates put social media membership at about 2.5 billion non-unique users, and the data produced by these users have been used to predict elections, movie revenues and even the epicentre of earthquakes.

HUMANS COULD REGENERATE HEART CELLS IN FUTURE: STUDY

Scientists have discovered genetic interactions that may allow heart cells to regenerate, an advance that could lead to new therapies to treat cardiac diseases.

Researchers from the University of Florida (UF) in the US found genes known to form hearts cells in humans and other animals in the gut of a muscle-less and heartless sea anemone.

The sea anemone can regenerate into a new animal if it is cut into many pieces.

Researchers analysed the function of its “heart genes,” and discovered a difference in the way these genes interact with one another, which may help explain its ability to regenerate, said Mark Martindale, a professor at UF.

The findings, published in the journal *Proceedings of the National Academy of Sciences*, point to potential for tweaking communication between human genes and advancing our ability to treat heart conditions and stimulate regenerative healing, he said.

“Our study shows that if we learn more about the logic of how genes that give rise to heart cells talk to each other, muscle regeneration in humans might be possible,” Martindale said.

These heart genes generate what engineers call lockdown loops in vertebrates and flies, which means that once the genes are turned on, they tell each other to stay on in an animal’s cells for its entire lifetime.

In other words, animals with a lockdown on their genes cannot grow new heart parts or use those cells for other functions.

“This ensures that heart cells always stay heart cells and cannot become any other type of cell,” Martindale said.

However, in sea anemone embryos, the lockdown loops do not exist. The finding suggests a mechanism for why the gut cells expressing heart genes in sea anemones can turn into other kinds of cells, such as those needed to regenerate damaged body parts, Martindale said.

The study supports the idea that definitive muscle cells found in the majority of animals arose from a bifunctional gut tissue that had both absorptive and contractile properties.

While the gut tissue of a sea anemone might not look like a beating heart, it does undergo slow, rhythmic peristaltic waves of contraction, much like the human digestive system.

Researchers argue that the first animal muscle cells might have been very heart-like, Martindale said.

“The idea is these genes have been around a long time and preceded the twitchy muscles that cover our skeleton,” Martindale said.

Continued research could one day allow scientists to coax muscle cells into regenerating different kinds of new cells, including more heart cells, Martindale said.

CANCER HIJACKS NATURAL CELL PROCESS TO SURVIVE: STUDY

Cancer tumours manipulate a natural cell process to promote their survival, and controlling this mechanism could stop progress of the deadly disease, Oxford scientists suggest.

Non-sense mediated decay (NMD) is a natural physiological process that provides cells with the ability to detect DNA errors called nonsense mutations.

It also enables these cells to eliminate the mutated message (decay) that comes from these faulty genes, before they can be translated into proteins that can cause disease formation.

NMD is known among the medical community for the role it plays in the development of genetic diseases such as Cystic Fibrosis and some hereditary forms of cancers.

However, not all nonsense mutations can elicit NMD, so until now, its wider impact on cancer was largely unknown.

Researchers from the University of Oxford and the University of Birmingham in the UK developed a computer algorithm to mine DNA sequences from cancer to accurately predict whether or not an NMD would eliminate genes that had nonsense mutations.

The work originally focused on ovarian cancers, and found that about a fifth of these cancers use NMD, to become stronger.

This is because NMD ensures that the message from a gene called TP53, which ordinarily protects cells from developing cancer is almost completely eliminated.

In the absence of NMD, a mutated TP53 might still retain some activity but NMD ensures that this is not the case.

Based on this research, the team predicts that because cancers essentially feed on NMD, they become dependent on it in some cases.

If scientists were therefore able to inhibit or control the process, it is possible that they could also control cancer and prevent the progression of the disease.

“Our first observations of evidence of the role of NMD in ovarian cancer were tantalising,” said Ahmed Ahmed, Professor at the University of Oxford.

“We found that NMD precisely explained why there was almost no expression of TP53 in certain ovarian cancers. We went on to test the role of NMD in other cancer types and the evidence of the role of NMD was compelling,” said Ahmed.

“This opens the door for exciting possibilities for customised treatments including individualized immunotherapies for patients in the future,” he added.

Following the ovarian cancer analysis, the team expanded the study to include other cancer types.

They analysed about a million different cell mutations in more than 7,000 tumours from the Cancer Genome Atlas covering 24 types of cancer.

The team was able to map how each cancer type used NMD revealing the remarkable extent to which NMD helps cancer to survive.

NEW DNA MINI-MACHINES MAY LEAD TO MOLECULAR COMPUTERS

Scientists have built simple machines out of DNA, which switch reversibly between two different shapes and could be used to make nanotech sensors, amplifiers and even a molecular computer.

The DNA machines can relay discrete bits of information through space or amplify a signal, said Yonggang Ke, an assistant professor from Georgia Institute of Technology in the US.

“In the field of DNA-based computing, the DNA contains the information, but the molecules are floating around in solution,” Ke said.

“What’s new here is that we are linking the parts together in a physical machine,” he said.

Similarly, several laboratories have already made nanotech machines such as tweezers and walkers out of DNA.

Ke said that the work sheds light on how to build structures with more complex, dynamic behaviours.

The arrays’ structures look like retractable security gates. Extending or contracting one unit pushes nearby units to change shape as well, working like a domino cascade whose tiles are connected.

The arrays’ units get their stability from the energy gained when DNA double helices stack up.

To be stable, the units’ four segments can align as pairs side by side in two different orientations.

By leaving out one strand of the DNA at the edge of an array, the engineers create an external trigger. When that strand is added, it squeezes the edge unit into changing shape.

To visualise the DNA arrays, the engineers used atomic force microscopy. They built rectangular 11x4 and 11x7 arrays, added trigger strands and could observe the cascade propagate from the corner unit to the rest of the array.

The arrays’ cascades can be stopped or resumed at selected locations by designing break points into the arrays. The units’ shape conversions are modulated by temperature or chemical denaturants.

For reference, the rectangular arrays are around 50 nanometres wide and a few hundred nanometres long - slightly smaller than a HIV or influenza virion.

To build the DNA array structures, the engineers used both origami (folding one long “scaffold” strand with hundreds

of “staple” strands) and modular brick approaches.

Both types of arrays self-assemble through DNA strands finding their complimentary strands in solution. The origami approach led to more stable structures in conditions of elevated temperature or denaturant.

Researchers showed that they could build rectangles and tubes of array units. They also include a cuboid that has three basic conformations, more than the two-dimensional array units with two conformations.

NEW FOLDABLE, WALKING ROBOT COULD AID FUTURE SPACE MISSIONS

Scientists have built the first foldable walking robot that pops up when deployed, and could be used for future space missions as well as seabed exploration on Earth.

The robot, which the researchers call DeployBot, is assembled from eight modules: four for the body and one for each of the four legs.

In their folded state, the modules lie flat, and after they are deployed they pop up into roughly a square shape.

The modules are made of both rigid and flexible materials and contain embedded magnets that connect and lock multiple modules together.

A shape memory alloy wire running through the square frame of each module is responsible for deploying and folding the modules, which takes several seconds but can be done repeatedly.

“The main advantage of this modular robot is robustness in various environments due to lack of mechanical systems such as motors and gears,” said Sung-Hoon Ahn from Seoul National University in South Korea.

“Thus, problems facing motor-based robots, such as sealing and lubrication of mechanical systems in water or space environments, are not a problem for the smart actuator,” Ahn was quoted as saying by ‘Phys.org’.

The robot walks when an electric current is applied to shape-memory alloy wires embedded in its frame. The current heats the wires, causing the robot’s flexible segments to contract and bend.

Sequentially controlling the current to various segments in different ways results in different walking gaits.

No motors are required for the robot to move, researcher said.

VIDEO GAMES CAN REWIRE YOUR BRAIN: STUDY

Playing video games can shape our brains and behaviour, boosting attention as well as causing neural changes similar to those seen in addictive disorders, say scientists.

Video games are becoming more common and are increasingly enjoyed by adults. The average age of gamers has been increasing, and was estimated to be 35 in 2016.

Changing technology also means that more people are exposed to video games. Many committed gamers play on desktop computers or consoles, but a new breed of casual gamers has emerged, who play on smartphones and tablets at spare moments throughout the day, like their morning commute.

Researchers looked at studies exploring brain regions associated with the reward system, and how these are related to video game addiction.

“Games have sometimes been praised or demonized, often without real data backing up those claims. Moreover, gaming is a popular activity, so everyone seems to have strong opinions on the topic,” said Marc Palaus, from Open University of Catalonia in Spain.

Scientists wanted to see if any trends had emerged from the research to date concerning how video games affect the structure and activity of our brains.

They collected the results from 116 scientific studies, 22 of which looked at structural changes in the brain and 100 of which looked at changes in brain functionality and behavior.

The studies show that playing video games can change how our brains perform, and even their structure.

For example, playing video games affects our attention, and some studies found that gamers show improvements in several types of attention, such as sustained attention or selective attention.

The brain regions involved in attention are also more efficient in gamers and require less activation to sustain attention on demanding tasks.

There is also evidence that video games can increase the size and efficiency of brain regions related to visuospatial skills. For example, the right hippocampus was enlarged in both long-term gamers and volunteers following a video game training program.

Video games can also be addictive, and this kind of addiction is called “Internet gaming disorder.”

Researchers have found functional and structural changes in the neural reward system in gaming addicts, in part by exposing them to gaming cues that cause cravings and monitoring their neural responses.

These neural changes are basically the same as those seen in other addictive disorders.

“We focused on how the brain reacts to video game exposure, but these effects do not always translate to real-life changes,” said Palaus.

As video games are still quite new, the research into their effects is still in its infancy. For example, we are still working out what aspects of games affect which brain regions and how.

“It’s likely that video games have both positive (on attention, visual and motor skills) and negative aspects (risk of addiction), and it is essential we embrace this complexity,” said Palaus.

NEW DROUGHT-RESISTANT CROPS DEVELOPED

In a breakthrough, scientists, including one of Indian origin, have developed plants that have a better chance of surviving droughts by enhancing the natural ability of their leaves to preserve water.

The new method has helped some plants survive 50 per cent longer in drought conditions, and could eventually benefit major crops such as barley, rice and wheat, which are crucial to world food supplies, researchers said

Researchers from Australian National University (ANU) mapped a new molecular signalling pathway that controls the ability of plants to close the pores on their leaves to conserve water during drought stress.

The team found that chloroplasts, better known for their role in photosynthesis, are actually key players that work together with plant hormones during drought stress.

Researchers, including Diep Ganguly of ANU, found chloroplasts in cells surrounding the pores on leaves, called stomata, can sense drought stress and thereby activate a chemical signal that closes stomata to conserve water.

The team conducted tests on barley and Arabidopsis, a small flowering native plant, and enhanced levels of the chloroplast signal which helps plants close stomata.

“Boosting the levels of this chloroplast signal also restores tolerance in drought-sensitive plants and extended their drought survival by about 50 per cent,” said Kai Chan from ANU.

Boosting the chloroplast signal, by breeding, genetic or agronomic strategies, could be the key to help plants preserve water and boost drought tolerance, he said.

“This finding was completely unexpected and opens new avenues of enquiry into how chloroplasts can contribute to plant responses to the environment,” said Barry Pogson from ANU.