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POLLUTANTS DISPERSING IN DELHI BUT AIR QUALITY STILL BAD

The volume of pollutants markedly came down in Delhi today with their rapid dispersion caused by a strong wind movement, a day after Diwali fireworks pushed the city's air quality into the 'severe' zone for the first time this year.

The Central Pollution Control Board (CPCB), which attributed yesterday's high pollution levels to calm wind movement and a low mixing height (where air and suspended particles mix), said the situation will improve further by tomorrow if favourable conditions prevail.

"The wind speed is expected to pick up and reach up to 9 km/hour, which is adequate enough for the dispersion of suspended particulates. Yesterday and the day before, wind speed and mixing height were extremely low, which led to the rapid build up of pollutants near the surface," Dipankar Saha, CPCB's air lab head, told PTI.

The improvement was captured by the pollution monitoring stations. Six out of the eight stations maintained by SAFAR (System of Air Quality Forecasting and Research), an agency under the Ministry of Earth Sciences, had air quality index (AQI) in the 'very poor' category, a shade better than 'severe'.

Among the station maintained by the CPCB, nine out of 17 were in the 'very poor' category, while the rest recorded 'severe' air quality.

A 'very poor' AQI comes with the warning that people may develop respiratory illness on prolonged exposure while exposure to 'severe' air affects healthy people and seriously impacts those with existing respiratory or cardiovascular diseases.

At 12 PM, the 24-hour rolling average of PM2.5 and PM10, ultra-fine particulates, which are up to 30 times tinier than the width of a human hair, were 206 and 357 microgrammes per cubic metre (ug/m3) respectively, as against yesterday's 407 and 595.

Their 24-hour safe standards are 60 and 100 and anything beyond that is considered harmful as these particles enter the respiratory system and can manage to reach the bloodstream, causing irreparable damage to humans and animals.

Diwali fireworks left Delhi gasping yesterday as night-long bursting of firecrackers despite a Supreme Court ban on their sale had plunged the air quality into the 'severe' zone for the first time this year.

Pollution in Delhi breached emergency levels on the Diwali night and the air quality worsened the day after, but compared to last year's post Diwali period, the city is relatively better off, the pollution monitoring agencies concurred in their reports yesterday.

The CPCB, the country's apex pollution regulator, had recorded an air quality index (AQI) of 403 in Delhi, 402 in Noida and 412 in Ghaziabad, all in the severe zone, or the most polluted category, on October 20.

In a direct indicator of the impact of firecrackers, the SO2 (sulphur dioxide) levels that otherwise remain very low in the region, had increased by more than three times in several locations, including R K Puram, Shadipur and Punjabi Bagh on October 19, the Centre for the Science and Environment (CSE) said.

Delhi Environment Minister Imran Hussain had reviewed the situation during a meeting. The government had issued a statement following the meeting, saying major changes in the level of pollutants were observed after 8 PM on Thursday when the fireworks started.

Yesterday, the US Embassy's pollution monitor recorded 'hazardous' air quality with the index scoring an alarming 878, which the mission considers "beyond its air quality index" (AQI), which ends at 500".

But unlike previous years, the run-up to Diwali festivities was much cleaner this time.

Even the Diwali evening was relatively quiet and promising, suggesting that the ban on sale of firecrackers in the Delhi-NCR region imposed by the apex court has worked.

As the clock ticked, frenzied celebrations picked up and noisy and relentless bursting of firecrackers continued till the wee hours, sending the pollution graph off the charts.

The Supreme Court-appointed Environment Pollution Prevention and Control Authority (EPCA), which is empowered to enforce the Graded Response Action Plan (GRAP) to combat air pollution in Delhi-NCR, kicked off a series of preventive measures on October 17.

Measures under the GRAP's 'very poor' and 'severe' categories, which include a ban on diesel generator sets, have come into effect and will remain in force till March 15.

'DIWALI NIGHT POLLUTION IN DELHI BREACHED EMERGENCY LEVELS'

Pollution in Delhi breached emergency levels on the Diwali night and the air quality has since progressively deteriorated, but compared to last year, the city was relatively better off, the pollution monitoring agencies today concurred.

The Central Pollution Control Board (CPCB) released data showing a significant fall in volume of particulates PM2.5, PM10 and gaseous pollutant SO2 (sulphur dioxide) recorded by its stations across the national capital on the Diwali night, as compared to last year.

However, the volume of pollutants were almost identical, at places even higher, when placed against the figures of 2014 or 2015, making it difficult to attribute the marginal dip to any particular factor, such as the ban on the sale of firecrackers in the region by the Supreme Court on October 10.

The CPCB's Diwali day air quality index had a score of 426 last year, which falls in the 'severe' - or the most polluted - category. This year, it was 326, in the 'very poor' category, a shade better.

However, the overall air quality index (AQI) of the city, as recorded by CPCB, was 403 today, which is in the severe category. CPCB's monitoring network has also expanded over the the last one year with the addition of around 10 new stations.

Dipankar Saha, head of CPCB's air lab, said inspite of non-favourable meteorological conditions such as lesser distribution of pollutants and low wind speed leading to their stagnation, the air quality on Diwali has shown an improvement over 2016.

The Centre for Science and Environment (CSE) said the pollution levels worsened this morning due to calm wind and higher moisture in the air - as was predicted.

"Since October 1, PM2.5 levels have largely hovered around 'poor' to 'very poor' categories. But this breached the emergency level on Diwali night," Anumita Roychowdhury, executive director-research and advocacy, CSE, said.

CSE's analysis also established the fact that this year's Diwali morning and evening were promising indeed, with little or no firecrackers being burst across localities.

But as the revelry picked up, the air quality declined.

"During the day (about 13 hour average – 6 am to 7 pm) the levels in Delhi and NCR towns of Gurugram and Ghaziabad were in 'very poor' category (Delhi - 139 micrograms per cubic metre (ug/m3); Gurugram - 121 (ug/m3); and Ghaziabad - 142 (ug/m3).

"However, during Diwali night (about 12 hour average - 7 pm last night to 7 am this morning) the levels in Delhi, Gurugram and Ghaziabad were in emergency level. (Delhi- 548 (ug/m3); Gurugram – 382 (ug/m3); Gaziabad – 501 (ug/m3))," CSE said in a statement.

The 24-hour safe limit of PM2.5 and PM10 are 60 and 100 respectively.

The Delhi Pollution Control Committee (DPCC) also released data based on monitoring at 16 sites. According to its data, levels of PM2.5 and PM10 showed a marginal dip compared to last year.

30 NOBEL LAUREATES TO ATTEND INDIAN SCIENCE CONGRESS: MINISTER

The 105th Indian Science Congress, to be held here in January next year, will be attended by about 30 Nobel laureates, Telangana Forests Minister Jogu Ramanna has said.

The Congress will be hosted by Osmania University from January 3 to 7, a state government release yesterday quoted the minister as saying.

The state government will set up nine science centres across the state at a cost of Rs 166.40 crore for promoting learning of science, he said.

It would also establish "radiation technology plants' under the Smart City project in Warangal and Karimnagar, the minister added.

HYSEA, IIIT-H SIGN MOU TO BOOST IND-ACADEMIA COLLABORATION

Hyderabad Software Enterprises Association (HYSEA) and International Institute of Information Technology Hyderabad (IIIT-H) today signed an MoU to further the cause of technology and enhance the industry-academia collaboration.

"As part of this effort HYSEA plans to conduct seminars, workshops on emerging technologies towards helping the engineers and mid-level managers in the industry stay abreast with technology and relevant research in collaboration with IIIT, Hyderabad," a release said.

As technologies like AI and Machine Learning become "more mainstream" and the gap between research and industry reduces, it is important that both industry and academia collaborate in meaningful ways, it said.

"Some of the emerging technologies proposed to be covered as part of the TechSeries include Artificial Intelligence (AI), Machine Learning (ML), Automation, Internet of Things (IoT), and Advanced Analytics and Data Sciences," the release quoted the Chief Operating Officer of HYSEA, R Srinivas Rao, and Ramesh Loganathan, Professor- Co-Innovation, IIIT-H, as saying.

INDIGENOUS DENTAL IMPLANTS WOULD BE SOON AVAILABLE: MINISTER

Union Minister for Science and Technology Harsh Vardhan today said indigenously developed dental implants would be soon available at one-third rate of the current market price.

He was speaking here after inaugurating a research centre and super specialty dental clinic at Indian Dental Association's (IDA) headquarter in Prabhadevi area of Mumbai city.

The minister said, "In a huge country like ours, the services of organisations like the IDA are needed to make treatment and medicine affordable for the poor.

"The IIT-Delhi, Council of Scientific and Industrial Research (CSIR) and Maulana Azad Institute of Dental Science, Delhi have come out with a dental implant. It will be available to the people in a couple of months at one-third of the price of dental implants currently available in the market."

The IDA in its official statement claimed that its centre is first ever such initiative in the country. The centre is named as

'Dr APJ Abdul Kalam Education and Research Centre and Super Speciality Dental Clinic'.

The super-specialty dental clinic is set up to provide dental restoration work and advanced dental procedures, with special focus on the underprivileged by providing them free treatment. This is a tribute to Dr Rafiuddin Ahmed, the founding father of IDA.

It will be open everyday between 9 am to 6 pm (except Saturday and Sunday), the IDA stated. IDA's president Vishwas Puranik said this centre was a dream come true for IDA members.

"From a small place to 5,000 sq ft office and the research centre, we have come far but a lot needs to be achieved," said Puranik.

The proposed Centre will have 25 simulators in addition to five clinical stations and one operation station for rendering all types of pre-clinical, clinical and advanced clinical training. The Centre aims at catering to the growing demand for further enhancing the knowledge and skills of dental professionals in India, he said.

KOLKATA RAW FOOD ITEMS HAVE ALARMING LEAD LEVELS, FINDS STUDY

Raw food items sold in most city markets have Lead concentration far above the permissible limit and can permanently damage key human organs, a survey conducted by the Geological Survey of India (GSI) has found.

Samples of raw food items like polished rice, red lentil (masoor dal), red spinach, chicken, fish (without scales), biscuits, spice (cumin seeds) and a common medicinal herb (Holy Basil or Tulsi), collected from 12 markets in the city showed a mean Lead (Pb) concentration between 3.78 and 43.35 mg/kg (average 23.56 mg/kg).

"The mean Lead concentration found in the raw food materials is very high compared to the threshold value of 2.5mg/kg specified by Food Safety & Standards Regulation (2011), India," senior scientist of the GSI, Avijit Das, who headed the group conducting the two-year study, said today.

As per the American and European standards, the current reference range for acceptable blood Lead-concentration in a healthy human being, without excessive exposure to environmental sources of Lead, is less than 0.05 mg/L for children whereas it is less than 0.25 mg/L for adults.

Prolonged exposure of lead, which is a highly toxic element, to humans can cause permanent damage to the kidneys, liver and hematologic systems.

Children are more at risk because lead exposure can reverse their brain growth and cause irreversible damage to their overall well being.

The study, conducted by leading scientists of the GSI, also found that about 75 per cent of the Lead contamination in the food items sold in Kolkata markets, were contributed by atmospheric Lead, mainly produced by the combustion of diesel.

Apart from collecting soil and vegetable samples from Dhapa ground, alongside the EM Bypass, for the study of Lead contamination, the scientists had also collected street dust samples from major roads of the northern and southern parts of the city for the study.

"Coal samples were collected from Jharia and Ranigunj to assess the presence of atmospheric lead from the use of coal while Galena (ore of Lead) samples from Alwar (Rajasthan) were brought to calculate the Lead Isotopic Ratio (LIR) of Indian lead," Das said adding, rain water and diesel samples were collected from city markets for the study.

"All these samples were collected to compare their LIR and lead concentration with that of the raw food items sold in Kolkata markets," he added.

To compare the level of contamination in sediments and vegetables found in Dhapa, soil and vegetable samples were collected from a relatively less polluted Ichapur (Control Site) in North 24 Parganas district.

The maximum Lead concentration in rice was 14.39mg/kg found in the samples collected from a market in Kidderpore in the western part of the city, the study said.

"The Lead concentration in red lentil samples collected from markets in Tollygunge in south Kolkata was found to be between 1.82 and 7.44 mg/kg," Das said.

Samples of vegetables sold in different markets also revealed a Lead concentration ranging from a low of 3.28 mg/kg to a very high value of 145.47 mg/kg while fish had a range of 1.33 to 17.80 mg/kg, he said.

Chicken collected from a market at Garden Reach in the city's port area showed a Lead concentration of 9.58 mg/kg.

"The whole cumin seeds samples collected from a market in Tollygunge area had a Lead-concentration value of 31.25 mg/kg. Among the herb (tulsi) samples, the range of lead concentration was from 8.92 to 33.27 mg/kg," Das said.

Vegetable samples from the three different sites in Dhapa showed an average Lead concentration of 16.83 mg/kg with the Bainchtola sample bearing the minimum with 13.24 mg/kg.

"The less contaminated soil and vegetable samples collected from Ichapur had a total Lead concentration value of 137.75 mg/kg for soil sample and 5.17 mg/kg respectively," it revealed.

The average Lead concentration in soil samples collected from the three sites at Dhapa was 475.85 mg/kg with the minimum value of 197.09 mg/kg at Bainchtola and a maximum of 800.39 mg/kg at Arupota.

The Lead concentration in locally made snacks were found to be in the range of 4.82 to 10.71 mg/kg with the maximum found in the sample collected from Gariahat in south

Kolkata. Das said the survey also found that the Lead concentration in street dust of the city was worrisome.

"The mean concentration of Lead found in the 29 sites of the city was 383.2 mg/kg with a range from 23.82 mg/kg to a very high value of 2,697.24 mg/kg at Amherst Street in north Kolkata," he said.

On ways to tackle the Lead contamination, Das said it could be done by minimising the use of diesel and by urging people to use green energy in vehicles.

"We must encourage the mass traffic movements by greener energy sources like LPG/CNG operated vehicles, battery operated electric cars, solar cars, increasing metro rail network," Das said.

The study was published in the peer reviewed International journals of "Environmental Science and Technology (2017) (online publication)" and "Environmental Science and Pollution Research (2016)".

NEW DEVICE COULD MAKE MALARIA DETECTION CHEAPER, QUICKER

Detection of common mosquito-borne disease malaria could become cheaper and take just "seconds" with a new portable device, the handiwork of researchers from two Kolkata institutes.

A team of researchers from the Institute of Engineering and Management in collaboration with the Indian Institute of Engineering Science and Technology, Shibpur claim to have developed a mobile, low-cost malaria detection system, which can also diagnose dengue with some modification.

"We have attached a mobile phone camera on a paper microscope which can be used to take image of blood sample on a slide with some chemicals, and the data can be processed at a central server to detect the presence of malaria cell," IIEST, Shibpur Head of Department, IT, Dr Arindam Biswas said.

The paper microscope, also known as 'foldscope' is an optical microscope that can be assembled from simple components, including paper and lens.

The results are relayed back to the remote client, and the doctor registered in system's database can access the data and prescribe treatment accordingly, he said.

All tests performed by the system are automatically logged on the remote central server.

"Every patient will incur a cost of only Rs 10 for each test against a drop of blood taken from the tip of his finger, and the remote testing facility will give results within seconds and provide a hard copy of the report," he said.

Biswas said he had collaborated with the project, undertaken by his PhD student and IEM Professor Nilanjana Dutta Roy and two of her research scholars at the institute - Nilanjan Daw and Debapriya Paul.

To a question about patenting the kit, he said, "The paper microscope has been already there and it was developed by Stanford University. The microscope has been given to the research team by Stanford."

Biswas, however, added that the malaria detection, monitoring and mitigation framework devised by the team has been patented.

The framework includes fitting the image capturing camera, the necessary magnification, the algorithm developed to process the image and find out whether malarial parasites are present, Dutta Roy said.

The system is called 'Centaur' in short.

The detection kit, including the foldable papermade microscope, incurs a manufacturing cost of Rs 80.

"The entire process will not cost much considering the conventional microscope is high priced. And we have registered 90 per cent accuracy in test cases," Biswas, who was part of the project as an academician and not on behalf of IIEST, said.

Asked if the same kit can be used to diagnose dengue, he said, "We have to assess the procedures of dengue test first and the algorithm has to be modified accordingly."

Biswas said they have approached the West Bengal government and if their feedback is positive, they are ready to offer the technology for mass use in rural health centres, where vector-borne diseases typically affect more people.

"There are places like Kakdwip in Sunderbans where we think such devices will be of great help to the people since this system will be effective in both archival of data and mapping real-time spread of the disease in a particular locality," Dutta Roy said.

The developers aim to train social workers in remote villages on using the device if it gets the nod for mass production.

FESTIVAL OPENS IN ASSAM TOMORROW TO POPULARISE SCIENCE

A two-day festival opens take science to the people and out of the confines of classrooms and journals, an organiser said.

The festival — 'Reverberations: We are Science Communicators' — seeks to popularise science while igniting young minds, Ratna Bharali Talukdar, the executive editor of a bilingual web magazine which has organised the event, said.

"Scientists and science teachers have the expertise in explaining the rudiments of science but these often remain limited to classrooms, journals, workshops and laboratories and seldom reach the masses," Talukdar told PTI.

She said the festival, organised by 'NEZINE MEDIA, aimed at encouraging the youth to take to science communication.

The multi-venue science communication festival is for students of schools, colleges and universities in Assam and other northeastern states.

"We hope the festival will bring forth science communicators who can play the crucial role of utilising the space in traditional media, the convergent media and the new media to bridge the gap between the scientific community and the masses and leverage media tools to popularise science and promote a scientific temperament," Talukdar added.

Among the highlight of the festival are talks by sound designer Amrit Pritam on 'Science of Sound and its use in communication' and by population activist Ilias Ali on 'Population explosion and the role of media' and skill development workshops on photography, digital media and video making.

Edugenie, a Guwahati-based education start-up established by a team of IIT Guwahati alumni, which provides hands-on learning solutions through an innovative technology-based environment, will organise puzzles and science shows while the Amateur Radio Society of Assam will hold a programme on the use of ham radios.

Under the segment 'Science Communication on Wheels', a van with resource persons, science communication material and exhibits will also travel to different places in Assam from October 20 to connect with students.

The festival has been organised with the support of the Assam Skill Development Mission, Oil India Limited and Numaligarh Refinery Limited.

PRESIDENT ASKS SCIENTISTS NOT TO COMPROMISE THEIR REQUEST FOR KNOWLEDGE

President Ram Nath Kovind urged scientists not to compromise their quest for knowledge, from atoms to galaxies, as society demands solutions to daily problems.

"These two endeavours are not contradictory. We have seen how ISRO has succeeded through the efforts of late Dr Satish Dhawan in combining cutting-edge science with helping farmers," he said in at a round-table discussion with scientists here.

"Today you have the opportunity to pioneer a revolution where all the scientific institutes in Bengaluru work together. They can share their strengths and show by example how science and technology can take us to new heights," he said.

The President said knowledge, discovery, innovation and society were the four wheels that take a country forward, but slightest misstep by one will take the nation in wrong direction or stall it.

"As scientists, you have an immense responsibility. You are directly in charge of three wheels. But unless you connect every day with the fourth, we have no future," he said.

Kovind said the size of a challenge to lift people out of poverty and ensure food among other aspects, was enormous.

"Today, India is in an unusual situation. We face enormous challenges. We are to lift our people out of poverty, ensure their health and well-being and ensure our food and energy security. The size of the challenge is enormous," he said.

Kovind said the India was among the world's best in nano-science and materials science due to Professor C N R Rao.

The President said India was a leader in generic drugs and vaccines, and the biotech start-up ecosystem was extraordinarily vibrant in Bengaluru.

Kovind said, for thousands of years, from the age of Aryabhatta and Charaka, India has embraced science and its sense of inquiry.

"From eminent scientists such as C.V. Raman to S Chandrashekar, G N Ramachandran to Obaid Siddiqi and Rao to my illustrious predecessor Dr APJ Abdul Kalam, it is the investment in curiosity driven science that has paid off to society. The saga continues with younger scientists today," he said.

KAMAL CLARIFIES ON 'NILAVEMBU' DRINK

As a row erupted over his statement asking his fan clubs to not distribute 'nilavembu', a traditional drink used to fight dengue, veteran star Kamal Haasan today said he made the suggestion in view of a controversy over its efficacy and he was not against it.

In a statement here tonight, he said it was "not fair" to paint him as opposed to the traditional medicine, said to improve immunity, following his tweet to his fan clubs.

Haasan said he had put out a tweet yesterday only because a controversy had erupted over the use of 'nilavembu' concoction being given as part of treatment for dengue fever, which has affected a large number of people in Tamil Nadu in recent weeks.

"I had put out the tweet to avoid the medicine, which is under a controversy, from being given in excess quantity. I don't prefer those of my movement to give a medicine without the advice or direction of a doctor," he said.

"... that its being spread as if Kamal Haasan is opposed to nilavembu is not fair," he said

The actor said he was being critical only of the medicine being given sans proper doctors' guidance and said he welcomed any initiative benefiting people.

Haasan said he did not discriminate between any branches of medicine.

Taking a swipe at the AIADMK government over the spread of dengue, he sarcastically remarked using a Tamil saying that preventive steps could have been put in place earlier.

Further, "it can be learnt from neighbouring Kerala on how to control dengue," he added.

In Madurai, senior BJP leader L Ganesan criticised Haasan, saying his remarks on nilavembu was 'unwarranted'.

"His statement is unwarranted when the Tamil Nadu government is taking serious steps to control dengue fever and bring it under control. There is no need to do research on 'nilavembu' now," the Rajya Sabha member told reporters there.

The actor had made the statement just for the "sake of making a statement with a difference," he added.

Ganesan also said there was a strong possibility of the proposed All India Institute of Medical Sciences (AIIMS) being located in Madurai District.

TN MINISTER SAYS COW-DUNG CAN REPEL DENGUE MOSQUITOES

Tamil Nadu Minister Sellur K Raju, whose participation in an experiment using thermocol to prevent water evaporation evoked ridicule, is facing flak again this time for suggesting use of cow-dung to control dengue causing mosquitoes.

Participating in a door to-door campaign to create awareness about dengue here yesterday, Raju asked the people to sprinkle cow-dung mixed water in their front courtyards to prevent breeding of mosquitoes.

"Our forefathers used to sweep and sprinkle cow-dung water in front of homes to keep away mosquitoes. We are not following such practices now. You do the same (sprinkle cow-dung mixed water) neither mosquito nor dengue will come," Raju, Minister for Cooperation, said.

Talking to reporters, the minister said dengue could be controlled easily with the cooperation of the people.

The campaign has been launched at a time when the state has been witnessing a spike in dengue fever cases.

However, his remarks on cow-dung use drew flak on the social media with PMK leader Dr S Ramadoss suggesting Nobel prize for the minister.

Taking a dig, Ramadoss tweeted: "...Nobel prize for science and medicine should be given to him (Raju) only."

The Minister had earlier come under criticism for launching an experiment of state public works department to try and cut water loss due to evaporation in the Vaigai Dam by covering a small portion of it with thermocol sheets.

But the effort came a cropper with the sheets being swept away by strong winds.

After criticism over social media, the Minister had then said the idea was not his, indicating it came from officials.

DEPT OF BIOTECHNOLOGY SETTING UP LABS IN NORTH EAST

The Ministry of Science and Technology today said it is setting up a chain of laboratories in the North East to enable thorough parity in terms of service and facilities to the people.

Stating this while delivering the inaugural address at the third edition of the India International Science Festival, Union Minister of Science and Technology Harsh Vardhan said that the Centre was spending a "significant" portion of the budget to develop the North East.

"Our Department of Bio-Technology is working to establish a series of laboratories in North East and there are a number of programmes. We spend a very significant portion of our budget only in the North East", he said.

"We want to ensure that each and every part of the country and of course, the North East all develop to a level where we can say that there is thorough parity in terms of the services and facilities available to people", he said.

Referring to the four-day Science festival, he said it has a unique Science Village wherein the last two editions have been inviting children from the most remote villages of India, to participate along with their teachers.

"Over 2,000 young children are participating in the science village and they will have access to the best of things happening in science. For the first time they will have real exposure to science", he said.

Vardhan said that Prime Minister (Narendra Modi's) passion is to develop the North East and to see whether the region develops in totality and there is a thoroughly inclusive approach there, he said.

Several science teachers have come from North East and during the conference here would learn the new dimensions of science teaching, the Minister said.

WORLD'S LARGEST COMBUSTION RESEARCH CENTRE AT IIT MADRAS

The world's largest combustion research centre which will impart a major boost to the Indian scientific community was inaugurated at the Indian Institute of Technology, Madras today.

The National Centre for Combustion Research and Development (NCCRD) was inaugurated by NITI Aayog member V K Saraswat in the presence of Prof Ashutosh Sharma, Secretary, Department of Science and Technology, a release by the Indian Institute of Technology, Madras (IIT-M) said.

This is the world's largest combustion research centre, it said.

"With over 30 faculty members from six departments of IIT-M working on the project, this is the largest grouping of academic combustion researchers globally. In addition, the infrastructure facilities are also the largest for any combustion research centre in an academic setting globally," it said.

NCCRD's research interests will cover automotive, thermal power and aerospace propulsion, besides fire research and microgravity combustion to minor extent, the release said.

"The NCCRD has been established at a total cost of Rs 90 crore. It will develop state-of-the-art capabilities in combustion research involving experts in the country," it said.

"The establishment of the centre will impart a major boost to the Indian scientific community and will provide an impetus to research in 'Alternative Energy and Environmental Protection' by focusing on effective utilisation of combustion as a means of thermo-chemical energy conversion," the release said.

NCCRD is supported by the state-run Science and Engineering Research Board of Department of Science and Technology (DST), it said.

Saraswat was quoted as saying that NCCRD was one of the premier centres in the country.

"The intention is to make it a knowledge base in areas like gasification, combustion, propulsion and automotive sectors. This is one of the best diagnostic centres in the country to understand combustion," he said.

NCCRD has been set up as a nodal centre in the region and any institute and industry can work with it as it is totally IT-enabled and possess a strong simulation facility, the NITI Ayog member said.

IIT-M director Bhaskar Ramamurthi said energy, emission of carbon dioxide and pollutant gases have become ver important due to climate change, global warming and other impact that combustion has.

"This centre will play a pivotal role in making sure that India has access to the latest technologies in all these areas," he said.

Many industrial and R&D organisations like Mahindra, TVS, AVL, GAIL, GE, Shell, BHEL, DRDO (DRDL, GTRE, CFEES), NAL, ISRO, Forbes-Marshall, Siemens, Thermax, Cummins, FM Global, Tata Power, VTT and Valmet are working closely with NCCRD, the release added.

HARSH VARDHAN URGES SCIENTIFIC COMMUNITY NOT TO WORK IN SILOS

Union minister Harsh Vardhan today urged members of the country's scientific community to be connected with their counterparts in other parts of the world and not continue working in silos.

Delivering the inaugural address at the third edition of four-day India International Science Festival here, the Union minister for science and technology, and earth sciences said, "I ask, request and appeal to the scientific community to not work in silos."

Asserting that science and technology can help the country in a big way, he said, "I very proudly say that in the last couple of years, the focus of our government, more particularly of our Prime Minister (Narendra Modi), on science has increased tremendously."

"In terms of budgetary allocation, it (science and technology) saw almost 60 per cent hike," Vardhan said.

"Our scientists have given great strength, great knowledge, great innovations. But probably the country was working in silos. Scientists were working in silos, the laboratories were working in silos, science teachers were working in silos," he said.

"Our collaboration should be of a level that if you do something in your laboratory, it should be immediately connected with all other people who are doing same thing not only in India but all across the world," the minister said.

Noting that science festival is an occasion to rejoice the success of science, Vardhan said India has collaborations in with at least 44 countries in the field of science and technology.

"I think it gives us further stimulus to work hard and to ensure that we are able to use science as a big movement to resolve issues," he said, adding after green and white revolutions, India was witnessing "innovation revolution".

"We will help every young man with bright ideas, who wants to convert it into an innovative programme and help the country stand on his own feet. This is where the scientific community of India has a role to play," Vardhan said.

CENTRAL TEAM TERMS 40 DENGUE DEATHS IN TN 'MINIMAL', SAYS NO NEED TO PANIC

A five-member central team deputed to examine the dengue situation in Tamil Nadu today termed the 40 deaths since January due to the fever as "minimal" and said there was no need to panic.

The team said it had been informed by state officials that there were 40 deaths out of the 12,000 cases of dengue reported since January.

This, it said, did not warrant any panic and stressed on more public cooperation in eradicating the fever spread by mosquitoes.

During discussions with the team members, the state government sought Rs 256 crore from the Centre to enhance its dengue control activities.

"The death of 40 (people) out of the 12,000 (cases) is minimal. It is nothing... no need to create panic," Professor of Medicine at the All India Institute of Medical Sciences (AIIMS) and a member of the team Ashutosh Biswas told reporters.

He said the team had come here to support the state government and also "examine the upsurge of dengue cases" in Tamil Nadu.

Several parts of the country, including Kerala, had witnessed outbreak of the fever, he said.

On the deaths, Biswas said a number of factors, including medical negligence, possibility of any other serious

disease, secondary infections and possible late referrals, should also be examined.

"The virus causing the fever is generally killed within five days by the body," he said.

State Health Minister C Vijayabaskar said the government had sought "further advice" from the central team on its anti-dengue activities.

Officials, including Principal Health Secretary J Radhakrishnan, apprised the team of the steps taken to curb dengue, the handling of which by the state has come in for sharp criticism by opposition parties.

The team will be visiting a couple of government hospitals here and also hold public interactions during their proposed two-three days' stay, Vijayabaskar told reporters.

If required, they would even extend their stay, he said adding that the government suggested the team members visit other districts such as Salem, Namakkal and Coimbatore.

The team was apprised of the state government's anti-dengue initiatives and told that they were being implemented on a "war-footing", he said.

"We have said we will implement their suggestions. To strengthen our efforts by expanding human resources involved in dengue control activities and procuring more fogging machines. We have sought central funding of Rs 256 crore," he said.

He expressed hope that the funds will be released at the earliest.

Biswas said the state government was taking all measures against the spread of the fever.

"Eradication of dengue is not in the hands of the government, but in the hands of the public. Everybody has to change their habits," he said.

The practice of storing water, especially in drums, should be changed since it aids breeding of mosquitoes and the spread of dengue, Biswas said.

"If we change our habit of collecting fresh water, naturally we will eradicate dengue," he added.

FIRST JURASSIC-ERA 'FISH LIZARD' FOSSIL FOUND IN INDIA

In a first, a near- complete fossilised skeleton of a Jurassic ichthyosaur - large marine reptile which lived alongside dinosaurs - has been discovered in India, scientists said.

Fossil records of ichthyosaurs, which means 'fish lizards' in Greek, have been found in North American and Europe previously. However, in the Southern Hemisphere, they have mostly been limited to South America and Australia.

Researchers including those from the University of Delhi and University of Erlangen-Nuremberg (FAU) in Germany have found what they believe to be the first Jurassic ichthyosaur in India, from the Kachchh area in Gujarat.

The near-complete skeleton, nearly 5.5 metre long, is thought to belong to the Ophthalmosauridae family, which likely lived between around 165 and 90 million years ago.

It was found among fossils of ammonites and squid-like belemnites, and its tooth wear patterns suggest it predated such hard, abrasive animals.

"This is a remarkable discovery not only because it is the first Jurassic ichthyosaur record from India, but also it throws light on the evolution and diversity of ichthyosaurs in the Indo-Madagascan region of the former Gondwanaland and India's biological connectivity with other continents in the Jurassic," said Guntupalli Prasad, from the Department of Geology in University of Delhi.

While the study, published in the journal PLOS ONE, has not yet been able to pinpoint the ichthyosaur's species, researchers believe that a full identification could inform on possible ophthalmosaurid dispersal between India and South America.

They hope that unearthing more Jurassic vertebrates in this region could provide further insights into the evolution of marine reptiles in this part of the globe.

RENEWABLE, ALGAE-BASED FOOTWEAR DEVELOPED

Scientists have developed algae-based, renewable flip-flops that could be an environment friendly alternative to petroleum-based slippers - the go-to footwear in countries like India and China.

Three billion petroleum-based flip-flops are produced worldwide each year, eventually ending up as non-biodegradable trash in landfills, rivers and oceans around the globe.

"Even though a flip-flop seems like a minor product, a throwaway that everyone wears, it turns out that this is the Number one shoe in the world," said Stephen Mayfield, professor at University of California San Diego in the US.

"These are the shoes of a fisherman and a farmer. This is the number one footwear in India, China and in Africa. One of the largest pollutants in the ocean is polyurethane from flip- flops and other shoes that have been washed or thrown into rivers and flow into the ocean," Mayfield added.

The flip flops consist of a flexible, spongy slipper and a simple strap, researchers said.

"Petroleum comes from algae that lived in the ancient oceans hundreds of millions of years ago," said Mayfield.

"A lot of people do not know that. But what that means is that anything we can make from petroleum we can ultimately make from algae," Mayfield said.

The flip-flops, shoe soles and other polyurethane products scientists make from living algae oil are "sustainable" because the carbon to construct them was pulled from the atmosphere, rather than underground oil reserves, researchers said.

Scientists are seeking to also make them "biodegradable," by chemically converting the algae oil into polyurethane in manner that will allow the carbon bonds to be degraded by microorganisms, they said.

"The idea we are pursuing is to make these flip-flops in a way that they can be thrown into a compost pile and they will be eaten by microorganisms," Mayfield said.

NASA'S MARS ODYSSEY PROBE CAPTURES FIRST IMAGE OF MOON PHOBOS

NASA's Odyssey orbiter - the longest-lived mission to Mars - has taken the first look at Phobos, and produced a colour-coded image revealing surface temperatures of the Martian moon considered to be a potential future human-mission outpost.

The Thermal Emission Imaging System (THEMIS) camera on NASA's Mars Odyssey orbiter observed Phobos on September 29.

Researchers combined visible-wavelength and infrared data to produce an image color-coded for surface temperatures of this moon, which has been considered for a potential future human-mission outpost.

"Although THEMIS has been at Mars for 16 years, this was the first time we have been able to turn the spacecraft around to look at Phobos," said Jonathon Hill, THEMIS Mission Planner.

"This half-moon view of Phobos was chosen because it allowed us to observe a wide range of temperatures on the surface," said Hill.

Phobos has an oblong shape with an average diameter of about 22 kilometers. Cameras on other Mars orbiters have previously taken higher-resolution images of Phobos, but none with the infrared information available from THEMIS.

Observations in multiple bands of thermal-infrared wavelengths can yield information about the mineral composition of the surface, as well as the surface texture.

One major question about Phobos and Mars' even smaller moon, Deimos, is whether they are captured asteroids or bits of Mars knocked into the sky by impacts. Compositional information from THEMIS might help pin down their origin.

Since Odyssey began orbiting the Red Planet in 2001, THEMIS has provided compositional and thermal-properties information from all over Mars, but never before imaged either Martian moon.

The observation was completed to validate that the spacecraft could safely do so, as the start of a possible series of observations of Phobos and Deimos in coming months.

NEW 'BODY-ON-A-CHIP' FOR QUICK DRUG TESTING DEVELOPED

Scientists have created micro hearts, lungs and livers that be combined to develop a "body- on-a-chip" and mimic how the human body responds to new medications.

Drug compounds are currently screened in the lab using human cells and then tested in animals. However, neither of the methods adequately replicates how drugs affect human organs.

"There is an urgent need for improved systems to accurately predict the effects of drugs, chemicals and biological agents on the human body," said Anthony Atala, from Wake Forest Institute for Regenerative Medicine in the US.

Researchers developed micro-sized 3D organs, known as organoids, and connected them together on a single platform to monitor their function.

While other teams have combined cells from multiple organs in a similar system, this is the first reported success using 3D organ structures, known to be higher functioning and to more accurately model the human body.

The organ structures were made from cell types found in native human tissue using 3D printing and other methods.

Heart and livers were selected for the system because toxicity to these organs is a major reason for drug candidate failures and drug recalls.

Lungs are the point of entry for toxic particles and also for aerosol drugs, such as asthma inhalers.

The organoids are placed in a sealed, monitored system - complete with real-time camera. A nutrient-filled liquid that circulates through the system keeps the organoids alive and is used to introduce potential drug therapies into the system.

The researchers first tested the organoids to ensure their similarity to human organs. For example, the micro-liver received a high dose of a common pain reliever - and then a different drug to counteract the toxic effects.

"The data shows a significant toxic response to the drug as well as mitigation by the treatment, accurately reflecting

the responses seen in human patients," said Aleksander Skardal, assistant professor at Wake Forest Institute for Regenerative Medicine.

However, more important than how an individual organ responds to drugs is how the body as a whole responds.

In many cases during testing of new drug candidates - and sometimes even after the drugs have been approved for use - drugs have unexpected toxic effects in tissues not directly targeted by the drugs themselves.

"If you screen a drug in livers only, for example, you're never going to see a potential side effect to other organs," said Skardal.

"By using a multi-tissue organ-on-a-chip system, you can hopefully identify toxic side effects early in the drug development process, which could save lives as well as millions of dollars," he said.

The scientists conducted multiple scenarios to ensure that the body-on-a-chip system mimics a multi-organ response.

For example, they introduced a drug used to treat cancer into the system. Known to cause scarring of the lungs, the drug also unexpectedly affected the system's heart. However, a control experiment using only the heart showed no response.

"This was completely unexpected, but it's the type of side effect that can be discovered with this system in the drug development pipeline," Skardal said.

FIRST 4D MAP OF HUMAN GENOME FOLDING CREATED

Scientists, including one of Indian origin, have created the first high-resolution four- dimensional (4D) map of human gene folding, tracking an entire genome as it folds over time.

The advance by researchers, including those from Stanford University and Harvard University in the US, may lead to new ways of understanding genetic diseases.

For decades, researchers have suspected that when a human cell responds to a stimulus, DNA elements that lie far apart in the genome quickly find one another, forming loops along the chromosome.

By rearranging these DNA elements in space, the cell is able to change which genes are active.

In 2014, the same team of scientists showed it was possible to map these loops.

However, the first maps were static, without the ability to watch the loops change. It was unclear whether, in the crowded space of the nucleus, DNA elements could find each other fast enough to control cellular responses.

"Before, we could make maps of how the genome folded when it was in a particular state, but the problem with a static picture is that if nothing ever changes, it is hard to figure out how things work," said Suhas Rao, a medical student at Stanford University.

"Our current approach is more like making a movie; we can watch folds as they disappear and reappear," said Rao, first author of the study published in the journal Cell.

To track the folding process over time, the research team began by disrupting cohesin, a ring-shaped protein complex that was located at the boundaries of nearly all known loops.

In 2015, the team proposed that cohesin creates DNA loops in the cell nucleus by a process of extrusion.

"Extrusion works like the strap-length adjustor on a backpack," said Erez Lieberman Aiden, director of the Center for Genome Architecture at Baylor College of Medicine in the US.

"When you feed the strap through either side, it forms a loop. DNA seems to be doing the same thing - except that cohesin rings appear to play the role of the adjustor," said Aiden.

Aiden said a crucial prediction of the 2015 model is that all the loops should disappear in the absence of cohesin. In the new research, Aiden, Rao and colleagues tested that assumption.

"We found that when we disrupted cohesin, thousands of loops disappeared," said Rao.

"Then, when we put cohesin back, all those loops came back – often in a matter of minutes. This is precisely what you would predict from the extrusion model, and it suggests that the speed at which cohesin moves along DNA is among the fastest for any known human protein," he said.

'SQUIRTABLE' ELASTIC SURGICAL GLUE SEALS WOUNDS IN 60 SECONDS

Scientists have developed a highly elastic and adhesive surgical glue that can be simply squirted on wounds to seal them within 60 seconds, doing away with the need for stitches.

The glue, called MeTro, is ideal for sealing wounds in body tissues that continually expand and relax - such as lungs, hearts and arteries - that are otherwise at risk of re-opening.

The material, developed by researchers at University of Sydney in Australia and Harvard University in the US, also works on internal wounds that are often in hard-to-reach areas and have typically required staples or sutures due to surrounding body fluid hampering the effectiveness of other sealants.

MeTro sets in just 60 seconds once treated with UV light, and the technology has a built-in degrading enzyme which can be modified to determine how long the sealant lasts - from hours to months, in order to allow adequate time for the wound to heal.

The liquid or gel-like material has quickly and successfully sealed incisions in the arteries and lungs of rodents and the lungs of pigs, without the need for sutures and staples.

MeTro combines the natural elastic protein technologies with light sensitive molecules.

"The beauty of the MeTro formulation is that, as soon as it comes in contact with tissue surfaces, it solidifies into a gel-like phase without running away," said Nasim Annabi, assistant professor at Northeastern University in the US.

"We then further stabilise it by curing it on-site with a short light-mediated crosslinking treatment," said Annabi, lead author of the study published in the journal Science Translational Medicine.

"This allows the sealant to be very accurately placed and to tightly bond and interlock with structures on the tissue surface," he said.

The process resembles that of silicone sealants used around bathroom and kitchen tiles.

"When you watch MeTro, you can see it act like a liquid, filling the gaps and conforming to the shape of the wound," said Anthony Weiss from University of Sydney.

"It responds well biologically, and interfaces closely with human tissue to promote healing. The gel is easily stored and can be squirted directly onto a wound or cavity," Weiss said.

"The potential applications are powerful - from treating serious internal wounds at emergency sites such as following car accidents and in war zones, as well as improving hospital surgeries," he said.

"MeTro seems to remain stable over the period that wounds need to heal in demanding mechanical conditions and later it degrades without any signs of toxicity," said Ali Khademhosseini from Harvard Medical School.

"It checks off all the boxes of a highly versatile and efficient surgical sealant with potential also beyond pulmonary and vascular suture and staple-less applications," he said.

MYSTERIOUS STONE TOOLS DISCOVERED IN THE UK

Archaeologists have unearthed a hoard of 20 unusual Bronze Age stone tools unlike any that have been found before at a site in the UK.

Researchers from Clwydian Range Archaeological Group (CRAG) discovered around 20 of roughly triangular stone hand tools, of various sizes, at the excavation site in Wales.

The tools appear to have been deposited deliberately - perhaps ceremonially - in what would have been a stream around 4,500 years ago, researchers said.

The tools are rough slabs of the limestone, which have been shaped to produce one pointed end, researchers said.

The tools vary in size, between two inches long to about 8.6 inches long. However, they all have this characteristic point at one end, which has then been battered indicating heavy use.

"I have not seen anything like them before, and I have talked to a number of colleagues who have never seen anything like them," Ian Brooks, an archaeologist at CRAG told 'Live Science'.

Although, the purpose of the tools is unknown, and future work by the archaeological team would include examining the utensils in more detail it is possible that the tools were used for chipping ornamental designs onto rock surfaces, Brooks said.

"One of the things that you do get in the Bronze Age is the decoration of natural boulders and rock faces, producing things like cut marks and rings and suchlike. The point on these things would be about the right sort of size for pecking that sort of design," Brook said.

MOON ONCE HAD AN ATMOSPHERE: NASA STUDY

The Moon had an atmosphere about three to four billion years ago, when intense volcanic eruptions spewed gases above the surface faster than they could escape to space, a NASA study has found.

When one looks up at the Moon, dark surfaces of volcanic basalt can be easily seen to fill large impact basins.

Those seas of basalt, known as maria, erupted while the interior of the Moon was still hot and generating magmatic plumes that sometimes breached the lunar surface and flowed for hundreds of kilometers.

Analyses of lunar samples indicate those magmas carried gas components, such as carbon monoxide, the ingredients for water, sulfur, and other volatile species.

Researchers, from NASA and Lunar and Planetary Institute in the US, calculated the amounts of gases that rose from the erupting lavas as they flowed over the surface and showed that those gases accumulated around the Moon to form a transient atmosphere.

The atmosphere was thickest during the peak in volcanic activity about 3.5 billion years ago and, when created, would have persisted for about 70 million years before being lost to space.

The two largest pulses of gases were produced when lava seas filled the Serenitatis and Imbrium basins about 3.8 and 3.5 billion years ago, respectively.

The margins of those lava seas were explored by astronauts of the Apollo 15 and 17 missions, who collected samples that not only provided the ages of the eruptions, but also contained evidence of the gases produced from the erupting lunar lavas.

"The total amount of water released during the emplacement of the mare basalts is nearly twice the volume of water in Lake Tahoe," said Debra H Needham, Research Scientist of NASA Marshall Space Flight Center.

"Although much of this vapor would have been lost to space, a significant fraction may have made its way to the lunar poles. This means some of the lunar polar volatiles we see at the lunar poles may have originated inside the Moon," said Needham.

"This work dramatically changes our view of the Moon from an airless rocky body to one that used to be surrounded by an atmosphere more prevalent than that surrounding Mars today," said David A Kring, from LPI.

"When the Moon had that atmosphere, it was nearly three times closer to Earth than it is today and would have appeared nearly three times larger in the sky," Kring said.

NOVEL TEXTILE MATERIAL CAN KEEP ITSELF GERM-FREE

Scientists have developed a textile material that disinfects itself, an advance that can help fight deadly hospital-acquired infections.

By incorporating the specially-engineered textile in a device designed to be used on hospital doors instead of the traditional aluminium door plate - the part of the door that people push to open it - they aim to bolster hand hygiene.

Researchers from the University of Leeds in the UK developed the device known as Surfaceskins.

Hospital doors are recognised as a key weak link in hygiene because of the number of times people touch them.

It takes just one person with dirty hands to pass through a door to put everyone else who follows at risk of cross contamination.

Surfaceskins antibacterial door pads work by dispensing a small quantity of alcohol gel onto the pad when it is pushed, to disinfect the surface ready for the next person to use the door.

This low-cost device, which incorporates three separate non-woven textiles is designed to be replaced after seven days or one thousand pushes, whichever comes sooner, researchers said.

The device is fitted into a plastic holster which is attached to the door. Surfaceskins contain a reservoir of alcohol gel and a membrane with tiny valves that dispense the gel onto the surface where it is pressed when opening a door, self-disinfecting it within seconds.

In the study, published in the Journal of Hospital Infection, both the Surfaceskins and control aluminium door plates were inoculated with bacteria at levels found on the hands of hospital staff.

Researchers found that the Surfaceskins door pads were more effective than standard door plates over seven days in reducing the levels of three bacteria that commonly cause hospital-acquired infections: S aureus, E coli and E faecalis.

"Our results suggest that Surfaceskins door pads can help to reduce the contamination of doors by microbes," said Mark Wilcox, a professor of Medical Microbiology at thew University of Leeds.

"They offer a new way to reduce the risk of the spread of bacteria and viruses in hospital environments and other settings where frequent contact with doors could undermine hand hygiene," Wilcox added.

Surfaceskins address a definite need, in a simple, effective and low-cost way. Designed to provide protection in many high-risk situations, the global market for Surfaceskins is immense, researchers said.

EATING TOO MANY SWEETS MAY UP HEART DISEASE RISK: STUDY

Drinking too many fizzy drinks and eating a lot of sweets may put even otherwise healthy people at increased risk of heart disease, a study has warned.

Researchers from University of Surrey in the UK found that a subject group of otherwise healthy men had increased levels of fat in their blood and fat stored in their livers after they had consumed a high sugar diet.

The study, published in the journal Clinical Science, looked at two groups of men with either high or low levels of liver fat, and fed them a high or low sugar diet to find out if the amount of liver fat influences the impact of sugar on their cardiovascular health.

The low sugar diet contained no more than 140 calories a day worth of sugar - an amount close to the recommended intake - while the high sugar diet contained 650 calories worth.

After 12 weeks on the high sugar diet, the men with a high level of liver fat - a condition known as non-alcoholic fatty liver disease (NAFLD) - showed changes in their fat metabolism that are associated with an increased risk of cardiovascular disease, heart attacks and strokes.

Fat metabolism is the biochemical process by which fats are transported and broken down in the blood, and used by the cells of the body, researchers said.

They also revealed that when the group of healthy men with a low level of liver fat consumed a high amount of sugar, their liver fat increased and their fat metabolism became similar to that of the men with NAFLD.

"Our findings provide new evidence that consuming high amounts of sugar can alter your fat metabolism in ways that could increase your risk of cardiovascular disease," said Bruce Griffin, professor at University of Surrey.

WOMEN USE GOSSIP TO COMPETE FOR A MAN'S ATTENTION: STUDY

Although both men and women gossip, women are more likely to use gossiping and rumour-mongering as tactics to badmouth a potential rival who is competing for a man's attention, a study claims.

Women also gossip more about other women's looks, whereas men talk about cues to resource holding (eg wealth) and the athleticism of their competitors.

According to Adam Davis of the University of Ottawa in Canada, gossiping is a highly evolved social skill and an intrasexual competition tactic that relates to women's and men's evolved preferences.

He therefore sees it as essential for interpersonal relationships, and not a flaw of character.

The study, published in journal Evolutionary Psychological Science, provides the first verifiable evidence for a positive link between intrasexual competitiveness, the amount of gossip that people take part in, and whether they are OK with such talk or not.

Scholars agree that gossip has evolved as an efficient way to learn more about others, and to enforce group norms.

It is also a method by which people can learn more about their rivals, and can call into question their reputation, especially when they are vying for the same romantically or sexually desirable mates.

In this study, 290 heterosexual Canadian students between the ages of 17 and 30 years old completed three questionnaires.

One measured how competitive the participants are towards members of the same sex as their own, especially in terms of access to the attention of potential mates.

The other questionnaires measured the tendency and likelihood of the participants to gossip about others, the perceived social value of gossip, and whether it is okay to talk about others behind their backs.

It was found that people who were competitive towards members of their own sex had a greater tendency to gossip.

They were also more comfortable with the practice than others. Women had a greater tendency to gossip than men, and they also enjoyed it more, and saw more value in participating in such chit-chat.

Men were more likely to gossip about the achievements of others. Such talk among women often targeted the physical appearance of another, and was used to share social information.

Women also found gossip to have greater social value, which may allow them gather more information about possible competitors in the game of finding a mate. It may also help to hone their ability to gossip in future.

According to Davis, these findings provide evidence that gossip is an intrasexual competition tactic that corresponds to women's and men's evolved mate preferences.

It also reflects the different strategies used by the sexes in their quest to find suitable mates.

"The findings demonstrate that gossip is intimately linked to mate competition and not solely the product of a female gender stereotype that may be viewed as pejorative," said Davis.

"It is a highly evolved social skill essential for interpersonal relationships, rather than a flaw of character," he said.

DIVORCE DOES RUN IN FAMILIES AND COULD BE GENETIC: STUDY

Children of divorced parents are more likely to get separated when compared to those who grew up in two-parent families, and genetic factors may be to blame, according to a study.

The study analysed Swedish population registries and found that people who were adopted resembled their biological - but not adoptive - parents and siblings in their histories of divorce.

"We were trying to answer the basic question: Why does divorce run in families?" said Jessica Salvatore, assistant professor at Virginia Commonwealth University (VCU) in the US.

"Across a series of designs using Swedish national registry data, we found consistent evidence that genetic factors primarily explained the intergenerational transmission of divorce," said Salvatore, first author of the study that appears in the journal Psychological Science.

The findings are notable because they diverge from the predominant narrative in divorce literature, which suggests that the offspring of divorced parents are more likely to get divorced themselves because they see their parents struggling to manage conflict or lacking the necessary commitment.

They grow up to internalise that behaviour and replicate it in their own relationships, researchers said.

"I see this as a quite significant finding. Nearly all the prior literature emphasised that divorce was transmitted across generations psychologically," said Kenneth S Kendler, professor at VCU.

"Our results contradict that, suggesting that genetic factors are more important," he said.

By recognising the role that genetics plays in the intergenerational transmission of divorce, therapists may be able to better identify more appropriate targets when helping distressed couples, Salvatore said.

"At present, the bulk of evidence on why divorce runs in families points to the idea that growing up with divorced parents weakens your commitment to and the interpersonal skills needed for marriage," she said.

MYSTERIOUS DIMMING OF TABBY'S STAR CAUSED BY DUST, NOT ALIENS

Unusual dips in brightness shown by the mysterious Tabby's Star may be caused by an uneven dust cloud moving around the star, say scientists, debunking an imaginative theory that blames a "megastructure" built by an advanced alien civilisation for the phenomenon.

Called KIC 8462852, also known as Boyajian's Star, or Tabby's Star, the object has experienced unusual dips in brightness - NASA's Kepler space telescope even observed dimming of up to 20 per cent over a matter of days.

The star has had much subtler but longer-term enigmatic dimming trends, with one continuing today. None of this behavior is expected for normal stars slightly more massive than the Sun.

Speculations have included the idea that the star swallowed a planet that it is unstable, and a theory that a giant contraption built by an advanced civilisation could be harvesting energy from the star, causing its brightness to decrease.

Researcher from the University of Arizona in the US, used NASA's Spitzer and Swift missions, as well as the Belgian AstroLAB IRIS observatory, and found that the cause of the dimming over long periods is likely an uneven dust cloud moving around the star.

They found less dimming in the infrared light from the star than in its ultraviolet light. Any object larger than dust particles would dim all wavelengths of light equally when passing in front of Tabby's Star.

"This pretty much rules out the alien megastructure theory, as that could not explain the wavelength-dependent dimming," said Huan Meng from University of Arizona.

"We suspect, instead, there is a cloud of dust orbiting the star with a roughly 700-day orbital period," said Meng, lead author of the study published in The Astrophysical Journal.

Researchers observed Tabby's Star in ultraviolet using Swift, and in infrared using Spitzer. Supplementing the space telescopes, they also observed the star in visible light during the same period using AstroLAB IRIS, a public observatory with a 68 centimetre reflecting telescope located near the Belgian village of Zillebeke.

Based on the strong ultraviolet dip, the researchers determined the blocking particles must be bigger than interstellar dust, small grains that could be located anywhere between Earth and the star.

Such small particles could not remain in orbit around the star because pressure from its starlight would drive them farther into space.

Dust that orbits a star, called circumstellar dust, is not so small it would fly away, but also not big enough to uniformly block light in all wavelengths.

This is currently considered the best explanation, although others are possible, researchers said.

NEW NANOMATERIAL CAN CREATE HYDROGEN FUEL FROM SEAWATER

In a breakthrough, scientists have developed a new nanomaterial that uses solar energy to generate hydrogen from seawater, producing the low cost and clean-burning fuel more efficiently than existing materials.

The advance may lead to a new source of hydrogen fuel, ease demand for fossil fuels and boost the economy of countries where sunshine and seawater are abundant.

It is possible to produce hydrogen to power fuel cells by extracting the gas from seawater, but the electricity required to do it makes the process costly.

Researchers from University of Central Florida in the US developed a new catalyst that is able to not only harvest a much broader spectrum of light than other materials, but also stand up to the harsh conditions found in seawater.

"We've opened a new window to splitting real water, not just purified water in a lab. This really works well in seawater," said Yang Yang, assistant professor at UCF.

Yang developed a method of fabricating a photocatalyst composed of a hybrid material. Tiny nanocavities were chemically etched onto the surface of an ultrathin film of titanium dioxide, the most common photocatalyst.

Those nanocavity indentations were coated with nanoflakes of molybdenum disulfide, a two-dimensional material with the thickness of a single atom.

Typical catalysts are able to convert only a limited bandwidth of light to energy. With its new material, Yang's team is able to significantly boost the bandwidth of light that can be harvested.

By controlling the density of sulphur vacancy within the nanoflakes, they can produce energy from ultraviolet-visible to near-infrared light wavelengths, making it at least twice as efficient as current photocatalysts.

"We can absorb much more solar energy from the light than the conventional material," Yang said.

In many situations, producing a chemical fuel from solar energy is a better solution than producing electricity from solar panels, he said.

That electricity must be used or stored in batteries, which degrade, while hydrogen gas is easily stored and transported.

Fabricating the catalyst is relatively easy and inexpensive. Researchers are now trying to find the best way to scale up the fabrication, and further improve its performance so that it is possible to split hydrogen from wastewater.

OUR UNIVERSE NOT A MATRIX-LIKE COMPUTER SIMULATION: STUDY

Humans are not living in a computer simulation controlled by alien overlords, according to a study that debunks a theory popular among science fiction fans and many modern philosophers.

Following the popularity of 90s classic 'The Matrix' many have questioned whether our world is a mere simulation and humans are in reality just a "Brain in a Vat".

Researchers at University of Oxford in the UK and Hebrew University in Israel found proof that such a simulation is impossible as a matter of principle.

The study, published in the journal Science Advances, showed that the complexity of this simulation - can be measured in a number of processor hours, memory size and electricity bills - increases in line with the number of particles one would have to simulate.

If the amount of computational resources required for a quantum simulation increases slowly with the number of particles in the system, then one has to double a number of processors, memory, etc in order to be able to simulate a system twice as large in the same amount of time.

However, if the growth is exponential, or in other words if for every extra particle one has to double the number of processors, memory, etc, then this task becomes intractable.

Just to store the information about a few hundred electrons on a computer one would require a memory built from more atoms than there are in the universe.

Researchers identified a particular physical phenomenon that cannot be captured by any local quantum - Monte-Carlo simulation.

It is a curious effect, which has been known for decades, but has only ever been measured indirectly.

In the field of condensed matter physics, it is called the "thermal Hall conductance" and in high-energy physics it is known as a "gravitational anomaly", researchers said.

Thermal Hall conductance implies a generation of energy currents in the direction transverse to either temperature gradient, or a twist in the underlying geometry of space-time.

Many physical systems in high magnetic fields and at very low temperatures are believed to exhibit this effect.

Researchers showed that for systems exhibiting gravitational anomalies the quantities which are involved in quantum Monte-Carlo simulations will acquire a negative sign or become complex.

This ruins the effectiveness of the Monte-Carlo approach through what is known as "the sign-problem".

Finding a solution to "the sign problem" would make large-scale quantum simulations possible, so that the proof that this problem cannot be solved for some systems, is an important one, researchers said.

"Our work provides an intriguing link between two seemingly unrelated topics: gravitational anomalies and computational complexity," said Zohar Ringel, professor at Hebrew University.

"It also shows that the thermal Hall conductance is a genuine quantum effect: one for which no local classical analogue exists," said Ringel.

ANTI-VACCINE SENTIMENT THRIVING ON TWITTER: STUDY

Anti-vaccine sentiment is alive and thriving on Twitter and other social media websites, according to a study which shows that regions with large number of new mothers are most likely to be hotbeds of tweets opposing vaccines.

In the five-year study, California, Connecticut, Massachusetts, New York and Pennsylvania showed the most negative tweets of any states in the US.

Regions with high affluence or a large number of new moms were most likely to be hotbeds of anti-vaccine Twitter users, the study found.

"The debate online is far from over. There is still a very vocal group of people out there who are opposed to vaccines," said Chris Vargo, assistant professor at University of Colorado Boulder in the US.

"Half of the talk online that we observed about vaccines was negative," said Vargo.

For the study, published in the journal Social Science and Medicine, researchers created a machine-learning algorithm to examine more than a half-million tweets from around the country between 2009 and 2015.

To make the sample a manageable size, they looked only at tweets that referred to both autism spectrum disorder and vaccines.

For two decades anti-vaccine activists have suggested that certain vaccines can lead to autism, often referring to a 1998 study of 12 children, published in the Lancet, which suggested that the measles, mumps, and rubella (MMR) vaccine predisposed youth to developmental disorders.

The Lancet retracted the paper in 2010 and subsequent studies have failed to find a causal link.

"Time and time again researchers have tried to substantiate this idea that there is a link between autism and vaccines but they have not been able to," said Theodore Tomeny, autism researcher with University of Alabama in the US.

"Unfortunately the idea is still very much out there, being promoted by a vocal minority online. That's problematic because often only one side of the story is being told," Tomeny said.

The researchers note that recent outbreaks of previously eradicated, vaccine-preventable diseases like measles and pertussis have been linked to refusal to vaccinate and anti- immunization-related beliefs.

A few studies have provided clues as to what drives anti-vaccine sentiment, but they have relied on small samples of people.

Between 2010 and 2015, anti-vaccine tweets became, overall, more common nationwide. As the number of households that made over USD 200,000 annually increased or the number of women who had delivered a baby in the past 12 months increased, so did the amount of anti-vaccine tweets in a particular region.

Vargo stressed that he does not see Twitter posts as a representative sample of overall public opinion, but rather a pulse of the level of anti-vaccine activism in an area.

Ultimately, he envisions using the algorithm developed for the study to create real-time maps that pediatricians could use to gauge anti-vaccine sentiment in the communities.

MONITORING MICROBES CAN KEEP 'MARSONAUTS' HEALTHY: STUDY

Monitoring how microorganisms adapt to the confined conditions onboard spacecraft can guarantee a safe environment for astronauts on long-duration space missions such as journey to Mars, a study suggests.

Researchers, including those from University of Edinburgh in the UK, found that apart from the crew - the main source of human-associated bacteria inside the habitat - confinement appears to be the strongest trigger shaping the bacterial community which remains highly dynamic over time.

"Until now, little was known about the influence of long-term confinement on the microorganisms that live inside habitats that may one day be used to travel to other planets, and whether the structure of the microbiota changes with time," said Petra Schwendner, from University of Edinburgh.

"Ours is the first comprehensive long-time study that investigates the microbial load, diversity and dynamics in a closed habitat - a mock-up spacecraft - for 520 days, the full duration of a simulated flight to Mars," said Schwendner, corresponding author of the study published in the journal Microbiome.

In the simulations, human-associated microorganisms, including Bacillus and Staphylococcus species were the most frequent, indicating that humans were the main source for microbial dispersal.

For example, Staphylococcus, which is frequently found in the nose, respiratory tract, and on the skin, was probably dispersed via skin flakes shed by the crew.

Although Staphylococcus will not always cause disease, it is a common cause of skin infections, especially in individuals with weakened immune systems.

To find out which bacterial species may be present in the air and on the surfaces inside spacecraft and how the composition of the microbiota may change during human habitation, a crew of six male "Marsonauts" lived inside a mock-up spacecraft, located in Moscow, from June 3, 2010 to November 5, 2011.

During the isolation period the crew members remained fully confined.

Simulating conditions during a manned mission to Mars, they followed a strict diet and schedule, which included cleaning the habitat and conducting scientific experiments.

They collected 360 microbial samples from 20 locations (nine air, 11 surface) at 18 time points, using air filters and swabs.

While a core microbiota of the same bacteria was present in all areas of the mock-up spacecraft, researchers noticed specific bacterial signatures for each individual area, indicating that microbial presence is associated with human presence as well as the type of activity that an area is used for.

Communal areas, sleep areas, the gym, and the toilet had the highest numbers and greatest diversity of bacteria, while the lowest numbers of bacteria were found inside the medical module.

FIVE SUPERMASSIVE BLACK HOLE PAIRS DISCOVERED

Scientists, including one of Indian origin, have identified five pairs of supermassive black holes, each millions of times the mass of the Sun, that could help better understand the phenomenon of gravitational waves - ripples in the fabric of space and time.

These black hole couples formed when two galaxies collided and merged with each other, forcing their supermassive black holes close together.

The black hole pairs were uncovered by combining data from a suite of different observatories including NASA's Chandra X-ray Observatory, the Wide-Field Infrared Sky Explorer Survey (WISE), and the ground-based Large Binocular Telescope in Arizona, researchers said.

"Astronomers find single supermassive black holes all over the universe," said Shobita Satyapal, from George Mason University in the US.

"But even though we've predicted they grow rapidly when they are interacting, growing dual supermassive black holes have been difficult to find," said Satyapal.

Researchers used optical data from the Sloan Digital Sky Survey (SDSS) to identify galaxies where it appeared that a merger between two smaller galaxies was underway.

From this set, they selected objects where the separation between the centers of the two galaxies in the SDSS data is less than 30,000 light years, and the infrared colors from WISE data match those predicted for a rapidly growing supermassive black hole.

Seven merging systems containing at least one supermassive black hole were found with this technique.

Since strong X-ray emission is a hallmark of growing supermassive black holes, researchers then observed these systems with Chandra.

Closely-separated pairs of X-ray sources were found in five systems, providing compelling evidence that they contain two growing (or feeding) supermassive black holes.

Both the X-ray data from Chandra and the infrared observations suggest that the supermassive black holes are buried in large amounts of dust and gas.

"Our work shows that combining the infrared selection with X-ray follow-up is a very effective way to find these black hole pairs," said Sara Ellison of the University of Victoria in Canada.

"X-rays and infrared radiation are able to penetrate the obscuring clouds of gas and dust surrounding these black hole pairs, and Chandra's sharp vision is needed to separate them," said Ellison.

One member of this black hole pair is particularly powerful, having the highest X-ray luminosity in a black hole pair observed by Chandra to date.

The research has implications for the burgeoning field of gravitational wave astrophysics.

While scientists using the Laser Interferometer Gravitational-Wave Observatory (LIGO) and the VIRGO interferometer have detected the signals of merging black holes, these black holes have been of the smaller variety weighing between about eight and 36 times the mass of the Sun.

The merging black holes in the centres of galaxies are much larger. When these supermassive black holes draw even closer together, they should start producing gravitational waves.

The eventual merger of the dual supermassive black holes in hundreds of millions of years would forge an even bigger black hole.

This process would produce an astonishing amount of energy when some of the mass is converted into gravitational waves.

GRAVITATIONAL WAVE DETECTORS COULD UNLOCK DARK MATTER MYSTERY

) The same instruments used in the Nobel Prize-winning discovery of gravitational waves causedby colliding black holes could help unlock the secrets of dark matter, scientists, including one of Indian origin, say.

Dark matter is a mysterious and as-yet-unobserved component of the universe. Its nature remains unknown, but scientists estimate that it is five times as abundant as ordinary matter throughout the universe.

"The nature of dark matter is one the greatest mysteries in physics," said Emanuele Berti, associate professor at University of Mississippi (UM) in the US.

"It is remarkable that we can now do particle physics - investigate the "very small" - by looking at gravitational- wave emission from black holes, the largest and simplest objects in the universe," Berti said.

The research, published in the journal Physical Review Letters, details calculations by a global team of scientists which show that gravitational-wave interferometers can be used to indirectly detect the presence of dark matter.

Calculations show that certain types of dark matter could form giant clouds around astrophysical black holes, said researchers, including UM graduate student Shrobana Ghosh.

If ultralight scalar particles exist in nature, fast- spinning black holes would trigger the growth of such scalar "condensates" at the expense of their rotational energy.

This will produce a cloud that rotates around the black hole, now more slowly-spinning, and emits gravitational waves, pretty much like a giant lighthouse in the sky, they said.

"One possibility is that dark matter consists of scalar fields similar to the Higgs boson, but much lighter than neutrinos," said Paolo Pani, scientist at UM.

"This type of dark matter is hard to study in particle accelerators, such as the Large Hadron Collider at CERN, but it may be accessible to gravitational-wave detectors," Pani said.

The team studied gravitational waves emitted by the "black hole plus cloud" system.

Depending on the mass of the hypothetical particles, the signal is strong enough to be detected by the Laser Interferometer Gravitational-wave Observatory in the US, and its European counterpart Virgo, as well as by the future space mission Laser Interferometer Space Antenna.

"Surprisingly, gravitational waves from sources that are too weak to be individually detectable can produce a strong stochastic background," said Richard Brito, who led the study.

"This work suggests that a careful analysis of the background in LIGO data may rule out - or detect - ultralight dark matter by gravitational-wave interferometers," Brito said.

CHEMICAL FOUND AROUND STAR DEALS BLOW TO SEARCH FOR ALIENS

Scientists have found traces of methyl chloride around an infant star system and a comet, disproving astrobiologists who previously suggested that searching for the chemical in the atmospheres of alien worlds is indicator of life.

Using the Atacama Large Millimeter/submillimeter Array (ALMA) telescope in Chile, researchers detected faint molecular fingerprint of methyl chloride - a chemical commonly produced by industrial and biological processes here on Earth - around an infant star system known as IRAS 16293-2422.

Traces of this organic compound were also discovered in the thin atmosphere of comet 67P/Churyumov-Gerasimenko (67P/C-G) by the Rosetta space probe.

Methyl chloride (CH3Cl), also known as Freon-40, is one of a class of molecules known as organohalogens. This new ALMA observation is the first detection ever of a stable organohalogen in interstellar space.

The cosmic discovery of this organic compound, however, is disappointing news for astrobiologists, who previously suggested searching for methyl chloride in the atmospheres of alien worlds as a possible indicator of life.

The recent ALMA and Rosetta detections raise doubts about that proposal, however. They indicate that methyl chloride forms naturally in interstellar clouds and endures long enough to become part of a forming solar system.

IRAS 16293-2422 is a collection of several infant stars, or protostars, each about the same mass as our Sun. It is located about 400 light-years from Earth and is still surrounded by its natal cocoon of dust and gas.

"Finding organohalogens near these young, Sun-like stars was surprising," said Edith Fayolle, a researcher at Harvard-Smithsonian Center for Astrophysics (CfA) in the US.

"We simply didn't predict its formation and were surprised to find it in such significant concentrations," said Fayolle.

"It's clear now that these molecules form readily in stellar nurseries, providing insights into the chemical evolution of solar systems, including our own," she said.

"ALMA's discovery of organohalogens in the interstellar medium also tells us something about the starting conditions for organic chemistry on planets," said Karin Oberg, an astrochemist at CfA.

"Such chemistry is an important step toward the origins of life," said Oberg, co-author of the study.

"Based on our discovery, organohalogens are likely to be a constituent of the so-called 'primordial soup', both on the young Earth and on newly formed rocky exoplanets," she said.

The researchers also note that abundant organohalogens around a young Sun-like analogue demonstrates that the organic chemistry present in the interstellar medium involves halogens, which was previously not known.

In addition, both ALMA and Rosetta detected this molecule in similar abundance ratios. Since comets are a remnant of the formation of our solar system and retain a chemical fingerprint of that era, the new observations support the idea that a young solar system can inherit the chemical make-up of its parent star-forming cloud.

PROTEIN IN TEARS, EGG WHITES MAY HELP GENERATE ELECTRICITY

A protein - found in egg whites, as well as tears, saliva and milk of mammals - can be used to generate electricity and power novel medical devices in the future, scientists say.

Researchers from the University of Limerick (UL) in Ireland observed that crystals of lysozyme, a model protein can generate electricity when pressed.

The ability to generate electricity by applying pressure, known as direct piezoelectricity, is a property of materials such as quartz that can convert mechanical energy into electrical energy and vice versa.

Such materials are used in a variety of applications ranging from resonators and vibrators in mobile phones to deep ocean sonars to ultrasound imaging. Bone, tendon and wood are long known to possess piezoelectricity.

"While piezoelectricity is used all around us, the capacity to generate electricity from this particular protein had not been explored," said Aimee Stapleton from UL.

"The extent of the piezoelectricity in lysozyme crystals is significant. It is of the same order of magnitude found in quartz," said Stapleton, lead author of the study published in the journal Applied Physics Letters.

"However, because it is a biological material, it is non toxic so could have many innovative applications such as electroactive, anti-microbial coatings for medical implants," she said.

Crystals of lysozyme are easy to make from natural sources, researchers said.

The discovery may have wide reaching applications and could lead to further research in the area of energy harvesting and flexible electronics for biomedical devices.

Future applications of the discovery may include controlling the release of drugs in the body by using lysozyme as a physiologically mediated pump that scavenges energy from its surroundings.

Being naturally biocompatible and piezoelectric, lysozyme may present an alternative to conventional piezoelectric energy harvesters, many of which contain toxic elements such as lead.

WORLD'S FIRST ROBOTIC FARM COMPLETES FULLY AUTOMATIC HARVEST

An experimental robotic farm run by UK scientists has been harvested for the first time, yielding about five tonnes of spring barley.

Everything from start to finish - including sowing, fertilising, collecting samples and harvesting - has been done by autonomous vehicles on the farm, researchers said.

Researchers from the Harper Adams University in the UK

believe that the robotic technology improve yields in agriculture, which is necessary to avoid food crisis with the growing population in coming years.

For the project, dubbed Hands Free Hectare, researchers used commercially available agriculture machines and software used to guide amateur drones.

"In agriculture, nobody has really managed to solve the problem of autonomy," said Jonathan Gill, mechatronics researcher at Harper Adams University, who led the project.

The researchers purchased several small-size agricultural machines, including a tractor and a combine, a machine for harvesting grain crops, the 'Live Science' reported.

They then fitted the machines with actuators, electronics and robotic technology that would allow them to control the machines without the presence of a human operator.

"The vehicles navigate entirely based on the GPS, and they are just essentially driving towards targets that we predetermined," said Martin Abell, of Precision Decisions, an agricultural company that partnered with the university.

"At different GPS targets, there are different actions designed to be carried out," Abell said.

The Harper Adams team plans to use the robotically harvested spring barley to make a limited batch of "hands- free" beer that will be distributed to the project's partners.

LANGUAGES HAVE DIFFERENT HISTORIES: STUDY

Languages do not share a single history but different components evolve along distinct paths, say scientists who have found that grammatical structures change more quickly than vocabulary.

Scientists, including those from the Max Planck Institute for the Science of Human History in Germany, analysed 81 Austronesian languages based on a detailed database of grammatical structures and lexicon.

By analysing these languages, all from a single family and geographic region, using sophisticated modelling the researchers were able to determine how quickly different aspects of the languages had changed.

The study, published in the Proceedings of the National Academy of Sciences, noted that strikingly different processes seemed to be shaping the lexicon and the grammar.

The lexicon changed more when new languages were created, while the grammatical structures were more affected by contact with other languages, researchers said.

"We found striking differences in the overall pattern of rates of change between the basic vocabulary and the grammatical features of a language," said Simon Greenhill from Max Planck Institute for the Science of Human History.

"The grammatical structures changed much more quickly and seemed to be more likely to be affected by neighbouring languages, while the lexicon changed more as new languages were formed," Greenhill said.

Researchers noted that there were specific elements of both vocabulary and grammar that change at a slow rate, as well as elements that change more quickly.

One interesting finding was that the slowly evolving grammatical structures tended to be those that speakers are less aware of, researchers said.

This was because when two languages come together, or when one language splits into two, speakers of the languages emphasise or adopt certain elements in order to identify or distinguish themselves from others, they said.

"This is a bit of an unexpected finding, since many have thought that grammar might give us deeper insight into the linguistic past than vocabulary, but there is still some reason for caution," said Stephen Levinson from Max Planck Institute for the Science of Human History.

"But what is clear is that grammar and vocabulary changes are not closely coupled, even within branches of a family, so looking at them both significantly advances our ability to reconstruct linguistic history," Levinson added.

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