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SCIENCE & TECHNOLOGY

Scientists find new method to make sperm move up to twice as fast

Scientists have found that exposing sperm to ultrasonic waves can improve their motility, or its ability to move.

A team of researchers found that exposing human sperm to ultrasound can make them swim faster. They exposed human semen samples to ultrasonic waves and then measured changes in "sperm motility."

Research in the past have shown that reduced sperm motility can make it difficult for males to make a female pregnant.



Can sound be the key to fertility? Study shows ultrasound waves significantly increase sperm speed.

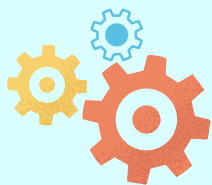
There are drugs that have been used to speed up the sperm but this could potentially cause issues like damage to sperm DNA, according to Monash University, where the engineers conducted the study. Fertility doctors get around this problem by collecting sperm from a donor and injecting them directly into the uterus.

The Monash University researchers collected 50 semen from both men with normal sperm motility and those with motility problems. They then isolated the sperm cells and exposed them 800 megawatts of ultrasonic waves for 20 seconds. The samples were tested both before and after exposure to ultrasound.

The exposure dramatically increased motility, by as much as 266 per cent in one edge case. They also found that even sperm that were not moving at all could be jolted into starting with a dose of ultrasound waves.

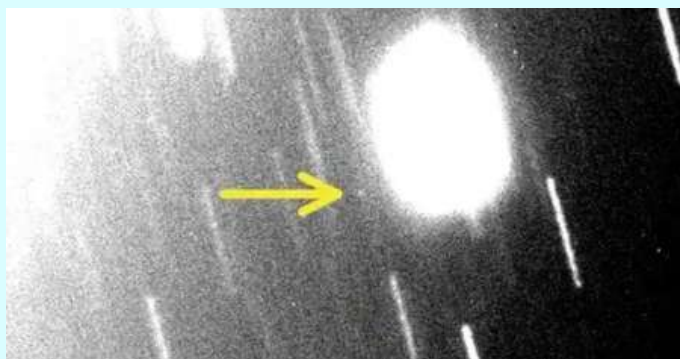
The researchers propose that the sperm are speeding up because of the energy from the ultrasonic waves replacing what they lack in sperm cell mitochondrial energy. But the researchers admit that more work is needed to make sure the waves don't damage the sperm cells or even the reproductive cells of the female.

Source: <https://indianexpress.com/article/technology/science/sperm-motility-ultrasound-waves-9164912/>



Scientists find 3 previously unknown moons of Uranus and Neptune

Scientists have discovered a new Uranian moon after 20 years. They also discovered two new moons of Neptune.



The new moon is a the small bright spot you see in the image where the yellow arrow is pointed.

With the James Webb Space Telescope peering into the depths of space, it wouldn't be your fault if you imagine we know our own solar system very well. But you would be wrong. Scientists have discovered a new moon of Uranus after more than 20 years along with two new moons of Neptune, announced the International Astronomical Union's Minor Planet Center.

"The three newly discovered moons are the faintest ever found around these two ice giant planets using ground-based telescopes. It took special image processing to reveal such faint objects," explained Carnegie Science's Scott S. Sheppard in a press statement.

With the latest addition, Uranus has 28 total moons. The latest measures only about 8 kilometres and is most probably the smallest moon of the planet. It takes 680 days to orbit the planet and has been named S/2023 U1. Just like with all outer satellites of Uranus, this will also be named after a character from a Shakespeare play.

Sheppard first spotted S/2023 U1 on November 4 last year using the Magellan telescopes at Carnegie Science's Las Campanas Observatory in Chile. He then made follow-up observations a month later in December at the same facility. He worked with Marina Brozovic and Bob Jacobson of NASA's Jet Propulsion Laboratory and looked at months of observations to detect a possible moon orbit for the find.

They were able to locate the new member of Uranus's moon collection in older images that were taken in 2021 and also from images taken by the Subaru telescope in Hawaii. Sheppard also worked with the Magellan Telescope to find the brighter of the two newfound Neptunian moons. Sheppard also sued the Magellan Telescope to find the brighter of the two new moons of Neptune.

Source: <https://indianexpress.com/article/technology/science/scientists-find-new-moons-uranus-neptune-9178343/>

Mushroom growing on a frog in India baffles scientists

Scientists are baffled by a frog that was discovered in India, which seems to have a mushroom growing out of its side.



This could be the first time that a mushroom has been seen growing on the flank of a frog.

Scientists made a surprising discovery in the foothills of the Western Ghats in India — a mushroom growing out of the side of the frog. This is the first time that a mushroom has been observed growing out of a living being.

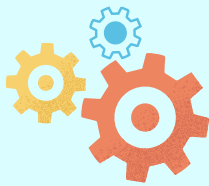
On June 19, 2023, the researchers discovered several "Rao's Golden-backed frogs" in a rainwater-fed pond on the roadside in the foothills of the Kudremukha ranges at Mala, Karkala, in Karnataka. But one of the frogs had what looked like a white-coloured growth coming out from the right side of its body. As it turned out, that was a mushroom growing out of a living frog.

The frog was not captured, instead, the researchers took pictures of it and documented it in a note published in the journal *Reptiles and Amphibians*. Fungus experts who looked at the images identified the white growth to be a Bonnet mushroom, which usually grows on dead and rotting wood.

There are many fungi that grow in a symbiotic relationship with other organisms. There are also some that are parasitic and can cause infections like mucormycosis, more commonly known as "black fungus." But this is the first time that a mushroom has been observed growing on a living organism, according to *The Independent*.

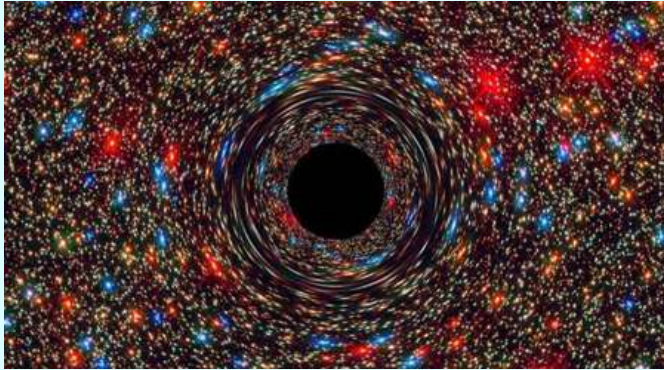
"To the best of our knowledge, never has a mushroom sprouting from the flank of a live frog been documented. The frog was not collected, so no prognosis is possible," wrote the researchers in the paper.

Source: <https://indianexpress.com/article/technology/science/mushroom-growing-on-frog-india-9161001/>



Black holes existed at the dawn of time, birthing new stars, finds study

A new study suggests that supermassive black holes existed in the earliest days of the universe, upending current theories about star formation and galaxy creation.



A computer-simulated image of a supermassive black hole

A new analysis of James Webb Space Telescope data suggests that black holes existed at the dawn of time, helping create new stars and supercharging galaxy formation. This theory could challenge the current understanding that they formed after the first stars and galaxies emerged.

The study published in *The Astrophysical Journal Letters* says that black holes may have accelerated the birth of new stars during the first 50 million years of the universe, a small part of its 13.8 billion-year history.

“We know these monster black holes exist at the centre of galaxies near our Milky Way, but the big surprise now is that they were present at the beginning of the universe as well and were almost like building blocks or seeds for early galaxies,” said lead author Joseph Silk in a press statement. Silk is a professor in the Department of Physics and Astronomy at Johns Hopkins University and at the Institute of Astrophysics, Paris, Sorbonne University.

The Webb telescope offered a better view into the distant galaxies of the very early universe, but there was a problem — those galaxies appeared much brighter than scientists had predicted. Webb images also reveal an unusually high number of young stars and supermassive black holes.

Predominant theories hold that black holes formed that black holes formed after the collapse of supermassive stars and that galaxies formed after the first stars in the dark early universe. However, the new analysis puts forth the theory that black holes and galaxies coexisted and influenced each other’s growth during the first 100 million years. To put that into context, if the entire history of the universe were a 12-month calendar, that would be the first days of January.

Source: <https://indianexpress.com/article/technology/science/supermassive-black-holes-dawn-of-time-9151229/>

Researchers find cure to liver cancer through target therapy



Liver cancer, a growing health challenge often diagnosed in its advanced stages, can be prevented by changing the metabolic programming of cells as a target therapy, a research has concluded.

The research, conducted over six years, is a collaborative effort of scientists from CSIR-Central Drug Research Institute (CSIR-CDRI), Central Institute of Medicinal and Aromatic Plants (CIMAP), and Centre of Biomedical Research (CBMR), SGPGIMS, Lucknow.

Led by CDRI scientist Madhav Nilakanth Mugale, the research concludes that cancer cells change metabolic programming, and it can be used as a diagnostic tool for cancer prevention.

The research, published in the renowned international journal Elsevier, also unravels crucial insights into the metabolic mysteries behind Hepatocellular Carcinoma (HCC), a Challenging form of liver cancer.

Besides delving into the intricacies of HCC, the research opens avenues for targeted therapies.

In their research work, CDRI’s Mugale and his team utilized an animal model of HCC induced by a substance called Diethylnitrosamine (DEN), mirroring the development of the disease in humans.

Source: https://timesofindia.indiatimes.com/city/lucknow/researchers-find-cure-to-liver-cancer-through-target-therapy/articleshow/107215607.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst&pcode=461



ENVIRONMENT

90% of Himalayas face year-long drought at 3 degrees global warming: study

A collection of eight studies — all focusing on India, Brazil, China, Egypt, Ethiopia, and Ghana — shows that the risks of drought, flooding, declines in crop yields, and loss of biodiversity and natural capital greatly increase for each additional degree of global warming



The study found that in India pollination is reduced by half at 3-4 degrees global warming compared to a quarter reduction at 1.5 degrees.

About 90% of the Himalayan Region will experience drought lasting over a year if global warming increases by 3 degrees Celsius, according to new research.

The findings, published in the journal *Climatic Change*, show that 80% of the increased human exposure to heat stress in India can be avoided by adhering to Paris Agreement's temperature goals of limiting global warming to 1.5 degrees Celsius, compared to 3 degrees Celsius warming.

The team led by researchers at the University of East Anglia (UEA) in the U.K. quantified how climate change risks to human and natural systems increase at a national scale as the level of global warming increases.

A collection of eight studies — all focusing on India, Brazil, China, Egypt, Ethiopia, and Ghana — shows that the risks of drought, flooding, declines in crop yields, and loss of biodiversity and natural capital greatly increase for each additional degree of global warming.

It found that in India pollination is reduced by half at 3-4 degrees global warming compared to a quarter reduction at 1.5 degrees. Limiting warming to 1.5 degrees Celsius allows half the country to act as a refuge for biodiversity, compared with 6% at 3 degrees, the researchers said.

The team found very large increases in the exposure of agricultural land to drought with 3 degrees Celsius warming — more than 50% of the agricultural land in each of the countries studied is projected to be exposed to severe droughts of longer than one year over a 30-year period.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/global-warming-90-percent-himalayas-face-year-long-drought-at-3-degrees-says-study/article67898431.ece>

Scientists discover new kangaroo lizard species from Western Ghats

The species is the second one of the *Agasthyagama* genus after *A. beddomii* that has been previously reported from Sivagiri hills in Tamil Nadu



Agasthyagama edge or the northern kangaroo lizard

The biodiverse forests of Western Ghats have thrown up yet another marvel of evolution — a new species of tiny lizards, which researchers have described as a “diminutive dragon.”

Agasthyagama edge or the northern kangaroo lizard, which belongs to the Agamidae family, is known to have a maximum snout-vent length of 4.3 cm. A group of scientists from various institutions in India and abroad discovered the new species from the southern Western Ghats at Kulamavu in Idukki.

The species is the second one of the *Agasthyagama* genus after *A. beddomii* or Indian kangaroo lizard that has been previously reported from Sivagiri hills in Tamil Nadu.

Poor climbers

A reduced fifth toe makes these reptiles poor climbers and hence do not climb trees like other lizards. Instead, they are mostly terrestrial and found in areas with dense leaf litter cover. While they feed on small insects, this variety of kangaroo lizard run fast and hide within dry leaves to evade predators.

The findings have been reported in the *Vertebrate Zoology*, a scientific journal published by the Senckenberg Museum in Germany.

According to the study's lead author Sandeep Das, a Science and Engineering Research Board (SERB) national postdoctoral fellow at Calicut University, the species was first sighted during an expedition in search of another evasive species, the Mahabali frog or the purple frog, around 2015. The frog was spotted on the roadside near a forest stream in Idukki. While the sighting was initially assumed to be *A. beddomii*, the herpetologists found evidence that suggested the possibility of a new species.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/scientists-discover-new-kangaroo-lizard-species-from-western-ghats/article67792494.ece>



ENVIRONMENT

Dusted Apollo, a rare high altitude butterfly, sighted for first time in Himachal's Chamba

Dusted Apollo (*Parnassius stenosemus*), is an extremely rare high-altitude butterfly and has never been photographed before in Himachal Pradesh



Photograph of Dusted Apollo (*Parnassius stenosemus*), a rare high-altitude butterfly in Himachal Pradesh's Chamba district.

Dusted Apollo (*Parnassius stenosemus*), a rare high-altitude butterfly has been sighted and photographed for the first time in Himachal Pradesh, indicating the flourishing diversity of Apollo butterflies in the region, bringing cheers to butterfly enthusiasts.

The butterfly was sighted and photographed in September 2023, during a trek to Manimahesh Lake in Chamba by Gajinder Verma and Abinash Thakur, both forest guards of Chamba Forest Circle, Himachal Pradesh Forest Department. The species was discovered in the year 1890.

The distribution range of Dusted Apollo extends from Ladakh to West Nepal and it flies between 3,500 to 4,800 meters in the inner Himalayas.

Dusted Apollo is extremely rare and has never been photographed before in Himachal Pradesh. Lovish Garlani, a butterfly expert and researcher associated as a technical consultant with the State Forest Department, told The Hindu, "The Dusted Apollo species closely resembles Ladakh Banded Apollo (*Parnassius stoliczkanus*) but the discal band on the upper fore wing in dusted apollo is complete and extends from costa to vein one while this discal band is incomplete and extends only up to vein four in Ladakh Banded Apollo. Moreover, the Dark marginal band on the hind wings is much narrower in Dusted Apollo while it is broad in Ladakh Banded Apollo. After it was photographed in Chamba, its identification was confirmed a month ago after thorough scientific examinations."

Another rare species Regal Apollo (*Parnassius charltonius*) was also photographed at Manimahesh, which is protected under Schedule II of the Wildlife Protection Act, 1972, he said. "It is an encouraging indication of the flourishing diversity of Apollo butterflies in the region.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/dusted-apollo-a-rare-high-altitude-butterfly-sighted-for-first-time-in-himachals-chamba/article67807682.ece>

Gulls for weather updates

The annual return of gulls and terns are a sign of calmer waters and better catch. And proof that urban spaces can be unexpected sanctuaries for wildlife



This year, winter came on the night of Deepavali, in a sky torn by incessant explosions of colour and light. It came on the wings of a huge, slow moving flight of egrets swimming south, hugging the coast, undeterred by the umbrellas of falling fire.

This extraordinary tableau was a reminder that our cities, for all their hazards, are not the sterile spaces we believe them to be. more, evidence points to non-human life actively finding ways to thrive in urban areas, often without our knowledge. One global study (started in 2017), which tracked 529 bird species, found that an incredible 66 were found only in urban areas. As agriculture becomes increasingly mono-cropped and chemical-dependent, even bees may be more abundant in cities than rural scapes.

Many of those egrets probably settled down with long-distance migrants around the Muttukad backwaters, to the south of Chennai. On Margazhi mornings, the widening strands of yellow sand and restless waves in the creek are alive with white. While gulls slice inland, terns rove bay-wards. Spot-billed pelicans kiss the waves like flying boats. Cormorants dip and dive while elegant painted storks and great egrets meditate in the shallows. Nervous sandpipers stalk at the edges, hopping away from the surf. A dowdy pond heron abruptly bursts into brilliant light on an upturned boat. A hefty Eurasian curlew, a sand and pebble-winged wader with feet the colour of the waves, is nearly invisible till it tilts its head to unveil a slender down-curved bill.

Sign of calmer waters

Why are so many sea birds coloured like they are? The answer may lie in who is looking at them. Seen by prey from underwater, their white bodies merge with the bright sky. And when seen by predators from above, their greys meld into the waves below. Melanin makes the wing tips black and abrasion resistant.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/seagull-weather-updates-tern-egret-birds-chennai-urban-wildlife/article67866389.ece>



ENVIRONMENT

Scientists track longest wolf trek across Europe through its droppings

The longest distance previously recorded involved a wolf journeying for 1,092 km between Norway and Finland.



Researchers have traced the droppings of a German-born grey wolf that traversed three countries to reach northeastern Spain, making it the longest journey ever documented for that species, the Autonomous University of Barcelona (UAB) said on 20 Feb. 2024.

The male, named GW1909m, travelled at least 1,240 km (770 miles) from his birthplace in Nordhorn, Lower Saxony, crisscrossing France before appearing to settle near a village in the Catalan Pyrenees, where he was last detected in February 2023.

The longest distance previously recorded involved a wolf journeying for 1,092 km between Norway and Finland. UAB said GW1909m was an "example of the behavioural plasticity and physical capacity" of wolves, highlighting that he passed through landscapes filled with large human settlements.

Molecular genetics laboratories in Germany, France and Catalonia jointly analysed the wolf's faeces - which contained a genetic trait found in Central European packs - to pinpoint his long trek.

In Spain, the droppings were found by specialist sniffer dogs that help foresters monitor wolf populations. Scientists believe that long-distance dispersal events are key to connect distant wolf populations, as they help prevent genetic isolation and inbreeding.

The rising number of wolves across Europe has led to conflicts with local farming and hunting communities on measures to prevent attacks on livestock, prompting the European Commission to review their "strictly protected" status.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/scientists-track-longest-wolf-trek-across-europe-through-its-droppings/article67866076.ece>

New species of damselfly discovered in Kerala's Ponnudi hills

The discovery is significant, because for over 160 years, the genus *Phylloneura* was considered monotypic, with a single described species



Cliffside Bambootail (Phylloneura rupestris), which belongs to a group called bambootails, is named thus because it lays eggs in the moss beds in seasonal rills that flow over rock cliffs

A team of researchers have discovered a new species of damselfly at the Ponnudi hills in Thiruvananthapuram district of Kerala. The hills are a part of the Agasthyamalai landscape, at the southernmost tip of the Western Ghats. The Ponnudi hills are biodiversity-rich, and this is the third species of damselfly discovered from the region.

According to A. Vivek Chandran, a member of the research team, the new species, named Cliffside Bambootail (*Phylloneura rupestris*), belongs to a group called bambootails, so named because of their long abdomen that resembles bamboo stalks.

Just one species

The discovery is significant, because for over 160 years, the genus *Phylloneura* was considered monotypic, with a single described species, the Myristica Bambootail (*Phylloneura westermanni*). He said its populations are associated with myristica swamps, and hence is known by its common name Myristica Bambootail. To date, it has remained the sole described species of the genus *Phylloneura* and is considered near-threatened as per the IUCN Red List of Threatened Species. He said it is endemic to the Western Ghats and has been recorded only in the area between the Nilgiri Hills and Sharavathi Valley, north of the Palghat Gap.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/new-species-of-damselfly-discovered-in-ponnudi/article67852949.ece>



AGRICULTURE

The unusual cabbage mutation that could boost crop yield

Some 44 years ago, people found a cabbage plant with a natural mutation that destroyed the plant's ability to make pollen.



Representative photo of a cabbage plant.

The males of plants as diverse as cabbage, cauliflower, broccoli, tomato, and rice can be made sterile by deleting a very small part of their genome's DNA. This is the take-home message of a paper published in the journal *Nature Communications* in October by researchers at the State Key Laboratory of Vegetable Biobreeding of the Chinese Academy of Agricultural Sciences, Beijing.

The simple deletion resulting in such a drastic outcome brings to mind the story of a kingdom that was lost for want of a horseshoe nail. But here, instead of loss, the researchers assure us of a gain: that the deletion could lead to an abundant harvest of these plants, thanks to a process called heterosis.

Genes and promoters

The DNA molecule consists of two long strands. Each strand is composed of four compounds called nucleotide bases. They are designated A, C, G, and T for simplicity (for adenine, cytosine, guanine, and thymine respectively). An A on one strand makes chemical bonds, called hydrogen bonds, with a T on the other and a C on one strand makes hydrogen bonds with a G on the other.

The bonds between As and Ts and the bonds between Gs and Cs hold the two DNA strands together. A base-pair, or bp for short, is a single A-T or G-C pair between the two strands, with the dash denoting the bond.

The genome of the cabbage plant (*Brassica oleracea*) consists of around 1.06 billion base-pairs organised in 18 chromosomes, which every cell holds in nine pairs of two each. In each pair of two chromosomes, one chromosome comes from the pollen and the other comes from the egg. The DNA (which is all the base-pairs together) in every chromosome pair share a mostly identical sequence of base-pairs.

Source: <https://www.thehindu.com/sci-tech/science/ms-cd1-cabbage-mutation-heterosis-crop-yield-explained/article67617801.ece>

Reducing ammonia emissions through targeted fertilizer management

Based on machine learning, researchers have come up with detailed estimates of ammonia emissions from rice, wheat and maize crops. The dataset enabled a cropland-specific assessment of the potential for emission reductions, which indicates that effective management of fertilizer in the growing of these crops could lower atmospheric ammonia emissions from farming by up to 38%. The paper was published in the journal *Nature*.

Atmospheric ammonia is a key environmental pollutant that affects ecosystems across the planet, as well as human health. Around 51-60% of anthropogenic ammonia emissions can be traced back to crop cultivation, and about half of these emissions are associated with three main staple crops: rice, wheat and maize. However, quantifying any potential reductions in ammonia emissions related to specific croplands at high resolution is challenging and depends on details such as nitrogen inputs and local emission factors.

Yi Zheng from the Southern University of Science and Technology, Shenzhen, China and others used machine learning to model ammonia output from rice, wheat and maize agriculture worldwide on the basis of variables that include climate, soil characteristics, crop types, irrigation, tillage and fertilization practices. To inform the model, the researchers developed a dataset of ammonia emissions from over 2,700 observations obtained via systematic review of the published literature. Using this model, the researchers estimate that global ammonia emission reached 4.3 teragrams (4.3 billion kilograms) in 2018. The authors calculated that spatially optimizing fertilizer management — as guided by the model — could result in a 38% reduction in ammonia emissions from the three crops. The optimised strategy involves placing enhanced-efficiency fertilizers deeper into the soil using conventional tillage practices during the growing season.

The researchers found that under the fertilizer management scenario rice crops could contribute 47% of the total reduction potential, and maize and wheat could contribute 27% and 26%, respectively. Without any management strategies, the authors calculated that ammonia emissions could rise by between 4.6% to 15.8% by 2100, depending on the level of future greenhouse gas emissions.

Source: <https://www.thehindu.com/sci-tech/reducing-ammonia-emissions-through-targeted-fertilizer-management/article67804549.ece>



AGRICULTURE

Researchers grow beef cells in rice grains to create nutritious, hybrid food

Researchers in Korea have grown a culture of animal meat and fat inside a "scaffold" of rice, creating what they hope could be an eco-friendly and cheaper alternative to meat.



Cow muscle and fat cells cultured in rice to create a hybrid food

Scientists in Korea are working on creating "cultured beef rice" by growing animal muscle and fat cells inside rice grains. They presented their method on Wednesday and hopes to use it to create a nutritious and flavourful hybrid food that could become a more affordable protein with a smaller carbon footprint.

"Imagine obtaining all the nutrients we need from cell-cultured protein rice. Rice already has a high nutrient level, but adding cells from livestock can further boost it," said Sohyeon Park, first author of an article published in the journal *Cell Press*, in a press statement.

Animal meat has biological "scaffolds" that help guide and support cells growth in three dimensions to make tissue and organs. The researchers mimicked this cellular environment using rice. Since rice grains are porous and have organised structures, they provide a solid "scaffold" to house animal-derived cells. Some molecules found in rice can also promote the growth of these cells.

They began by coating the rice with fish gelatin, which helps the cells lock to the rice better. They then seeded cow muscle and fat stem cells and left it to culture in a petri dish for nine to 11 days. The final product they got is a cell-cultured "beef rice:" with ingredients that meet food safety requirements, according to Yonsei University.

To see how the "rice" would fare as food, the researchers steamed and performed some food industry tests for nutritional value, odour and texture. They found that the new hybrid rice has eight per cent more protein and 7 per cent more fat than regular rice. It was also firmer and brittle compared to the sticky and soft texture. The rice with higher muscle content had beef and almond-like odour compounds while those with a higher fat content had compounds that corresponded to cream, butter and coconut oil.

Source: <https://indianexpress.com/article/technology/science/beef-meat-fat-cells-in-rice-grains-hybrid-food-9163661/>

ICRISAT pioneers 'world's first' pigeonpea speed breeding protocol to bolster food security in drylands



The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has pioneered the world's first pigeonpea speed breeding protocol, further bolstering food security in Asia and Africa, the organisation said on 20th Feb. 2024.

The new convention promises to substantially cut the time required to develop new pigeonpea lines with desirable traits, effectively bringing food to dryland communities faster.

Traditionally, pigeonpea breeding can take up to thirteen years. But with the new protocol's emphasis on material breeding and control over factors like photoperiod, temperature, and humidity, the breeding cycle can now be shortened to just two to four years, as opposed to the conventional period of seven years. Pigeonpea, a staple in tropical and subtropical diets, is crucial for food security and soil health globally and is lauded for its nutritional value and versatility.

Dr Jacqueline Hughes, Director General of ICRISAT, underscored the consequence of the innovation. "This pigeonpea speed breeding protocol represents a significant advancement for major pigeonpea-producing regions, paving the way for self-reliance in pulse production and meeting the dietary necessities of nations such as India, Myanmar, Kenya, Tanzania and Mozambique.

"I commend our researchers and partners for developing this protocol, which promises to enhance food and nutrition security in the drylands. This achievement is particularly timely, coinciding with World Pulses Day celebrations, highlighting the global significance of pulses," said Dr Hughes.

Historically, pigeonpea's long growth cycle and sensitivity to day length have hindered breeding efforts, with only about 250 varieties released globally over six decades.

Source: <https://agriculturepost.com/agri-research/icrisat-pioneers-worlds-first-pigeonpea-speed-breeding-protocol-to-bolster-food-security-in-drylands/>



HEALTH

Plant-based diet linked with improved sexual health of men with prostate cancer in new study

An increased proportion of plant-based foods in the diet of men with prostate cancer has been linked with better sexual, hormonal and urinary health.



The study analysed more than 3,500 men with prostate cancer.

A plant-based diet rich in fruits, vegetables, grains and nuts is linked to less urinary incontinence, erectile dysfunction and some other side effects seen in patients who have prostate cancer, finds a study published.

The study published in the International Interdisciplinary Journal of the American Cancer Society analysed more than 3,500 men with prostate cancer and looked at whether eating a more plant-based diet improved quality-of-life issues that sometimes come up after prostate cancer treatment.

Researchers sorted patients into quintiles or five groups based on the proportion of plant versus animal foods they said they ate. The quintile that consumed the most plant-based food scored between eight to 11 per cent better in measures of sexual function compared to the group that consumed it the least.

Similarly, it also found up to 14 per cent better scores for urinary health, with fewer instances of incontinence, obstruction and irritation. Hormonal health scores — assessing symptoms like low energy, depression and hot flashes — were also up to 13 per cent higher for the quintile with the highest proportion of plant-based foods in their diet compared to the lowest.

“Our findings offer hope for those looking for ways to improve their quality of life after undergoing surgery, radiation, and other common therapies for prostate cancer, which can cause significant side effects. Adding more fruits and vegetables to their diet, while reducing meat and dairy, is a simple step that patients can take,” said study lead author and urologist Stacy Loeb in a press statement.

Source: <https://indianexpress.com/article/technology/science/plant-based-diet-sexual-health-prostate-cancer-9161241/>

Scientists propose new way to repair memory issues caused by Alzheimer's

Scientists have developed a new treatment they believe could reverse some of the memory impairment caused by Alzheimer's disease.



The researchers work focuses on a protein called KIBRA.

There are some new treatments that show promise in slowing the disease that robs people's memories. But in a new study, researchers are proposing an alternative strategy to reverse the memory problems that come with Alzheimer's and related dementia.

According to the Buck Institute for Research on Aging, most current research on Alzheimer's treatments focuses on reducing toxic proteins that accumulate in the brain as the disease progresses. However, the research team that published a study in The Journal of Clinical Investigation took a different course. “Rather than trying to reduce toxic proteins in the brain, we are trying to reverse the damage caused by Alzheimer's disease to restore memory,” explained Tara Tracy, senior author of the study, in a press statement. Tracy is an assistant professor at Buck.

The new work focuses on a protein called KIBRA, which is found in the kidney and the brain. In the human brain, it is mainly found at the synapses, which are the connections between neurons that enable memory formation and recall. Past research has shown that KIBRA is required for synapses to form memories and the team led by Tracy found that brains with Alzheimer's are KIBRA deficient.

“We wondered how the lower levels of KIBRA affected signaling at the synapse, and whether understanding that mechanism better could yield some insight into how to repair the synapses damaged during the course of Alzheimer's disease. What we identified is a mechanism that could be targeted to repair synaptic function, and we are now trying to develop a therapy based on this work,” said Grant Kauwe, co-first author of the study, in a press statement.

Source: <https://indianexpress.com/article/technology/science/alzheimers-memory-loss-treatment-kibra-9142225/>



HEALTH

Protein markers in blood can help predict dementia 15 years in advance: Study

A new study has shown how some protein biomarkers in blood can be used to detect dementia 15 years before it is diagnosed.



This study analysed over 50,000 blood samples.

Scientists have shown in a new study how protein biomarkers found in blood can help predict dementia 15 years before it is diagnosed.

It is estimated that more than 8.8 million Indians above the age of 60 live with Dementia. During its final stages, the neurodegenerative disease can dive into the deepest parts of the brain and cause death by inhibiting basic bodily functions like heart rate control and breathing.

The study published in the journal Nature Aging on Monday shows how profiles of protein in the blood can be used to accurately predict dementia 15 years before it is clinically diagnosed. These biomarkers can be found in blood, some other body fluids or tissues. The study is the largest of its kind and included blood samples from 52,645 healthy participants taken from UK Biobank.

The blood samples studied were collected between 2006 and 2010 and analysed between 10 to 15 years later by the research team. Until March 2023, 1,417 of the participants went on to develop dementia and not coincidentally, these people's blood showed irregularities with some protein biomarkers.

The researchers used machine learning to analyse 1,463 proteins and identified 11 and combined a "protein panel" that the researchers believe can be very accurate at predicting dementia in the future. After incorporating risk factors like age, sex, education level and genetics, the predictive model showed 90 per cent accuracy, indicating that it could potentially be used to screen for dementia.

Source: <https://indianexpress.com/article/technology/science/protein-markers-blood-dementia-15-years-9159463/>

Are rice, potato, pasta, bread and cookies pushing up your triglycerides? Find out the blood sugar connection

Dr V Mohan, Chairman, Diabetes Specialities Centre, Chennai, analyses the impacts of carb consumption



If you have excess carbohydrates — say a combination of rice, wheat chapati, starchy root vegetables like potatoes, breads, pasta, cookies and pastry — day after day, then you might be building up not only excess sugar levels but also triglycerides, a type of fat in your blood. And triglycerides are the reason that people with diabetes have a higher risk of heart attack.

How Diabetes leads to Triglycerides?

Uncontrolled diabetes is one of the major triggers for higher triglyceride levels. When glucose levels in the blood increase, insulin, the hormone responsible for balancing these out, stores extra glucose as glycogen in the liver. When there is too much glycogen in the liver, the glucose gets converted to fatty acids. These form triglycerides. A high triglyceride count further leads to insulin resistance, which is just a step away from developing Type 2 diabetes. This prevents the insulin from letting our cells absorb glucose. This results in higher than normal blood sugar levels.

If you regularly eat more calories than you burn, particularly high-carbohydrate foods, you may have triglycerides. Their persistent high levels cause a condition called hypertriglyceridemia.

Why Triglycerides pose a higher Cardiac risk for people with Diabetes

Usually high triglycerides are inversely associated with low levels of good cholesterol or high density lipoprotein (HDL). They are also closely linked to increased blood sugar, waist circumference and blood pressure. All these five abnormalities together increase the risk of heart attacks, disease and strokes. But most importantly, high triglyceride levels mean the bad cholesterol or low-density lipoprotein (LDL) in the blood tends to be smaller and denser. This is a big risk factor for heart attacks and strokes.

Source: <https://indianexpress.com/article/health-wellness/rice-potato-pasta-bread-cookies-triglycerides-blood-sugar-connection-9160508/>



HEALTH

A touch of sun: the impact of excessive heat events on children

Effects on the very young can be significant, including low birth weight and prematurity, learning loss during the school years, heat-related illness, and death.



Temperature increases will manifest most negatively among children.

There is sufficient evidence to show global warming is causing temperatures across the globe to rise significantly enough to cause disruptions. Heat waves are occurring with greater frequency and are lasting longer than ever before, with the World Meteorological Organisation declaring that 2023 was the hottest year on record. While humans have adapted and acclimatised themselves to several variations in climate, there is believed to be a limit beyond which our bodies cannot process this change. The correlation between health outcomes and environmental conditions is something that has been broadly hinted at, but not studied in detail. It is about time to do that.

The first of a series, this working paper from the Early Childhood Scientific Council on Equity and the Environment, Harvard University, (Extreme Heat Affects Early Childhood Development and Health: Working Paper No. 1., 2023) explores how extreme heat can affect young children's biological systems and disrupt development, as well as the many ways it can amplify the effects of systemic inequities.

The authors also indicate the powerful effects that extreme temperatures can have during pregnancy and early childhood, including impacts on learning, sleep quality, and mental and behavioural health. It also explains how heat amplifies systemic inequities, including air quality, access to nutritious foods, and structural disadvantages. In addition, it provides some practical solutions to mitigate climate change, slow the heating of our environment, and provide new ways of cooling our communities. This includes tips on how to mitigate the impact of extreme temperatures, finding new ways of cooling the communities where children live, and grow, along with some community initiatives that have reportedly started to bear fruit.

Source: <https://www.thehindu.com/sci-tech/health/a-touch-of-sun-the-impact-of-excessive-heat-events-on-children/article67799848.ece>

Obesity rates going up across the world: Lancet study

Among women in India, the obesity rate increased from 1.2% in 1990 to 9.8% in 2022; among men, from 0.5% in 1990 to 5.4% in 2022



The total number of children, adolescents and adults worldwide living with obesity has surpassed one billion.

Obesity rates among children and adolescents worldwide increased four times from 1990 to 2022, while obesity rates among adults have more than doubled, a new study published in *The Lancet* has revealed. The total number of children, adolescents and adults worldwide living with obesity has surpassed one billion. In total, 159 million children and adolescents, and 879 million adults were obese in 2022.

Form of malnutrition

Along with the declining prevalence of people who are underweight since 1990, obesity has become the most common form of malnutrition in most countries, said the paper that analysed global data estimates.

The study was conducted by the NCD Risk Factor Collaboration (NCD-RisC), in collaboration with the World Health Organization. Over 1,500 researchers in more than 190 countries analysed weight and height measurements of over 220 million people aged five years or older. They reportedly looked at body mass index (BMI) to understand how obesity and underweight have changed worldwide from 1990 to 2022. Representatives from the Madras Diabetes Research Foundation were among the co-authors of the study in India. V. Mohan, Anjana Ranjit and Guha Pradeepa, who were also instrumental in the countrywide INdiab study, were co-authors.

Coexisting conditions

Dr. Mohan said that in India, both obesity and underweight continue to co-exist. "We have also seen, as part of the INdiab study that both abdominal obesity and generalised obesity are increasing in the population, with of course variations in rural areas."

Source: <https://www.thehindu.com/sci-tech/health/obesity-rates-going-up-across-the-world-lancet-study/article67901050.ece>



S&T COOPERATION FOR GLOBAL SOUTH

Pacific Island Countries Join in South-South Advocacy for Renewable Energy



On 25 January 2024, His Excellency the President of Fiji Ratu Wiliame Maivalili Katonivere inaugurated an 18.25 kW solar generation system at the Fiji State House. The system – funded by the India-UN Development Fund, and delivered in close partnership with the United Nations Development Programme (UNDP) – will supply the House with annual clean energy production of approximately 20,000 units of electricity. This will save 7,400 Fijian dollars of annual spending on energy costs.

This demonstration project, launched in December 2023, involves South-South coalition-building among 11 Pacific Island Countries, and joint advocacy to create awareness among different stakeholders on the importance of solar energy as a source of clean, renewable energy. Work to install solar systems at the State Houses of partner countries is currently underway.

Given sea-level rise, climate change is the single greatest threat to the livelihoods, security and wellbeing of the people of the 11 Pacific Island Countries involved in the project – Fiji, Federated States of Micronesia, Kiribati, Republic of the Marshall Islands (RMI), Nauru, Palau, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu.

Source: <https://unsouthsouth.org/2024/01/26/pacific-island-countries-join-in-south-south-advocacy-for-renewable-energy/>

IBSA Fund: New Teacher Training Centre Established in Palau



President Surangel Whipps Jr of the Republic of the Palau delivers remarks at the launch of the project in Koror. Photo IOM 2024, Yumie Morishita.

The International Organization for Migration (IOM) and the Government of Palau launched on 6 February a project to refurbish a school building to serve as a teacher training centre. The occasion was attended by President Surangel Whipps Jr., senior Government officials and representatives of embassies.

With funding from the Governments of India, Brazil and South Africa, the Palau High School Teacher Training Centre will be renovated into a modern training facility with the capacity to train 80 high school teachers.

High-quality education is critical to the future success of Palauan students. For disaster-prone Small Island States like Palau, in particular, it is paramount to ensure school buildings and communal centres are safe, secure and equipped with the capacity to minimize damage during emergency situations.

Implemented in collaboration with the Ministry of Education, the Ministry of Public Infrastructure and Industries and the United Nations Office of South-South Cooperation, the project will address infrastructure challenges related to teachers' growth and development with the goal of supporting teachers' preparation and performance and leading to improved outcomes for students.

Palau's Minister of Education, Dr. Dale Jenkins, expressed appreciation for the collaboration with IOM and partners. He acknowledged the project will support the implementation of Palau's 2017 to 2026 Education Master Plan which calls for investing in training to strengthen the capacity of teachers.

Source: <https://roasiapacific.iom.int/news/iom-establishes-new-teacher-training-centre-palau>



S&T COOPERATION FOR GLOBAL SOUTH

PGTF: Cuba, Panama and Paraguay Build Food Security through Climate Conscious Agriculture



The development of new plant varieties, that are adapted to the effects of climate change, and their rapid introduction to the farmers is a vital necessity to ensure food security and livelihoods for communities.

A Pérez-Guerrero Trust Fund for South-South Cooperation (PGTF)-supported project brought together researchers, academia, and farmers from Cuba, Panama and Paraguay, to develop new soybean, rice, and tomato varieties that are adapted to the effects of climate change. The institutions involved in the project are: the National Institute of Agricultural Sciences (INCA) of Cuba; the Multidisciplinary Center for Technological Research (CEMIT) of the National University of Asunción, Paraguay; and the Agricultural Research Institute of Panama (IDIAP).

The partners selected varieties of soybean, rice, and tomato; as well as identified strains of nitrogen-fixing bacteria that would reduce the use of chemical fertilizers, resulting in the highest possible yield under local environmental conditions.

The project facilitated a participatory method for the selection of the optimal plant variety among the those tested in the breeding program. In addition, the project supported the evaluation and selection of the best biofertilizers. These elements are contributing to higher production, increased food security, and reduced land pollution from fertilizers.

Over 140 farmers participated in the field days for the selection of the soybean, rice, and tomato varieties suitable for the soils of specific farms in the participating countries.

Source: <https://unsouthsouth.org/2024/01/31/pgtf-cuba-panama-and-paraguay-build-food-security-through-climate-conscious-agriculture/>

Republic of Korea and UNOSSC Support Electron Beam Technology-Sharing



Electron Beam (EB) technology is an excellent example of peaceful application of nuclear energy for sustainable and resilient development.

The United Nations Office for South-South Cooperation (UNOSSC) and the Regional Cooperative Agreement Regional Office (RCARO) in Daejeon, Republic of Korea, implemented two phases of a project on “Electron Beam Applications for Value Addition to Food and Industrial Products and Degradation of Environmental Pollutants in the Asia Pacific region,” under the Republic of Korea (ROK)-UNOSSC Facility on Science, Technology and Innovation in 2011-2021.

The project successfully introduced and promoted the EB technology through advisory services, capacity building and technology exchanges through South-South and triangular cooperation.

“We are delighted to see that this strategic initiative, piloted in the framework of the RoK-UNOSSC Facility 2011-2021, was successful at establishing long-lasting networks and partnerships,” said Ms. Dima Al-Khatib, UNOSSC Director. “It has proved the case for the benefits of this type of technical cooperation, and through a new phase of collaboration will be scaled-up with a new set of partners.”

During the initial project, seven new EB facilities were established in India, Pakistan and Thailand with the support of IAEA and other stakeholders. Over 100 new employment opportunities were created in 14 participating countries, among many other tangible results. The project also facilitated South-South exchanges and learning among participating countries.

Source: <https://unsouthsouth.org/2024/02/29/republic-of-korea-and-unossc-support-electron-beam-technology-sharing/>



S&T COOPERATION FOR GLOBAL SOUTH

UN Fund for South-South Cooperation and Global South-South Development Centre Design Next Project Phase



The United Nations Fund for South-South Cooperation (UNFSSC), established by the General Assembly in 1996, has been instrumental in fostering collaboration among developing nations to achieve the Sustainable Development Goals (SDGs).

Administered by UNOSSC, following UNDP rules and regulations, and UNSDG guidelines for interagency collaboration, \$50+ Million USD has been pledged to the UNFSSC from China, Republic of Korea, Russia, Qatar, UAE, Turkey, Thailand, Colombia, Japan, Norway, Nigeria, and Portugal among others. Additionally, the UNFSSC has built synergies with all Funds managed by UNOSSC, including the India-UN Development Partnership Fund as a sub-fund of UNFSSC; the India, Brazil and South Africa (IBSA) Fund; and the Perez-Guerrero Trust Fund (PGTF) of G77+China.

Within the UNFSSC framework, the Global South-South Development Center Project (2019-2024) was launched with full funding support from the Government of China. The GSSDC Project leverages the extensive expertise of 50 technical institutions under the China South-South Cooperation Network in supporting pragmatic South-South cooperation initiatives for developing countries. “Building on past results, the Global South-South Development Center (GSSDC) Programme aims to deepen its impact in a new phase leading up to 2030, through enhanced partnership with UN Agencies and scalable initiatives with multilateral, regional and sub-regional mechanisms,” said Ms. Xiaojun Grace Wang, Trust Fund Director of UNOSSC. Ms. Wang conducted a series of trust fund and programme stakeholders’ consultations with UN Country Teams and key partners in Bangkok and Beijing in January 2024. Partners anticipate that the new phase will launch strategic initiatives spanning from food systems, new industrialization, to energy transition, focusing on women, youth, digital and green transformation.

Source: <https://unsouthsouth.org/2024/02/29/un-fund-for-south-south-cooperation-and-global-south-south-development-centre-design-next-project-phase/>

India-UN Fund: Sparking Innovation in Barbados’ Energy Sector



Minister of Energy and Business, Senator Lisa Cummins, accepts the final documents for the Barbados Energy Local Content Development Project from Economic Adviser/Project Lead NR, Commonwealth Secretariat, Victor Kitange

At the core of a new energy initiative in Barbados, supported by the India-UN Development Partnership Fund, are insights and methodologies drawn from the experiences of Nigeria, Tanzania, and Trinidad and Tobago. The project is broadening the engagement of local actors in the energy market to promote more and better livelihood opportunities.

“Barbadians have a stake in the ownership of their own assets – sun, wind and wave energy,” said Senator Lisa Cummins, Minister of Energy and Business of Barbados, speaking about the project. “Here in the Ministry, it is a priority for us to make sure we facilitate that.”

The initiative was rolled out through a series of capacity-building workshops and the innovative ‘Share Fair’, designed to equip local suppliers with the skills and knowledge necessary to excel in the international energy arena.

The active participation of experts from the Nigerian Content Development and Monitoring Board (NCDMB) provided practical tools and insights, directly contributing to the project’s success by offering proven strategies tailored to the unique challenges and opportunities of the Barbadian context. With over 215 beneficiaries, the outcomes of this South-South cooperation initiative have contributed to bolstering the capacity and competitiveness of local suppliers in Barbados.

A pivotal achievement of the project was the development and implementation of a Supplier Data Management System (SDMS), along with a structured Supplier Development Program, both informed by Nigeria’s pioneering efforts. These systems not only facilitated efficient management of local content development, but also ensured the sustainability and scalability of the project’s impact.

Source: <https://unsouthsouth.org/2024/03/01/india-un-fund-sparking-innovation-in-barbados-energy-sector/>



OTHERS

Scientists discover new fungus species in Thrissur

The new species *Trichoglossum syamviswanathii*, named after former KFRI director Syam Viswanath, was collected from the moist soil of the Bambusetum of the KFRI Field Research Centre at Palappilly, Thrissur



Trichoglossum syamviswanathii

Scientists have discovered a new fungus species, *Trichoglossum syamviswanathii*, from Kerala. Researchers from the Kerala Forest Research Institute (KFRI), Botanical Survey of India, and the University of Hyderabad are behind the discovery of the new fungus species.

The species *Trichoglossum syamviswanathii* is named after renowned scientist and former director of KFRI Syam Viswanath for his contribution to the field of forestry in India.

The new fungus species belongs to the family Geoglossaceae (Ascomycota) and was collected from the moist soil of Bambusetum of the KFRI Field Research Centre, Palappilly, in Thrissur. It is characterised and described based on morphological characteristics and molecular phylogenetic analyses, said Shambhu Kumar, senior scientist and head of the Forest Pathology Department, KFRI, a member of the research team.

Abundant diversity

“The Western Ghats region of Kerala is renowned for its abundant fungal diversity, including numerous species that are endemic to this specific area. This finding underscores the importance of ongoing exploration and research into the diverse flora, fauna, and fungi in the Western Ghats,”

Globally, the genus *Trichoglossum* has so far 55 records (IndexFungorum, Dec. 2023). However, the diversity of species of *Trichoglossum* in India is poorly represented. *Trichoglossum*, commonly known as “hairy earth tongues” fungus, are characterised by distinctive features. These fungi exhibit club-shaped apothecia in dark shades of black or brown, explain the researchers.

Source: <https://www.thehindu.com/sci-tech/sciencel/scientists-discover-new-fungus-species-in-thrissur/article67826938.ece>

In snake genes, study finds they evolved 3x faster than other reptiles

Millions of years ago, an evolutionary explosion called the “singularity of snakes” propelled them to diversify rapidly. How did this happen?



The head of a jungle carpet python (*Morelia spinota cheynei*) is reflected in water at the Cairns Aquarium, Australia, September 19, 2018

The sci-fi writer David Brin built his fictitious ‘Uplift Universe’ in a series of novels for two decades from 1980. In the series, a patron race uplifts species of a future universe to a higher order of life.

Something similar happened in the earth’s distant past when many species went through bursts of evolutionary innovation, taking giant leaps and incorporating extraordinary diversity in their population, while others were left behind.

In a study published on February 22 in the journal *Science*, an international team of scientists, led by researchers at the University of Michigan, worked together to unravel the genetic sequence of more than 1,018 snake and lizard species. The result was the largest and most comprehensive evolutionary tree of snakes and lizards. They analysed the genetic sequence data together with previous studies, and revealed that snakes have been evolving much faster than their reptilian cousins.

Specifically, the team estimated snakes evolved almost three-times faster than lizards and other reptiles, allowing them to take advantage of the new environmental niches that rapidly emerged after the extinction of the dinosaurs.

Source: <https://www.thehindu.com/sci-tech/sciencel/singularity-of-snakes-evolution-burst-genetics/article67909956.ece>