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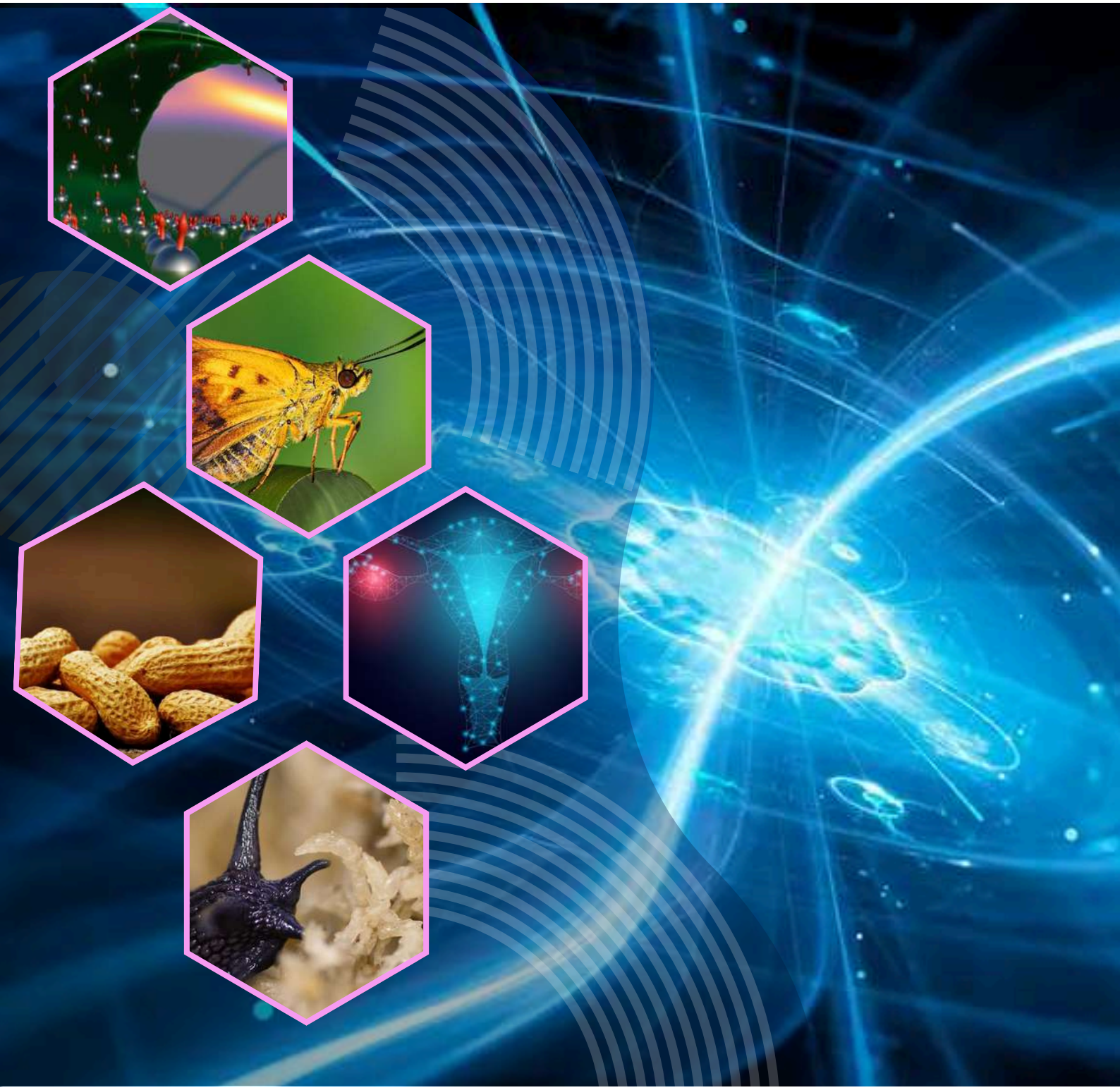

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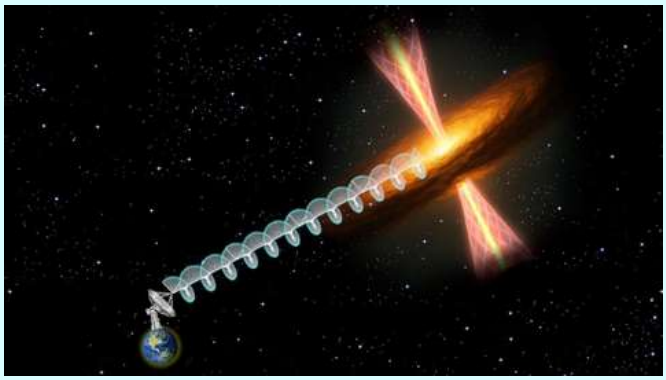
SCIENCE & TECHNOLOGY

IIST team discovers radio emission with circular polarisation near a massive young protostar

Discovery linked to IRAS 18162-2048, a massive protostar in the Milky Way, expands scientists' understanding of how massive stars form, say a research team from Indian Institute of Space Science and Technology, Thiruvananthapuram



An international team led by astronomers from the Indian Institute of Space Science and Technology (IIST) here has discovered radio emission with a special property known as circular polarisation near a massive young protostar that is still forming about 4,500 light years from earth. [Protostar refers to the earliest known stage of a star when it is still accumulating gas and dust material from its surroundings.]

The discovery linked to IRAS 18162-2048, a massive protostar in the Milky Way galaxy, opens an exciting window into scientists' understanding of how massive stars form, astronomers at the IIST.

Circular polarisation occurs when electric and magnetic field vectors of electromagnetic waves—in this case radio waves—rotate in a circle about the direction in which the waves travel through space. This emission offers the first direct clue to the strength of magnetic fields in the immediate neighbourhood of a protostar.

The findings have been published in The Astrophysical Journal Letters under the title 'First Detection of Circular Polarization in Radio Continuum Toward a Massive Protostar.'

In the early stage, the protostar can also eject high-velocity material in opposite directions, known as a bipolar jet. 'Massive protostars' evolve to have mass more than 8 to 10 times that of the Sun.

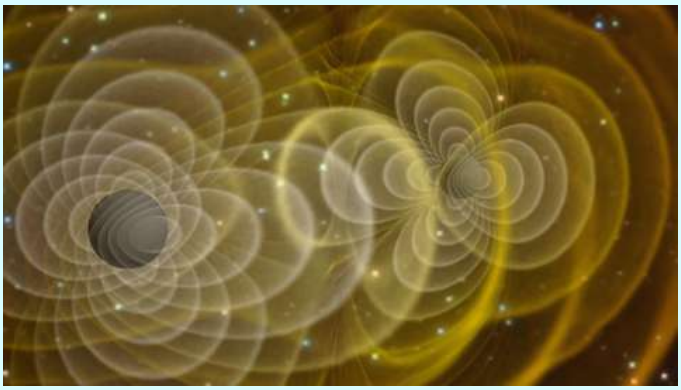
Protostellar jets

According to the astronomers, IRAS 18162-2048 powers one of the largest and brightest known protostellar jets in the Milky Way, the HH80-81 jet. It is believed that the magnetic field and rotation in the protostellar system are responsible for the ejection of the jet. While a magnetic field has been imaged from the jet earlier, this is the first time that hints of it have been detected directly from this massive protostar, according to the IIST.

Source: https://www.thehindu.com/sci-tech/science/iist-team-discovers-radio-emission-with-circular-polarisation-near-a-massive-young-protostar/article69823026.ece
Dated: July 18, 2025, https://www.thehindu.com

New gravitational waves reveal black hole with 'forbidden' mass

The mass of a heavier black hole that collided with a lighter one 2 billion lightyears away was found to be right inside, or just above, the pair instability mass gap



Scientists working with a network of observatories located around the world recently reported that they had detected a powerful and unusual burst of gravitational waves, which they called GW231123. The signal was traced back to two black holes colliding into each other on November 23, 2023. This isn't the first time the observatories have detected gravitational waves, but the event is special because of the extraordinary size of the black holes involved: they are much heavier than most seen before. More interesting is the fact that the heavier black hole appeared to have a "forbidden" mass — a value inside a range called the pair instability mass gap — which challenges what physicists thought was possible for black holes created from dying stars.

Imagine a massive star at the end of its life. Usually, very heavy stars explode in supernovae, leaving behind black holes. But theory predicts that no black holes should form with masses between about 60 and 130 times the mass of our sun. This is the pair instability mass gap: it's thought to exist because stars this large explode so violently that nothing remains, not even a black hole, just scattered gas.

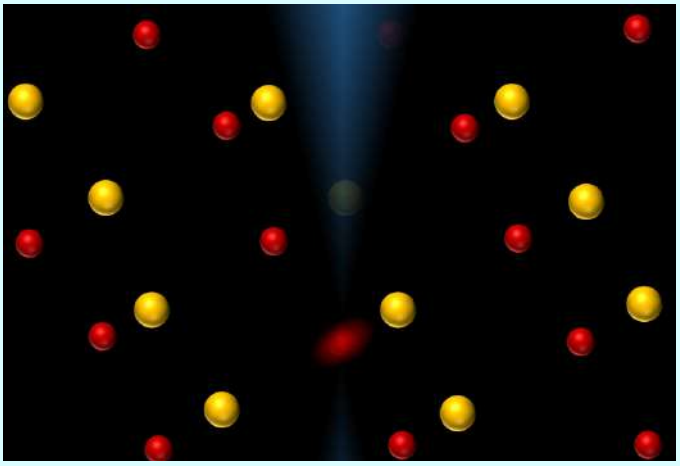
Above 130 solar masses, stars may skip the explosion and directly collapse to create supermassive black holes. So finding black holes in the mass gap raises important questions about how they got there.

On November 23, 2023, the two Laser Interferometer Gravitational-wave Observatories (LIGO) in the U.S. detected a burst of gravitational waves, faint ripples in spacetime created by massive objects accelerating and colliding. The GW231123 event lasted only about one-tenth of a second and the signal was strong and clear. The collision happened about 2 billion lightyears away.

Source:https://www.thehindu.com/sci-tech/science/new-gravitational-waves-reveal-black-hole-with-forbidden-mass-explained/article69826127.ece
Dated: July 18, 2025, https://www.thehindu.com

SCIENCE & TECHNOLOGY

First direct images reveal atomic thermal vibrations in quantum materials



In a new study, scientists at the Indian Institute of Technology (IIT) Bombay have demonstrated how cells can sense and respond to invisible mechanical patterns—like built-in tensions around them.

The research led by Professor Abhijit Majumder, was published in Cell Reports Physical Science. The findings not only add to the fundamental understanding of how cells organise themselves, but also have important implications for tissue engineering, cancer research, and wound healing.

Cells follow very specific patterns, for instance, muscle fibres are aligned parallel to each other to enable coordinated movements, blood vessels extend toward wounds to facilitate healing, and cells in the eye are arranged radially to help focus light precisely onto the retina, ensuring clear and accurate vision. Such precise spatial organisation is essential for proper tissue function.

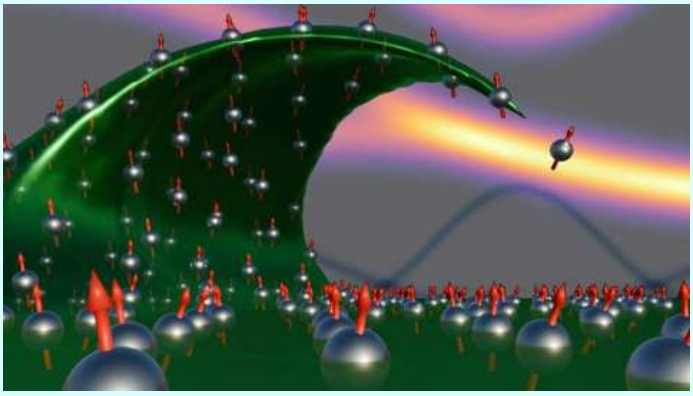
The arrangement of cells directly influences how effectively a tissue can carry out its role, be it contracting, transporting nutrients, or processing sensory input. But how do cells determine their correct location and orientation within these complex systems? Professor Majumder said that for decades, scientists believed that cells primarily relied on chemical signals, like growth factors or morphogens, to decide how and in which direction to grow.

“However, recent discoveries in this field suggest that mechanical signals are just as important. Cells can feel how stiff their surroundings are, detect tiny stretches, and even respond to surface textures smaller than themselves. In living tissue, mechanical inhomogeneities are common. You see it in tumours, healing wounds, and developing organs. But we haven’t fully explored how cells interpret and respond to these physical cues,” Professor Majumder said.

The researchers embedded a rigid object inside an otherwise soft material, mimicking mechanical inhomogeneity. The goal was to mimic how tissues naturally develop internal tension during processes like growth, injury, or tumour formation, and how cells might sense and respond to such forces.

Source:https://phys.org/news/2025-07-images-reveal-atomic-thermal-vibrations.html
Dated: July 24, 2025, https://phys.org/

Spin waves observed directly at nanoscale for first time



For the first time, spin waves, also known as magnons, have been directly observed at the nanoscale. This breakthrough was made possible by combining a high–energy-resolution electron microscope with a theoretical method developed at Uppsala University. The results open exciting new opportunities for studying and controlling magnetism at the nanoscale.

"We could suddenly see all the magnons and every step of their dance at the nanoscale. Until now, only surface magnons had been glimpsed at this resolution. It was like getting front-row seats to a performance no one had ever seen in full," says José Ángel Castellanos-Reyes, co-first author of the study and researcher at Uppsala University.

The magnetism of materials such as iron and nickel is a consequence of "tiny magnets" attached to their atoms, so-called atomic spins. In these magnetic materials, the spins in different atoms dance together in a synchronized motion called spin waves or magnons.

Magnons play a key role in the rapidly growing research field of magnonics, where the spin waves are used to carry information instead of electric charges. Magnonics has the potential to drive the next generation of electronics, offering faster, smaller, and more energy-efficient technology compared to today's charge-based systems.

Despite their importance, magnons have been nearly impossible to observe at the nanoscale with existing technologies. A big challenge in magnonics is understanding how magnons behave and how their properties may be modified at the nanoscale. For example, until now it has not been possible to assess the effect of impurities, such as a vacancy where an atom is missing in a material, on the performance of magnonic devices.

But now, in a study published in Nature, researchers from Uppsala University and international collaborators have taken a big step forward by introducing a new method to visualize and analyze magnons at the nanoscale. This was possible thanks to the combination of experiments performed at SuperSTEM laboratory in the UK and two theoretical and computational methods developed at Uppsala University, TACAW and UppASD.

Source:https://phys.org/news/2025-07-nanoscale.html
Dated: July 24, 2025, https://phys.org/

ENVIRONMENT

New butterfly species, Zographetus mathewi, discovered in Western Ghats

Zographetus mathewi is part of the Zographetus satwa species-group, characterised by unique features such as wing venation patterns and secondary sexual traits, including swollen forewing veins in males

Zographetus mathewi, the newly discovered skipper butterfly from the Western Ghats.

A team of lepidopterists have identified a new butterfly species in the Western Ghats, one of the world's eight "hottest hotspots" of biological diversity.

Named Zographetus mathewi, this newly described skipper butterfly belongs to the family Hesperiidae and adds a new entry to the genus ZographetusWatson, 1893, making it the 15th species in this oriental group and the fifth to be recorded from India.

The species, endemic to the low-elevation forests of Kerala, was identified after the researchers observed larvae feeding on Aganope thyrsiflora (Fabaceae), a leguminous vine. Although initially resembling the widely distributed Z. ogygia, detailed studies revealed key differences in wing venation and genital structure, thereby prompting its classification as a new species.

The species, published in the peer-reviewed journal Entomon, was discovered by scientists from the Travancore Nature History Society (TNHS), the Institute of Tropical Research, Ecology and Conservation (INTREC) Thiruvananthapuram, and the Zoological Survey of India.

"Initially, we thought we had encountered Zographetus ogygia, a known species from Western Ghats," explained Kalesh Sadasivan, the lead author and butterfly researcher from TNHS. "But detailed morphological and genitalia studies revealed that this was, in fact, a completely new species."

he new species is named in honour of George Mathew, a renowned Indian entomologist and former Head of the Entomology Division, Kerala Forest Research Institute. Its proposed common name is Sahyadri Spotted Flitter in reference to the Western Ghats, locally known as Sahyadri.

Zographetus mathewi is part of the Zographetus satwa species-group, characterised by unique features such as wing venation patterns and secondary sexual traits, including swollen forewing veins in males. It can be further distinguished by a basal hair tuft on the underside of the forewing, yellow-ochre scaling on the hindwing underside, and distinct genitalia structures in both males and females.

Source:https://www.thehindu.com/news/national/kerala/new-butterfly-species-zographetus-mathewi-discovered-in-western-ghats/article69807076.ece
Dated: July 13, 2025, The Hindu

India's water, energy demand spotlight risk of human-induced quakes

When groundwater is pumped out, the mass of water maintaining the pressure under the earth is removed, creating jolts on the surface

Type specimen of the new wasp species, Losgna occidentalis collected from Chandigarh.

Earthquakes are usually natural — but not always. Sometimes some natural factors can combine with human activities to lead to earthquakes as well. Quakes induced by human activities are called human-induced earthquakes. According to one estimate researchers discussed in Seismological Research Letters in 2017, more than 700 human-induced earthquakes have been recorded around the world in the last 150 years, and they are becoming more common.

Human activities like mining, extracting groundwater, impounding water behind a dam, injecting fluids into the ground, constructing tall buildings, and engineering coastal structures, among others, have been shown to induce seismic activity. This is because, according to experts, loading and unloading the crust in a repeated manner can cause strain to accumulate between tectonic plates, which would in turn modulate seismic activity.

In India, seismologists have also been studying how the amount of water above and below the ground can affect the geological processes.

A 2021 study in Scientific Reports reported that shallow earthquakes recorded in the National Capital Region could be linked to excessive groundwater extraction in the region for farming and human consumption.

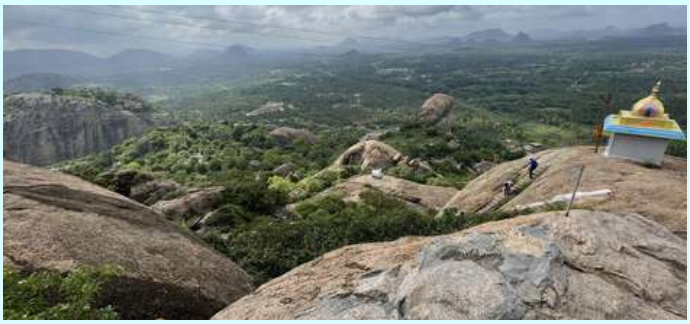
"It was seen that between 2003 and 2012, when the water table had depleted significantly, there was an increase in seismic activity. The seismic activity reduced after 2014 when the water table stabilised," Bhaskar Kundu, associate professor at NIT Rourkela and one of the authors of the study.

Source:https://www.thehindu.com/sci-tech/science/india-human-induced-earthquakes-water-energy-demand-risk/article69837667.ece
Dated: July 22, 2025, https://www.thehindu.com/

Environment

Groundwater crisis deepens in Karnataka's hard rock terrain

A new study suggests the primary cause of borewell abandonment is severe depletion of the water table rather than groundwater quality issues



Stretching across much of peninsular India, the Deccan Plateau hides a silent, subterranean struggle. Beneath its sunbaked soil lie ancient, fractured layers of basalt and granite — hard rock aquifers that dominate the region's groundwater story.

In Karnataka, this rocky reality is nearly absolute: about 99% of the State relies on these stubbornly unyielding formations for its water needs. With limited porosity and a dependence on narrow fractures and weathered pockets to store and move water, these geological formations offer far less than they promise, unlike the generous flow of sedimentary aquifers.

In a new study, researchers from the Water, Environment, Land and Livelihoods (WELL) Labs in Chennai examined Aralumallige and Doddathumakuru gram panchayats in the Upper Arkavathy watershed near Bengaluru, revealing a sharp decline in groundwater levels driven by intensive agricultural practices.

These areas supply vegetables, exotic crops, and flowers to Bengaluru, banking on water-intensive farming. While monsoon rains offer seasonal relief, farmers depend on deep borewells for the rest of the year. Borewells drilled into granite bedrock alter the subsurface geology, creating microfractures that fasttrack rainwater deep underground. As a result, instead of recharging shallow aquifers, water bypasses them entirely, disrupting the local hydrology and weakening long-term water retention.

Every year, the water table continues to drop. According to the study, published recently in PLoS Water, the average depth of gram panchayat drinking water borewells dramatically increased from 183 m during 2001-2011 to 321 m in 2011-2021. Thus almost 55% of all wells drilled in the Aralumallige sub-watershed have failed, with a staggering 70% of drinking water wells failing within a decade of their construction, primarily due to falling water tables.

The study also highlighted water quality issues. While nitrate levels in drinking water were often higher than the prescribed norm of 50 mg/l, people didn't abandon their wells. Interviews with gram panchayat officials revealed that only two of the 79 abandoned borewells were shut due to elevated fluoride concentrations.

Source: https://www.thehindu.com/sci-tech/energy-and-environment/groundwater-crisis-deepens-karnataka-hard-rock-terrain/article69758601.ece
Dated: July 02, 2025, The Hindu

The challenges of data centres trying to meet their climate goals

Electronics heat up very quickly. If the chips get too hot, they may malfunction or altogether fail. Cooling keeps them running smoothly and ensures a longer lifespan. However, in data centres, cooling consumes nearly as much power as computing

A team of researchers from Microsoft and WSP Global has published a groundbreaking study in Nature demonstrating that advanced cooling methods like cold plates and immersion cooling can cut data centre emissions by 15-21%, energy use by 15-20%, and water consumption by 31-52% compared to traditional air cooling.

The life cycle assessment, led by Husam Alissa of Microsoft, Mukunth Natarajan, and Praneet Arshi of WSP, among others, also provided actionable insights to help the Information and Communications Technology (ICT) industry meet its climate goals. "Our [life cycle assessment] has shown that reducing data centre energy use through advanced liquid-cooling technologies will lead to marked reductions in data centre environmental impacts," the authors wrote in their paper.

Electronics versus rising temperatures

Electronics heat up like crowded kitchens: billions of microscopic switches (transistors) are like cooks working nonstop, bumping into each other while flipping electrical dosas (data). The tighter they are packed — that is smaller the chips are — or the more tasks they handle, the more they collide and create heat, just like a packed kitchen gets hotter, needing fans and ACs to cool down. A laptop is like a kitchen with one burner: a simple fan suffices. A data centre is like a thousand laptops working at full speed in a single room, generating heat like a massive bonfire compared to a single candle. Without cooling, the intense heat will melt the hardware in minutes.

Heat slows down electrons, like runners in thick mud. If the chips get too hot, they may malfunction or altogether fail. Cooling keeps them running smoothly, ensures a longer lifespan and fast and reliable performance, and prevents heat damage. Just like an athlete needs water to stay sharp in a race, electronics need efficient heat removal.

Race to cut emissions

In data centres, cooling consumes nearly as much power as computing, like an AC fighting oven heat in a busy kitchen. To curb climate change, the ICT industry needs to cut emissions by 42% by 2030 (from its 2015 levels). Data centres need greener designs that use less energy and water, and have lower greenhouse gas emissions to help meet global climate goals and keep warming below 1.5°C. Urgent upgrades to energy, efficiency, and cooling are critical.

Source:https://www.thehindu.com/sci-tech/energy-and-environment/how-the-technology-industry-is-trying-to-meet-its-climate-goals/article69645291.ece
Dated: June 02, 2025, The Hindu

AGRICULTURE

Moisture, low row-crop prices prompt possible record Texas peanut production

Summer rains and a competitive market that outpaced other commodities could result in record-breaking Texas peanut production, according to Texas A&M AgriLife Extension Service specialists.

"Starting in May through the end of planting, we had good rainfall across much of Texas," said Emi Kimura, Ph.D., AgriLife Extension statewide peanut specialist, agronomist and associate professor in the Texas A&M Department of Soil and Crop Sciences, Vernon.

"Then the growing season in June and July saw more beneficial moisture—something that hasn't happened the past few years."

Pancho Abello, Ph.D., AgriLife Extension agricultural economist and assistant professor in the Department of Agricultural Economics, said in addition to good growing conditions, prices for other commodities were lower, and peanuts offered higher profitability potential for some producers.

"Every other option in terms of commodities was not as competitive as peanuts, so we have seen more producers shifting acreage this year," Abello said. "We are expecting a record-breaking production."

Building a record-breaking year

Texas' planted acreage for peanuts is up 45,000 acres this year over last year, for a total of 285,000 acres, according to the U.S. Department of Agriculture's Sept. 12 crop production report. Texas ranks second to Georgia in peanut production, followed by Alabama, Florida and North Carolina. The bulk of Texas peanut production is in Gaines, Yoakum, Terry and Cochran counties.

The report predicts average production will be 3,100 pounds per acre this year, compared to 2,600 pounds per acre harvested in 2024. The projected production is 822 million pounds compared to the 572 million pounds harvested in 2024.

Texas' acreage increased 4%. Overall, the U.S. saw a 5.5% increase in acres despite lower peanut prices. USDA is forecasting about $500 per ton, which is in line with what Texas farmers are reporting they contracted for this year, Abello said.

"Given the predicted yield with the increase of acreage, we are now expecting record-high production," he said. The record production is expected to push ending stocks about 34% higher than last year, which could mean lower prices next year, Abello said.

Source:https://phys.org/news/2025-09-moisture-row-crop-prices-prompt.html
Dated: September 24, 2025, https://phys.org/

Biodiversity strengthens pollinators and ensures stable yields, sunflower study finds

Improving biodiversity and maintaining yields at the same time? For many, this sounds like a contradiction in terms. However, a new study by the University of Würzburg shows that both are possible under the right conditions. For their study, researchers from the University of Würzburg (JMU), together with the Bavarian State Institute for Agriculture, analyzed 29 sunflower fields in northern Bavaria—15 organically and 14 conventionally farmed. They wanted to know which factors influence wild pollinators and how this affects agricultural yields. They took into account both the conditions in individual fields and the structure of the surrounding landscape.

To determine the contribution of insects, they used a simple experiment: some sunflower heads were protected from pollinators with fine nets, others were left open. The result: On average, freely pollinated sunflowers achieved around 25% higher yields—regardless of whether they were grown on organically or conventionally farmed fields.

The study is published in the Journal of Applied Ecology.
Different requirements, common benefits

The analysis showed clear differences between different pollinator groups: "Bumblebees, for example, benefited from a high proportion of organically farmed fields," explains Denise Bertleff, first author of the study and biologist at the Department of Animal Ecology. "We were able to show that if you increase the proportion of such areas from 10% to 20%, this almost doubles the bumblebee population."

The abundance of solitary bees, on the other hand, is based on the size of semi-natural habitats such as hedges, calcareous grasslands or orchards. "Our study shows that agriculture can be organized in a way that promotes biodiversity," says Bertleff. "A diverse landscape, for example by deliberately leaving weeds standing, makes harvests more stable and safeguards biodiversity."

Study provides recommendations for practical action
The researchers used their data to derive several recommendations for action for farmers, policymakers and nature conservation advisors:

- Manage more land in a region organically: This strengthens the number of pollinators—even on conventional fields.
- Preserve semi-natural habitats such as hedges, calcareous grasslands and orchards: Such areas are essential for pollinators, especially for solitary bees.
- Allow moderate amounts of weeds: They provide important food sources for wild bees and hoverflies without necessarily reducing yields.
- Avoid excessively large flowering areas: If too many crops flower in one area at the same time, there is a risk of dilution effects because pollinators are spread over larger areas. This can reduce pollination performance in individual fields.

Source:https://phys.org/news/2025-09-biodiversity-pollinators-stable-yields-sunflower.html
Dated: September 25, 2025, https://phys.org/

AGRICULTURE

NIPGR's gene-edited japonica rice shows increased phosphate uptake, 20% more yield

Phosphorus is an essential mineral for plant growth and development of plants. In case of limited phosphorus availability, crop productivity drops drastically. Even when phosphate fertilizers are used, only about 15-20% are taken up by plants while the balance gets leached out or lost through runoff

Scientists at the Delhi-based National Institute of Plant Genome Research (NIPGR) have used CRISPR-Cas9 gene editing technology to increase phosphate uptake and transport in japonica rice varieties. The resulting rice lines had higher seed and panicle numbers, thereby increasing the yield without compromising seed quality. The studies were carried out in a greenhouse.

Phosphorus is an essential mineral for plant growth and development of plants. In case of limited phosphorus availability, crop productivity drops drastically. Even when phosphate fertilizers are used, only about 15-20% are taken up by plants while the balance gets leached out or lost through runoff.

When the recommended amount of phosphate fertilizer was used, yield increased by 20% in gene edited rice lines. However, when only 10% of the recommended dose of phosphate fertilizer was used, yield in gene-edited rice lines increased by 40% compared with the control, says Dr. Jitender Giri from NIPGR, and the corresponding author of a paper published in Plant Biotechnology Journal.

"The purpose was to just demonstrate that even under extreme conditions of using only 10% of the recommended dose, the gene-edited lines showed increased phosphate uptake resulting in 40% higher yield compared with the control group, where the yield reduced sharply," says Dr. Giri. "But if phosphate fertilizer supply is reduced by 10% or even 30%, it is very likely that the gene-edited lines will still outperform the control plants."

Source: https://www.thehindu.com/sci-tech/science/nipgrs-gene-edited-japonica-rice-shows-increased-phosphate-uptake-20-more-yield/article69786092.ece
Dated: July 08, 2025, The Hindu

Warmer spots within fields have more blooms and more bees, researchers discover

Climate can vary across large areas of land, but it can also vary within much smaller areas such as farms. A new study by researchers at Penn State has examined whether these microclimates—the climate of a very small or restricted area—affect pollination by both wild and managed bees and resulting wild blueberry yields.

The study, appearing in Agriculture, Ecosystems & Environment, took place on a 170-acre wild blueberry field in Maine.

Researchers discovered that both wild bees and honey bees found the most densely blooming areas of the fields and concentrated their foraging in these areas. Wild bees also tended to forage on plots that were warmer than average.

The researchers also found that even though managed honey bees were abundant at the site, there was no evidence of fewer wild bees near the honey bee hive locations or in the fields that had the highest honey bee foraging.

Heather Grab, assistant professor in the College of Agricultural Sciences and lead author on the paper, said the findings could be used to help inform precision agriculture approaches to help conservation efforts.

"For example, precision agricultural management approaches often suggest removing low-performing sites from production, perhaps to the benefit of increasing areas for biodiversity conservation," she said. "Remote sensing techniques could measure flower density patterns across the field and identify low-blooming regions, which may be a promising method for selecting candidate areas to convert to conservation habitats."

As pollinators decline worldwide, much research has been dedicated to finding out why, with factors such as climate change and availability of floral resources and nesting habitats identified as contributors, according to Grab. The researchers said that while these factors are important at a broad scale, finer-scale variations in these factors can also drive pollinator distributions in smaller microclimates, such as within farms.

Source:https://phys.org/news/2025-06-warmer-fields-blooms-bees.html
Dated: June 24, 2025, www.phys.org

HEALTH

How can an allergic reaction in the throat feel like a throat infection?

An allergic reaction in the throat can feel remarkably similar to a throat infection because both conditions involve inflammation of the same tissues, and inflammation tends to produce a narrow range of sensations.

When allergens such as pollen, dust or certain foods enter the body, the immune system responds by releasing histamine and other chemical mediators. These substances increase blood flow and cause swelling in the mucous membranes of the throat. The result is a sense of tightness, an itch-like feeling, and/or soreness and is often accompanied by an urge to clear the throat. Postnasal drip, which frequently accompanies allergic responses, can add to the irritation.

On the other hand, infections arise when viruses or bacteria directly invade throat tissues. The immune system mobilises white blood cells to fight the pathogens, producing redness, swelling, and pain. In this case, the discomfort may be worse, particularly when swallowing, and is often accompanied by other signs of systemic illness such as fever, body ache, and fatigue. Bacterial infections like strep throat can also produce visible white patches or pus on the tonsils; these features are absent in allergies.

Despite these differences, the overlap in symptoms can be confusing. Both conditions activate nerve endings in the throat, which transmit similar signals of pain and irritation to the brain. The key to distinguishing between them lies in specific symptoms: itching and sneezing without fever point to allergy whereas fever and systemic malaise suggest infection.

Source: https://www.thehindu.com/sci-tech/science/how-can-an-allergic-reaction-in-the-throat-feel-like-a-throat-infection/article70083872.ece
Dated: September 23, 2025, The Hindu

Towards empowerment: busting myths around vitilig

India is home to one of the highest populations affected by vitiligo globally, with studies showing a prevalence ranging from 0.46% to 2.16%. Millions live with this condition — often silently, and sometimes, undiagnosed — in the shadow of misconceptions

Vitiligo is an autoimmune condition where the body's immune system mistakenly attacks its own pigment-producing cells.

In a world that idolises perfection, vitiligo tells a strikingly different story — one of resilience, uniqueness, and rediscovered beauty. Vitiligo is a skin condition where the body loses its pigment in patches, turning areas of the skin white due to the loss of melanin. India is home to one of the highest populations affected by vitiligo globally, with studies showing a prevalence ranging from 0.46% to 2.16%. That means that millions live with this condition — often silently, and sometimes, undiagnosed, in the shadows of misconceptions.

What causes it?
Vitiligo is an autoimmune condition where the body's immune system mistakenly attacks its own pigment-producing cells. It can also be triggered by genetics, thyroid dysfunctions, or skin trauma. It can occur at any stage in life — across genders, ages, and skin tones. Importantly, vitiligo is not contagious, and is not caused by poor hygiene.

Treatment and support
There is no permanent cure for vitiligo as yet; however, several treatments can help to manage and reduce progression of the condition. These include: topical creams to encourage re-pigmentation; phototherapy (UVB light therapy). Surgical options such as mini punch grafting, blister grafting and split-thickness skin grafting give excellent re-pigmentation in stable cases.

There are also options for cosmetic coverage for those who choose it and certain oral medications including immunosuppressants, as well as multivitamins, to arrest progression and for repigmentation. Consulting a dermatologist is essential to decide what is best for each individual. Emotional support and counselling often prove just as important as medical care.

Busting myths

Myth 1: Vitiligo is contagious.
Fact: It cannot be spread through contact.
Myth 2: It only affects people with dark skin.
Fact: It occurs in all skin tones.
Myth 3: Vitiligo is caused by poor hygiene.
Fact: Vitiligo is an autoimmune disorder.
Myth 4: Vitiligo is just cosmetic.
Fact: It is a skin condition that requires treatment as it impacts emotional and mental well-being.

Source:https://www.thehindu.com/sci-tech/health/towards-empowerment-busting-myths-around-vitiligo/article69707616.ece
Dated: June 18, 2025, The Hindu

HEALTH

All you need to know about: sickle cell disease

Sickle cell disease is inherited. When both parents have a copy of the sickle cell gene and the child inherits both copies, then the child gets sickle cell disease

It's a disease that not many know about, despite estimates indicating that India carries the second-highest burden globally. Sickle cell disease, a group of inherited blood disorders, affects around 1 million people in India, a significant proportion of whom are concentrated in tribal belts across Odisha, Jharkhand, Chhattisgarh, Madhya Pradesh, and Maharashtra.

June 19 is observed as World Sickle Cell Awareness Day and this year's theme is: 'Global Action, Local Impact: Empowering Communities for Effective Self-Advocacy.' Here is all you need to know about sickle cell disease.

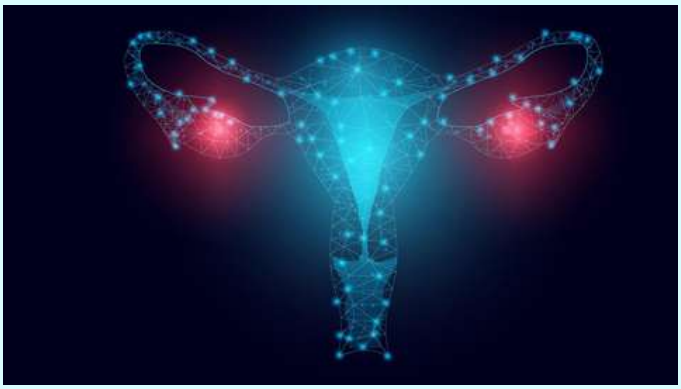
What is sickle cell disease?
Sickle cell disease refers to a group of inherited blood disorders. A genetic mutation causes the body to produce abnormal haemoglobin. Haemoglobin is a protein containing iron, found in the body's red blood cells. It plays a crucial role in transporting oxygen from the lungs to the rest of the body. In patients with sickle cell disease, the abnormal haemoglobin causes the shape of the red blood cells to change. Healthy red blood cells are round, and can easily move throughout the body, delivering oxygen. In sickle cell disease, the red blood cells are shaped like a sickle (hence the name) or a crescent, and become rigid and sticky. The sickle cells can slow or block blood flow, hampering the delivery of oxygen to organs and tissues, causing pain and other complications. In addition, sickle red blood cells are more fragile than normal red blood cells: they last only 10 to 20 days as opposed to 90 to 120 days that the normal red blood cells last, which means the body may have a lower number of red blood cells -- anaemia.

How does it occur?
Sickle cell disease is inherited. When both parents have a copy of the sickle cell gene and the child inherits both copies, then the child gets sickle cell disease. If the child inherits only one copy of the sickle cell gene, the child has sickle cell trait -- this means that there is one normal haemoglobin gene and one sickle cell gene. These children generally do not have symptoms, but are carriers, and can pass on the gene to their children.

Source:https://www.thehindu.com/sci-tech/health/all-you-need-to-know-about-sickle-cell-disease/article69708505.ece?cx_testId=81&cx_testVariant=cx_1&cx_artPos=1&cx_experienceId=EXPO56ZDYSGX&cx_experienceActionId=showRecommendationsX1R7QXU17VG227#cxrecs_s
Dated: June 19, 2025, The Hindu

New study finds how calcium and pH regulate ovarian cancer spheroids

Dr. Tapomoy Bhattacharjee's lab at the NCBS in collaboration with Dr. Ramray Bhat's lab at the Indian Institute of Science (IISc.), conducted this interdisciplinary work published in the scientific journal, Small.



The National Centre for Biological Sciences (NCBS), in a collaborative study, have found that two simple environmental factors — calcium and pH — dictate whether the cancer spheroids hold together, fall apart, or even rebuild themselves from scratch.

Floating cluster of cells

When ovarian cancer spreads, it often does so via floating clusters of cells – called spheroids – that drift through the abdominal cavity.

"These spheroids are quite sophisticated — some look like solid, misshapen masses (moruloids), while others resemble smooth, mulberry-like hollow structures (blastuloids). Why and how these structures emerge, and whether they affect how the cancer progresses has been under speculation for years," NCBS said.

Dr. Tapomoy Bhattacharjee's lab at the NCBS in collaboration with Dr. Ramray Bhat's lab at the Indian Institute of Science (IISc.), conducted this interdisciplinary work published in the scientific journal Small.

Led by Sreepadmanabh M., a graduate student at the Bhattacharjee lab, the team first investigated hollow blastuloids, which periodically undergo dramatic volume fluctuations.

"Every few hours, their central cavity pulses, collapses dramatically, and then steadily recovers — somewhat like a slowed-down heartbeat. Remarkably, despite these catastrophic fluctuations, the overall blastuloid, comprising hundreds of tightly organised cells, eventually recovers its overall shape. The secret to this recovery lies in the E-cadherin junctions, the biological mortar that binds cells together, whose stability depends on calcium," NCBS said.

By tweaking calcium levels, the researchers found they could flip the spheroids between completely different states.

Source: https://www.thehindu.com/news/national/karnataka/new-study-finds-how-calcium-and-ph-regulate-ovarian-cancer-spheroids/article70060757.ece
Dated: September 17, 2025, The Hindu

Regional Cooperation: The Third Africa High-Level Forum on South-South and Triangular Cooperation for Sustainable Development

The 3rd Africa High-level Forum on South-South and Triangular Cooperation for Sustainable Development was convened under the patronage of His Excellency Dr. Julius Maada Bio, President of the Republic of Sierra Leone. This Forum followed the adoption of the Declaration of the Second High-level Forum on South-South and Triangular Cooperation for Sustainable Development, which was held in Kampala from 15 to 17 January 2024.

First convened in 2021, the Forum serves as an institutional platform for promoting South-South and triangular cooperation in Africa under the leadership of the African Peer Review Mechanism (APRM) Continental Secretariat, the leading peer-review body of the African Union, in close collaboration with key partners. Third edition partners included the Islamic Development Bank, the Saudi Fund for Development, the United Nations Development Programme, the African Development Bank, the Organisation of Southern Cooperation, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) office to the African Union, the African Union Economic and Social Council, the United Nations Office for South-South Cooperation, and other strategic partners. The Forum brought together more than 25 African countries as well as representatives from non-African countries including Saudi Arabia, Germany, India and China. UN entities including the World Food Programme (WFP) and the United Nations Development Programme (UNDP) and the UN Resident Coordinator in Sierra Leone were also key partners.

Featuring eight thematic discussion sessions spanning topics related to economic resilience, global financial architecture, digital transformation, and engagement of non-state actors to promote inclusive and participatory governance in Africa and, building national ecosystems for South-South and triangular cooperation, the Forum aimed at raising awareness and deepening understanding of the current state of South-South and triangular cooperation in Africa, the implementation of the BAPA+40 outcome document in Africa and, the significance of these cooperation modalities in the second-ten-year implementation plan of Agenda 2063.

Source: https://unsouthsouth.org/2025/05/09/regional-cooperation-the-third-africa-high-level-forum-on-south-south-and-triangular-cooperation-for-sustainable-development/
Dated: May 9, 2025, https://unsouthsouth.org/

CSW69: Elevating Voices of Grassroots Women's Organizations through South-South and Triangular Cooperation

The Beijing Platform for Action (BPfA) was adopted at a time of hope when democratic and human rights institutions were being strengthened; social movements were strong, supported and resourced; and trust in global institutions, multilateralism and the United Nations was high." This year marks its 30th anniversary amid economic uncertainty and a shifting geopolitical landscape, with growing demands for a new era of multilateralism.

Various reports feeding into the Beijing+30 Review noted uneven progress and persistent challenges. The synthesis report prepared by UNWomen raised that:

- 10% of women and girls remain in extreme poverty
- women still have only 64% of legal rights of men
- proportion of women with Internet access still low at 65%
- 2 billion women and girls still have no social protection
- half of the world's women and girls face conflict-related sexual violence
- women still carry 2.5X more unpaid care work than men
- only 4% of aid goes to programmes with gender equality as main objective

The call to action at CSW69 includes greater attention to the reality on the ground for women in the Global South, for context-specific prioritization and responses, and for greater solidarity among and for women across the North and South.

At a roundtable discussion during CSW69 with UNWomen, Huairou Commission, Oxfam and Spain, UNOSSC Director Dima Al-Khatib highlighted that the global community needs to more effectively leverage all available assets, knowledge, tools, and resources in responding to this call, with a particular focus on women at the "frontlines" – the women at the grassroots. Strengthening the linkages between Beijing+30 and BAPA+40 at the regional and grassroots level will help move goals and aspirations forward, she said.

The Second High-level United Nations Conference on South-South Cooperation, or BAPA+40 was a Summit in 2019 where Member States reviewed, reaffirmed and strengthened the Buenos Aires Plan of Action that was adopted in 1978, which elevated the immense potential of South-South and triangular cooperation for achieving development goals.

Source:https://unsouthsouth.org/2025/03/17/csw69-elevating-voices-of-grassroots-womens-organizations-through-south-south-and-triangular-cooperation/
Dated: March 17, 2025, https://unsouthsouth.org

Advancing Financing for Development through South-South and Triangular Cooperation in the Arab Region

The Regional Commissions of the United Nations conduct annual Sustainable Development Forums to review progress on five SDGs around a specific theme, with outcomes feeding into the High-Level Political Forum (HLPF) in New York each July. For 2025, the SDGs under review are SDG 3 (health and wellbeing), SDG 5 (gender equality), SDG 8 (decent work and economic growth), SDG 14 (life below water), and SDG 17 (partnerships, reviewed every year). The 2025 theme is "Advancing sustainable, inclusive, science- and evidence-based solutions for the 2030 Agenda and its SDGs for leaving no one behind".

The Arab Forum for Sustainable Development (AFSD) convened 14-16 April 2025 on the theme "Restoring hope, raising ambition", calling attention to inclusive, science- and evidence-based solutions for the 2030 Agenda and its Sustainable Development Goals (SDGs). A high-level segment during the Forum (at Ministerial level) focused on financing for development, given the upcoming *Fourth Conference on Financing for Development (FfD4)* in Seville, Spain 30 June – 3July 2025.

The Ministerial-level discussion at AFSD on 15 April ("On the Road to FfD4: Advancing a renewed global FfD framework and reforming the international financial architecture") addressed the regional position on financing for development in the lead up to the FfD4 and deliberated on the First Draft Outcome Document released on 10 March (leaning on the priorities of the region). In the session were:

- Moderator: Ibrahim Ahmed Elbadawi Founder and Managing Director of the Gulf Economic Policy and Research Center
- Panelists: Yassine Jaber, Minister of Finance of Lebanon; Abbas Kadhom Obaid, Chair of the Group of 77 and Permanent Representative of the Republic of Iraq to the United Nations; Jesús Ignacio Santos Aguado, Ambassador of Spain to Lebanon; and, Mahmoud Mohieldin, United Nations Special Envoy on Financing the 2030 Agenda for Sustainable Development
- Discussants (live from New York): Navid Hanif, Assistant Secretary-General for Economic Development, United Nations Department of Economic and Social Affairs (UNDESA) and Dima Al-Khatib Director of the United Nations Office for South-South Cooperation.

Source:https://unsouthsouth.org/2025/04/25/advancing-financing-for-development-through-south-south-and-triangular-cooperation-in-the-arab-region/
Dated: April 25, 2025, https://unsouthsouth.org/

Middle-Income Countries Unite Behind the New Makati Development Plan in Manila

A new global action plan aimed at supporting middle-income countries (MICs) was officially adopted in the Philippines this week. Known as the Makati Declaration, the plan was the outcome of the High-Level Conference of Middle-Income Countries (HLC-MICs) hosted by the Philippine government as incoming MICs Chair, in Makati City from April 28 to 29.

The High-Level Conference brought together more than 200 leaders and senior representatives from 24 MICs. Their shared goal: to craft strategies that help MICs grow sustainably, and play a stronger role in shaping the global development agenda. The Makati Declaration endorses recommendations to help MICs achieve sustainable growth and avoid falling into the so-called "middle-income trap," among others.

The Makati Declaration on Middle-Income Countries

The list of measures adopted at the High-Level Conference of Middle-Income Countries:

- Productive capacity development
- Human and social development
- Environment and climate change
- Science, technology and innovation and digital transformation
- Inclusive development cooperation
- Global multi-stakeholder partnerships
- South-South and Triangular cooperation (SSTC)
- Measures for sustainable development beyond GDP
- Building resilience to global shocks and multidimensional crisis.

"South-South cooperation is not just a modality – it is a movement of solidarity, shared leadership, and action," said H.E. Mr. Omar Hilale, Ambassador of Morocco to the UN and President of the High-level Committee on South-South Cooperation, noting that MICs are not only recipients but also active contributors to South-South cooperation. "It is the key to unlocking MICs' potential and addressing the structural gaps that still prevent many from fully realizing the SDGs."

Source:https://unsouthsouth.org/2025/04/30/middle-income-countries-unite-behind-the-new-makati-development-plan-in-manila/
Dated: April 30, 2025, https://unsouthsouth.org/

OTHERS

New species of gecko endemic to Western Ghats discovered in Coonoor

Published in 'Bionomina', Dravidogecko coonoor is the formal name of the "...distinct population of Dravidogecko in Coonoor Hills of the Upper Nilgiris, Western Ghats, India"

A new species of gecko, believed to be present only around Coonoor, has been discovered in the Nilgiris in Tamil Nadu.

Published in 'Bionomina', Dravidogecko coonoor is the formal name of the "...distinct population of Dravidogecko in Coonoor Hills of the Upper Nilgiris, Western Ghats, India," noted authors A. Abinesh, R.S. Naveen, A.N. Srikanthan, S. Babu, and S.R. Ganesh. The paper is titled 'Code-compliant description of a recently identified district Dravidogecko species from Coonoor, Western Ghats, India'.

Speaking to The Hindu, Mr. Abinesh, the lead author of the paper, said the gecko from Coonoor had originally been thought to belong to the same species of geckos known previously as Hemidactylus anamallensis, and now known as Dravidogecko anamallensis. "However, surveys done throughout the Western Ghats led to the subsequent discovery of eight different Dravidogecko species," he said.

Following the discovery of the new gecko species in Coonoor, the number of Dravidogecko species found across the Western Ghats now stands at nine, added Mr. Abinesh. The researchers said the species was noted in both urban as well as natural habitats, including the walls of a building, on the branches of plants, and in tree bark and wall crevices.

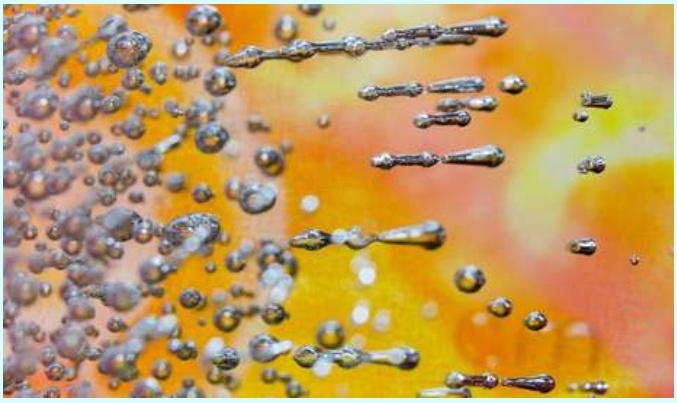
"In much as is known, Dravidogecko coonoor is currently known with certainty from the type locality Coonoor. The habitat here is generally characterised by a matrix of montane forests and monoculture plantations amidst human habitations. In all of the recorded places, human influence and settlement were rather dominant, with only partial vegetation cover," noted the authors.

The authors also said the species could be a "potentially threatened gecko species" whose population "as far as we know exists entirely outside the protected area network." This makes them highly susceptible to population decline due to habitat fragmentation, deforestation and potentially, climate change, said Mr. Abinesh, adding Dravidogecko was the only species of gecko endemic to the high elevation regions of the Western Ghats.

Source:https://www.thehindu.com/news/national/tamil-nadu/new-species-of-gecko-endemic-to-western-ghats-discovered-in-coonoor-in-tamil-nadu/article69727216.ece
Dated: June 24, 2025, The Hindu

Air bubbles trapped in ice can store messages in cold places

Scientists have developed a method that could be useful in cold places like the Arctic, the moon or Mars, where traditional storage like paper or electronics is hard to maintain



Close-up view of air bubbles in a variety of shapes frozen inside a mass of ice.

For as long as humans have lived, they've found ways to store information for others to find. Cave paintings were perhaps the first examples, followed later by messages in bottles, semaphore, books, persistent URLs, and so on.

Now, a research team from China and Czechia has reported in Cell Reports Physical Science a way to store messages by freezing air bubbles into ice. The researchers were inspired by bubbles in glaciers that preserve ancient air. They developed a method that could be useful in cold places like the Arctic, the moon or Mars, where traditional storage like paper or electronics is hard to maintain.

The idea is based on the fact that when water freezes, it traps air bubbles. The shape and arrangement of bubbles depend on how fast the water freezes. By carefully changing the freezing speed, the scientists could create layers of bubbles at specific spots in ice. These layers can be used to represent information just like the dots and dashes in Morse code or the 1s and 0s in binary code.

The scientists found that a bubble started smaller, grew, and shrank just a little before finally freezing. The bubble's final shape depended on how fast the freezing front, the part of water turning to ice, moved.

The team discerned two main bubble shapes: egg-shaped and needle-shaped. By measuring the height and width of the bubbles, team members classified regions as containing egg-shaped only, both eggs and needles, needle-shaped only, and no bubbles.

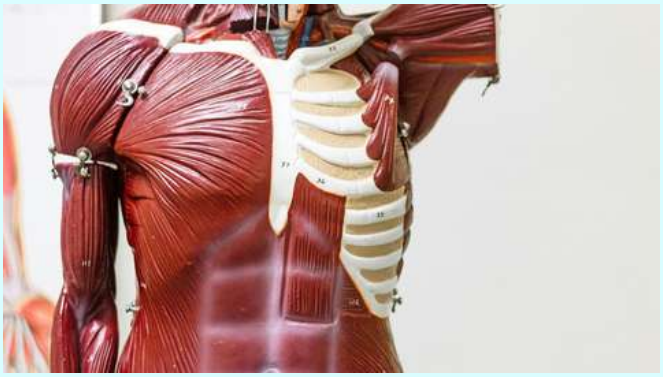
Next, the team created bubble layers by rapidly changing the freezing speed. This was done by suddenly lowering the temperature of the plate the water sat on. Each sudden change formed a new layer of bubbles. The scientists could form multiple layers in one ice slice by repeating this trick.

Source:https://www.thehindu.com/sci-tech/science/air-bubbles-trapped-in-ice-can-store-messages-in-cold-places/article69697105.ece
Dated: June 22, 2025, The Hindu

OTHERS

Common molecule offers clue to making old muscles young again

Researchers found that five daily injections of prostaglandin E2 restored muscle stem cell function in aged mice



As we age, it gets harder to recover from a fall, injury or even a tough workout because the body's muscle-repair system starts to falter. Muscle stem cells (MuSCs), the in-house repair crew, stop dividing and rebuilding tissue, losing their ability to respond to damage.

A study in Cell Stem Cell on June 12 suggested this decline may be reversible. The key isn't some futuristic therapy but a molecule already used in hospitals today.

Researchers found that five daily injections of prostaglandin E2 (PGE2), a compound involved in inflammation and used clinically to induce labour, restored muscle stem cell function in aged mice. After treatment, older mice regained the ability to regenerate damaged muscle: their muscle fibres grew larger, muscle mass increased, and strength improved by about 20% compared to their untreated peers.

The findings are important because PGE2 is naturally produced in the body, particularly after injury. It signals MuSCs to start repairs in young muscle, but in older tissue this signal fades, leaving stem cells inactive even when needed.

After PGE2 treatment, aged stem cells "woke up", resumed dividing, participated in tissue repair, and helped restore the animals' muscle strength. Remarkably, these effects lasted at least two weeks beyond the treatment window, suggesting more than just a temporary boost.

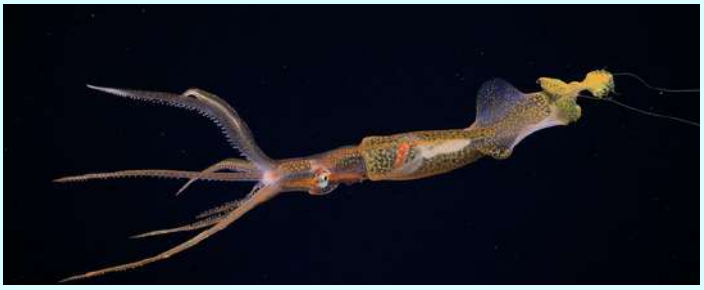
Even more strikingly, the outcome held true outside the body. When aged stem cells were treated with PGE2 for just 48 hours in the lab and transplanted into injured muscle, they formed new tissue at levels comparable to young stem cells. Imaging showed that these treated cells engrafted robustly, persisted for weeks, and even expanded in response to subsequent injury — evidence that PGE2 acted directly on the cells themselves, not just their environment.

To understand how, the team examined molecular changes inside the cells. PGE2 reopened regions of the genome that had become inaccessible with age. It also dialed down a stress-related pathway called AP-1, which becomes overactive in aging MuSCs. The molecule reset the cells' internal programmes, allowing them to act more like their younger selves.

Source:https://www.thehindu.com/sci-tech/science/can-old-muscles-be-made-young-again-common-molecule-offers-clue/article69697042.ece
Dated: June 16, 2025, The Hindu

Digital fossil-mining finally reveals origin of squids

The findings suggest squids became important players in marine ecosystems long before the mass extinction 66 million years ago that wiped out dinosaurs



Squids are some of the smartest and most agile animals in today's oceans, but their evolutionary history has been hard to figure out because their soft bodies don't fossilise well.

A new study has changed this using a method called digital fossil-mining to uncover fossils that were hidden inside rocks.

Instead of using traditional tools like chisels and acid baths, which often damage fragile rocks, scientists from Japan created a machine that slowly grinds a rock while taking detailed photographs of each layer. These images were stitched together to form a 3D model of everything inside the rock, including fossils. The method enabled the team to detect and digitally extract small squid beaks, the hard, chitin-based mouthparts all squids have.

By combining cutting-edge imaging with careful analysis of ancient rocks, the study has filled a big gap in the story of squid evolution. It was published in Science on June 26.

The team collected hard, round carbonate concretions from Cretaceous-era deposits in Japan dated 110-70 million years ago. These rocks were already known to preserve fossils well. From there, the team scanned and reconstructed 263 lower beaks from squids for further analysis.

The team found that the fossil beaks came from at least 40 squid species, divided among 23 genera and five families. This is a major discovery because previously only one fossil squid beak was known. The newfound squids belonged to two modern groups: deep-sea squids (Oegopsida) and coastal squids (Myopsida). It meant both groups existed as early as 100 million years ago, which is about 30 million years earlier than previously thought.

The earliest squids already had many different forms. Within only 6 million years, most known squid families had evolved, suggesting squids diversified very quickly once they appeared. By the Late Cretaceous, squids had become so abundant that their fossils outnumbered those of ammonites and bony fish.

Source:https://www.thehindu.com/sci-tech/science/digital-fossil-mining-finally-reveals-origin-of-squids/article69726508.ece
Dated: June 29, 2025, The Hindu