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ADDRESS FOR CORRESPONDENCE

Zaheer Science Foundation,
4 Udyan Marg,
New Delhi 110001

Tel: 011-23745697

EMAIL
zsfindia@gmail.com

WEBSITE
www.zaheersciencefoundation.org

SCIENCE & TECHNOLOGY

Indian scientists build breakthrough gene-editor

Researchers at CSIR-IGIB and the L.V. Prasad Eye Institute have engineered new versions of an enzyme that can make CRISPR more precise.

Scientists from the CSIR-Institute of Genomics and Integrative Biology, New Delhi, have developed an enhanced genome-editing system that can modify DNA more precisely and more efficiently than existing CRISPR-based technologies.

CRISPR occurs naturally in some bacteria, as a part of their immune system that limits infections by recognising and destroying viral DNA. In Nobel-prize winning work, scientists repurposed this bacterial defence mechanism to develop a novel approach for editing the genomes of higher-order organisms.

CRISPR's off-target problem

Using CRISPR-Cas9, researchers can add, remove or alter specific DNA sequences in the genome of animals. This system has been used in various fields, including in agriculture — to improve the nutritional value of plants and increase the yield — and in healthcare to diagnose several diseases and treat genetic disorders.

The CRISPR-Cas9 gene editing tool uses a guide-RNA (gRNA) designed to find and bind to a specific part of the target genome. The gRNA directs an enzyme, Cas9, to the target site, which is followed by a short DNA sequence called protospacer adjacent motif (PAM). Cas9 recognises and binds to the PAM sequence, and acts as a molecular scissor that snips some damaged DNA. This automatically triggers the cell's DNA repair system, which repairs the snipped part to insert the correct DNA sequence.

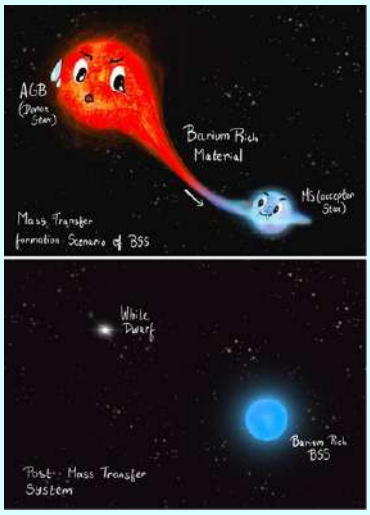
Source:https://www.thehindu.com/sci-tech/science/csir-igib-lvpei-scientists-build-breakthrough-fncas9-crispr-aim-for-patent/article68456544.ece

SCIENCE & TECHNOLOGY

Indian Institute of Astrophysics researchers discover 'vampire star' that feeds off its companion star

The key to this detection was data from the UltraViolet Imaging Telescope, on board AstroSat, India's first dedicated space observatory.

Vampire stars, known as blue straggler stars (BSS), defy simple models of stellar evolution and show many characteristics of younger stars.



A team of astronomers from the Indian Institute of Astrophysics (IIA) have made the discovery that a vampire star has been rejuvenating its youth by sucking up material from a companion in the star cluster M67 located in the constellation Cancer. Vampire stars, known as blue straggler stars (BSS), defy simple models of stellar evolution and show many characteristics of younger stars.

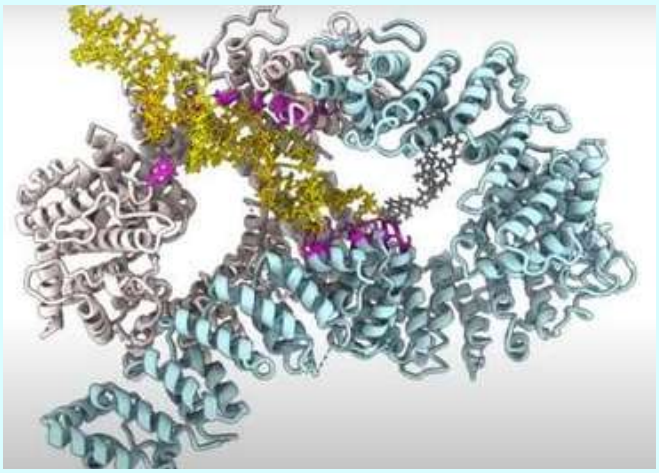
"This anomalous youth is explained theoretically as due to rejuvenation by eating up material from a binary stellar companion. Star clusters are useful test-beds to test this theory as they host a large number of binary stars, some of which can lead to the formation of vampire stars. Once rejuvenated, these stars follow a different path of evolution when compared to Sun-like single stars. So far, detection of sucked-up material along with the sighting of their remnant binary companion was elusive," said the Department of Science and Technology.

However, recently, a team of astronomers from IIA made a groundbreaking discovery of a vampire star in M67 that sheds light on a complex rejuvenation process known as mass transfer in a binary system.

The key to this detection was data from the UltraViolet Imaging Telescope on board AstroSat, India's first dedicated space observatory. The scientists studied the surface composition of the vampire star in M67, called WOCS 9005, using spectroscopy, a technique where the light of the star is dispersed into its colors like the rainbow.

Source:https://www.thehindu.com/sci-tech/science/iia-astronomers-discover-vampire-star-which-has-been-rejuvenating-itself-by-sucking-up-material-from-a-companion-star/article68476994.ece

Scientists solve mystery of DNA damage detection and repair caused by sunlight, alcohol, and pollution



A collaboration between researchers at the Laboratory of Medical Sciences (LMS) in London and the Laboratory of Molecular Biology (LMB) in Cambridge, has solved a decades-old mystery which could pave the way to better cancer treatments in the future.

The work, which uncovered the basic mechanism of how one of our most vital DNA repair systems recognizes DNA damages and initiates their repair, has eluded researchers for many years. Using cutting edge imaging techniques to visualize how these DNA repair proteins move on a single molecule of DNA, and electron microscopy to capture how they "lock-on" to specific DNA structures, this research opens the way to more effective cancer treatments.

The collaboration between the laboratories of Professor David Rueda (LMS) and Dr. Lori Passmore (LMB) has been a brilliant example of how #teamscience can bear fruitful results and underscores the importance of these two institutes in driving forward research that unlocks the fundamental mechanisms of biology which will underpin the future translation of that work into improvements in human health. The researchers were working on a DNA repair pathway, known as the Fanconi Anemia [FA] pathway, which was identified more than 20 years ago.

DNA is constantly damaged throughout our lives by environmental factors including UV light from the sun, alcohol use, smoking, pollution and exposure to chemicals. One way in which DNA becomes damaged is when it is "cross-linked," which stops it being able to replicate and express genes normally.

In order to replicate itself and to read and express genes, the two strands of the DNA double helix first has to unzip into single strands. When DNA is cross-linked, the "nucleotides" (the "steps" in the double-helix ladder of DNA) of the two strands become stuck together, preventing this unzipping.

Source:https://phys.org/news/2024-07-scientists-mystery-dna-sunlight-alcohol.html#:~:text=The%20research%2C%20published%20in%20Nature,together%20at%20that%20point%20to

Scientists find bacteria living in microwave ovens

Researchers already know that coffee machines and dishwashers have their own distinct microbial communities.

Since the bacterial communities found in microwave ovens were selected by evolution to survive repeated rounds of radiation, they may have applications in the bioremediation of toxic waste.

Microorganisms have mastered the art of surviving on the earth. They are found practically in all niches where life can possibly thrive. Over millions of years of evolution, they have developed mechanisms to adapt to diverse habitats. They are very flexible and able to colonise extreme environments, even those off limits to more complex life-forms.

Scientists have isolated microbes from volcanic vents, permafrost, acid mines, deep-sea hydrothermal vents, and dark lakes buried kilometres under polar ice caps. Microbes have also been found thriving on the exteriors of spacecraft and around nuclear waste storage sites. Microbes that live in extreme natural conditions are called extremophiles. Many researchers believe that life began on the earth in an extreme environmental niche, in the form of an extremophile, before spreading and adapting to more temperate ecosystems.

Microbes adapt to extreme environments by incorporating unique biological and biochemical processes. More complex life-forms like humans have evolved to have one set of proteins with which they navigate life. Extremophile microbes on the other hand have multiple sets of proteins, each customised for life in a specific environmental niche. They 'activate' each set depending on the conditions around them and what they need to survive: say, one set for the super-high temperature during a volcanic eruption, one for the debilitating lack of water during a prolonged drought, and one for the gruesome acidity of a volcanic crater lake.

Source:https://www.thehindu.com/sci-tech/science/scientists-find-bacteria-living-in-microwave-ovens/article68523521.ece

Scientists discover liquid water on Mars for the first time: What a new study says

The findings could help researchers better understand the water cycle of Mars, which in turn could unlock questions related to the evolution of the planet's climate, surface, and interior.

True color image of Mars taken by the OSIRIS instrument on the ESA Rosetta spacecraft during its February 2007 flyby of the planet.

According to a new study, there could be oceans' worth of liquid water deep in the rocky outer crust of Mars. While scientists have known about water ice at the Martian poles for a long time, this is the first time they have discovered liquid water on the planet.

The study, 'Liquid water in the Martian mid-crust', was published last week in the journal Proceedings of the National Academy of Sciences (PNAS). It was carried out by Vashan Wright, Matthias Morzfeld, and Michael Manga of the University of California San Diego.

The findings could help researchers better understand the water cycle of Mars, which in turn could unlock questions related to the evolution of the planet's climate, surface, and interior. The discovery could also provide impetus to the ongoing search for evidence of life on Mars.

Here is a look at how the study was carried out and the findings.

How was the study carried out?

For their study, the researchers used the data from NASA's Mars Insight Lander, which touched down on the planet back in 2018 and retired in December 2022. The lander was equipped with a seismometer, which recorded four years' of seismic waves — created by Marsquakes and meteorite impacts — deep inside the planet. In total, Insight recorded more than 1,300 quakes while it was active.

The researchers examined the speed of these seismic waves and were able to determine what material they were most likely to be moving through.

Source:https://indianexpress.com/article/explained/explained-sci-tech/liquid-water-mars-9522348/

ENVIRONMENT

Hotter Kalahari desert may stop hornbills breeding by 2027

A study found breeding output was negatively correlated with increasing air temperature and the occurrence of drought within the breeding season

Southern yellow-billed hornbills struggle to breed at high temperatures.

Rapid climate change has the potential to strongly influence the physiology, behaviour and breeding success of animals. Research is showing that increasing temperatures, for instance, are having negative effects on animals. These range from mass die-off events during heat waves to less obvious problems like difficulty finding food.

For birds in arid zones, rising temperatures pose a significant problem. Birds in these dry zones usually breed in response to rainfall, which often occurs during the hottest time of the year. And birds are mostly active during the day, when they are exposed to the sun's heat. This is when their vital processes for reproduction take place – such as territorial defence, courtship, finding food for their young and attending the nest.

Research suggests that high temperatures over a few days or weeks can have negative effects on foraging and body mass. At the scale of one or two breeding seasons, these effects have a negative impact on breeding performance. This can be through reducing the condition of offspring or the probability that young birds will survive to adulthood and breed.

The longer-term effects of responses to high temperatures – over decades – are less well-known.

Our recent research aimed to help bridge this gap in knowledge. We assessed the effects of air temperature and drought on the breeding output of southern yellow-billed hornbills (Tockus leucomelas) in southern Africa's Kalahari Desert over a decade period, from 2008 to 2019.

We found that the breeding output of our study population collapsed during the monitoring period and was strongly correlated with temperature and rainfall. In the Kalahari, air temperatures have already risen more than 2°C in a few decades. At this rate, by 2027, these birds will not breed at all at this site.

Source:https://www.thehindu.com/sci-tech/energy-and-environment/hotter-kalahari-desert-may-stop-hornbills-breeding-by-2027/article68471642.ece

Plastic-eating fungi could be glimmer of hope in cutting ocean pollution

Of 18 selected fungal strains, four proved to be particularly "hungry", which means they could efficiently utilise plastics, especially polyurethane which is used to make construction foam

Plastic bags floating in a water body

Scientists in Germany have identified plastic-eating fungi that could offer a glimmer of hope in tackling the problem of millions of tonnes of waste polluting the world's oceans every year.

But they warn that their work is likely to be only a small part of solving plastic pollution, and say there is still a need to reduce food packaging and other debris from entering the environment where it can take decades to degrade.

An analysis at Lake Stechlin in north-eastern Germany into how microfungi thrive on some plastics with no other carbon source to feed on has clearly demonstrated that some of them are capable of degrading synthetic polymers, said the team leader.

"The most surprising finding of our work ... is that our fungi could exclusively grow on some of the synthetic polymers and even form biomass," Hans-Peter Grossart, head of the research group at the Leibniz Institute of freshwater Ecology and Inland Fisheries, told Reuters TV.

Grossart believes the microbial plastic destroyers could be used in sewage treatment plants or other facilities with controlled conditions. However, the fungi are unlikely to be a solution for stemming the global flood of waste.

"We should definitely try to release as little plastic as possible into the environment," Grossart told Reuters. "Plastic is made from fossil carbon and if the mushrooms break it down, it's no different to us burning oil or gas and releasing CO2 into the atmosphere."

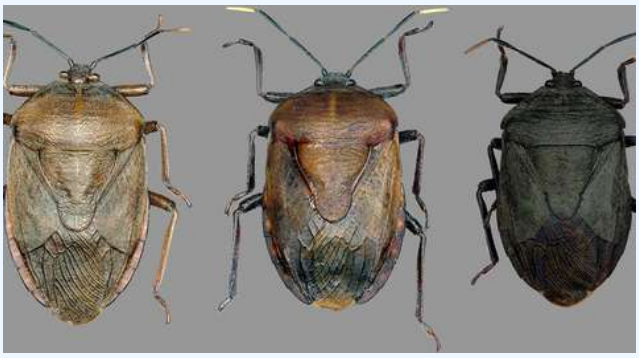
Of 18 selected fungal strains, four proved to be particularly "hungry", which means they could efficiently utilise plastics, especially polyurethane which is used to make construction foam.

Source:https://www.thehindu.com/sci-tech/science/plastic-eating-fungi-could-be-glimmer-of-hope-in-cutting-ocean-pollution/article68515525.ece

ENVIRONMENT

Researchers discover three new edible stink bug species from northeast India

The discovery was made by researchers Priyadarsanan Dharma Rajan, Swapnil Boyane, Sandeep Sen and Pavan Kumar Thunga from Ashoka Trust for Research in Ecology and the Environment (ATREE) in Bengaluru and Hemant Ghate from Modern College, Pune.



Coridius insperatus, Coridius adii and Coridius esculentus.

A team of entomologists have discovered three new edible insect species from Arunachal Pradesh. Belonging to the genus Coridius of family Dinidoridae (Hemiptera), these stink bugs have been named Coridius adii, Coridius insperatus and Coridius esculentus.

The discovery was made by researchers Priyadarsanan Dharma Rajan, Swapnil Boyane, Sandeep Sen and Pavan Kumar Thunga from Ashoka Trust for Research in Ecology and the Environment (ATREE) in Bengaluru and Hemant Ghate from Modern College, Pune. Their work has been published in the peer-reviewed open-access journal PLOS One.

Coridius adii is named in honour of the Adi tribe, one of the major groups inhabiting mainly the Siang valley in Arunchal Pradesh, which consumes this species as food. The insect is described as pale brown to dark brown with irregular yellow patches on its upper body.

According to the researchers, Coridius insperatus is distinct from all other species in the group. It has four segmented antennae and a copper-coloured back, while other similar bugs have five segmented antennae and are dark brown, yellow, or black on top. Coridius esculentus was discovered during a socio-economic survey when researchers observed that while the bugs are popular delicacies, consuming the darker-coloured insect in large quantities causes intoxication. Those consuming Coridius esculentus become "photophobic, exhibiting behaviour such as wanting to hide under carpets or beds," the researchers say.

Source:https://www.thehindu.com/sci-tech/energy-and-environment/researchers-discover-three-new-edible-stink-bug-species-from-northeast-india/article68512759.ece

Four-ringed butterfly resurfaces in India

Arunachal Pradesh policeman was among four who recorded the elusive Ypthima cantliei in Namdapha National Park, the country's easternmost tiger reserve, bordering Myanmar

The great four-ring.

A four-ringed butterfly belonging to a family with most members in China has resurfaced in India after 61 years, a new study said.

A policeman is one of four authors of the paper describing the great four-ring (Ypthima cantliei), a species of Satyrinae butterfly, published by the Bombay Natural History Society (BNHS). The butterfly was recorded in 2018 from the Namdapha National Park by Roshan Upadhaya, a member of the Arunachal Pradesh Police, Monsoon Jyoti Gogoi of BNHS, and Renu Gogoi and Rezina Ahmed of the Guwahati-based Cotton University's Department of Zoology.

Namdapha, straddling 1,985 sq. km. of Arunachal Pradesh's Changlang district, is India's easternmost tiger reserve bordering Myanmar. The park has an elevation ranging from 298.7 metres above the mean sea level to 4,498.8 metres.

"The great four-ring was photographed during a survey to document the butterfly diversity in the Miao range of the Namdapha National Park during 2018-19. It was identified based on general morphological patterns and habitat," Mr. Upadhaya told The Hindu on Saturday.

"Little is known about the current distribution or population of this species, which was last reported in 1957 from (eastern) Assam's Margherita, 61 years before our documentation," he said.

A coal town, Margherita was named after an Italian queen by C.R. Paganini, the chief engineer who supervised the construction of Assam's first railway line in the 1880s.

Source:https://www.thehindu.com/sci-tech/energy-and-environment/four-ringed-butterfly-resurfaces-in-india/article68480656.ece

Melting polar ice due to climate change is making earth's days longer

Scientists found that in the last two decades, the rate of earth's rotation has slowed by around 1.3 ms per century

The coastline of a small island off the coast of Antarctica, seen from a window on a commercial flight, February 8, 2017. After the previous ice age, a lot of ice melted from the northernmost and the southernmost parts of the earth, causing the planet to spin faster

In yet another unprecedented effect of climate change, scientists find that the melting polar ice caps have caused the earth to spin slower. This can lead to minuscule changes in the actual duration of a day — something that, ironically, does not affect our daily lives as much but could affect the technology we rely on.

As we build more connections not just among ourselves in this world but also with outer space, tools that rely on precise timekeeping, like computer networks and the ones involved in space travel, can be thrown off course.

Making the world go around

A basic physics phenomenon called the conservation of angular momentum is key to what is happening to the earth right now. When an ice-skater rotates, if their arms are held in tightly, their moment of inertia decreases and they spin faster. If they stretched their arms out wide, their moment of inertia would increase, making them spin slower. This is because angular momentum — a product of the moment of inertia and angular velocity — is conserved no matter how the skater is spinning.

As polar ice continues to melt rapidly in a warming world, the globe isn't affected very differently from the spinning ice-skater.

"When polar ice sheets and global glaciers melt, then this would go to the equatorial regions — we call this pole-to-equator mass flux," Mostafa Kiani Shahvandi, a geophysicist at ETH Zurich and the lead author of the July 15 paper describing the recent results, said. "As the ice sheets melt, the earth's oblateness increases and the region around the equator elongates slightly. The moment of inertia increases and the rotation rate gets smaller."

Source:https://www.thehindu.com/sci-tech/science/melting-polar-ice-due-to-climate-change-is-making-earths-days-longer/article68519525.ece

Earth's oldest, tiniest creatures are poised to be climate change winners

Scientists found prokaryotes are remarkably resilient to climate change – and as a result, could increasingly dominate marine environments

Algae floats on the surface of Lake Erie's Maumee Bay in Oregon, Ohio, on Friday, September 15, 2017. Scientists found prokaryotes are remarkably resilient to climate change – and as a result, could increasingly dominate marine environments.

The world's oceans are home to microscopic organisms invisible to the human eye. The tiny creatures, known as "prokaryotes", comprise 30% of life in the world's oceans. These organisms play an important role in keeping the oceans in balance. But new research shows this balance is at risk.

Prokaryotes are remarkably resilient to climate change – and as a result, could increasingly dominate marine environments. This could reduce the availability of fish humans rely on for food, and hamper the ocean's ability to absorb carbon emissions.

A fine balance

Prokaryotes include both bacteria and "archaea", another type of single-celled organism. These organisms are thought to be the oldest cell-based lifeforms on Earth. They thrive across the entire planet – on land and in water, from the tropics to the poles. What prokaryotes lack in size they make up in sheer abundance. Globally, about two tonnes of marine prokaryotes exist for every human on the planet.

They play a crucial role in the world's food chains, helping support the nutrient needs of fish humans catch and eat. Marine prokaryotes grow extremely fast – a process that emits a lot of carbon. In fact, prokaryotes to an ocean depth of 200 metres produce about 20 billion tonnes of carbon a year: double that of humans. This massive carbon output is balanced by phytoplankton – another type of microscopic organism which turns sunlight and carbon dioxide into energy, through photosynthesis.

Phytoplankton and other ocean processes also absorb up to one-third of the carbon humans release into the atmosphere each year. This helps limit the pace of global warming. How prokaryotes respond to warming is key to understanding how the fine balance of the world's oceans may change in a warmer world. This was the focus of our research.

Source:https://www.thehindu.com/sci-tech/science/earths-oldest-tiniest-creatures-are-poised-to-be-climate-change-winners/article68523779.ece

Taking roots in Tirupati, 'Konark' set to reach the kitchens of Odisha and Bengal

Principal Scientist (Plant Breeding) K. John showing the 'Konark' groundnut variety developed by Regional Agricultural Research Station (RARS), Tirupati, which was formally released by Prime Minister Narendra Modi in New Delhi recently. The variety is found suitable for cultivation in Andhra Pradesh, Odisha and Bengal.

Born in Tirupati, this 'Konark' groundnut variety is set to reach the kitchens of Odisha and West Bengal to titillate the taste buds in eastern India soon. After 12 years of research, the Regional Agricultural Research Station (RARS) in Tirupati, a unit of Acharya N.G. Ranga Agricultural University (ANGRAU), developed this variety.

This variety has been found exactly suitable to the climatic conditions of Odisha and West Bengal, and has been named 'Konark'. Initially dubbed as 'TCGS 1707', the variety was developed from the cross GPBD-4 x FDRS (ICG) 79. This medium-duration crop is known for efficient water use and gives yield in 105 to 110 days. The Spanish bunch possesses uniform maturity, the pods of which have an attractive rose testa colour.

"Konark is identified for cultivation in kharif season with yield potential of 25 quintals per hectare, with an impressive 70 to 75% of shelling out turn and 49% of kernel oil content," says V. Sumathi, Associate Director of Research, RARS, Tirupati. Its 100-kernel weight is 40 to 45 gm and protein content is 29%.

"The variety not only offers moderate resistance to foliar diseases and soil-borne diseases such as stem rot, dry root rot and collar rot, but also has tolerance to sucking insects like leafhoppers and thrips", adds K. John, Principal Scientist (Plant Breeding), who was associated in the development of the Konark variety. "We will take up seed production of 'Konark' on a large scale," asserts A. Srividya, a scientist involved in developing groundnut varieties.

Ahead of Konark, the Tirupati RARS had developed and released 'Dheeraj' groundnut variety in 2018, 'Visishta' in 2022 and 'Himani' in 2023 for sowing in Andhra Pradesh. The 'Dharani' variety developed here in 2012 had become hugely popular among the farmers. Meanwhile, the Indian Council of Agricultural Research (ICAR), on its X (formerly Twitter) page, has officially recommended the 'Konark' variety to be sown in Odisha and West Bengal.

Source:https://www.thehindu.com/sci-tech/agriculture/taking-roots-in-tirupati-konark-set-to-reach-the-kitchens-of-odisha-and-bengal/article68549723.ece

ICAR, Penn State team makes tool small enough to edit plant genomes

In a genome-editing landscape low on options for plants, the new tool has scientists enthused about its applications in agriculture

A close-up view of a paddy in Bali, Indonesia, September 22, 2020. Researchers have expressed hope a new miniature genome-editing tool will help rice crops become shorter and less prone to damage during cyclones.

Flour, chocolate, cocoa powder, eggs, and butter are all the ingredients to make a sweet treat you crave. The only thing you need right now is a step-by-step recipe to help you turn the ingredients into a yummy brownie.

Too big for its britches

Nature also has the ingredients it needs to 'make' living organisms, using a genetic instruction manual called the genome. A small change in the genome's composition can determine whether the living thing being made is a flower that exhibits two petal colours, a cat that has big or small ears or if the coriander leaves will taste like soap to some people. With the help of the gene-editing tool CRISPR, scientists today can precisely edit genomes to introduce desirable genetic traits or remove undesirable ones.

CRISPR holds the potential to revolutionise agriculture in particular by allowing agricultural scientists to increase crop yields and improve resistance to disease and anomalous weather through gene-editing. However, there has been a critical obstacle: a commonly used form of the CRISPR system is too big for plant genomes. This system uses one of two proteins, Cas9 or Cas12, to target specific parts of the DNA. But they are too bulky for plant cells to accommodate.

Smaller is better

A team of researchers led by Kutubuddin Molla from the ICAR-National Rice Research Institute in Cuttack and Mirza Baig from the Pennsylvania State University in the U.S. presented an alternative that could solve this major problem in plant genome editing in a recent paper in the journal Plant Biotechnology Journal

Source:https://www.thehindu.com/sci-tech/science/icar-penn-state-team-makes-tool-small-enough-to-edit-plant-genomes/article68549229.ece

AGRICULTURE

New AI platform will connect farmers and scientists over phone, aid in pest control

Launching the system, Union Agriculture Minister Shivraj Singh Chouhan said NPSS seeks to inculcate a scientific approach among farmers and reduce their dependence on pesticide retailers

Centre launched the AI-based National Pest Surveillance System (NPSS) that will help farmers connect with agriculture scientists and experts on controlling pests.

The Union Government on Thursday (August 15, 2024) launched the AI-based National Pest Surveillance System (NPSS) that will help farmers to connect with agriculture scientists and experts on controlling pests using their phone. Launching the programme, Agriculture Minister Shivraj Singh Chouhan said the aim of NPSS is to reduce the dependence of farmers on pesticide retailers and inculcate a scientific approach among them towards pest management. NPSS will analyse the latest data on pests using AI tools to help farmers and experts in pest control and management.

At the launch event in Indian Council of Agricultural Research here, Mr. Chouhan said the Centre's effort is to take new technological innovations in agriculture to the farmers. "All new developments in the field of agriculture should be beneficial for the farmers," he said and added that increasing yield is a priority for the Narendra Modi government. "Farmers need better seeds for increasing productivity. Our scientific community is working with farmers towards this," he said.

The Minister said technology should reach the fields and NPSS is one such effort. "If we know the pest attack immediately and at the beginning of the attack, it will help in curing. This system will help in identifying the pests and controlling it. The benefit of the technology must go to farmers," he said, adding that the Ministry will make efforts to strengthen the connect between scientists and farmers.

The Ministry said NPSS will help about 14 crore farmers in the country. The Centre envisages connecting scientists with the fields using the platform. Farmers can take photos of the infested crops or the insect using the NPSS platform and these will reach scientists and experts, it said. "Using the correct quantity of correct pesticide at the correct time is the challenge and this system helps the farmers to address this challenge," Union Agriculture Secretary Devesh Chaturvedi told The Hindu. He said it will help in addressing the problem of using excessive pesticides.

Source:https://www.thehindu.com/news/national/new-ai-platform-will-connect-farmers-and-scientists-over-phone-aid-in-pest-control/article68530026.ece

PM dedicates 109 climate-resilient and bio-fortified varieties of crops

PM highlighted the significance of sustainable and farmer-friendly agriculture.Farmers stated that the new varieties will be highly beneficial in helping reduce expenditure and have a positive impact on the environment. PM acknowledged ICAR scientists for the development of these new crop varieties

Hon'ble Prime Minister of India, Shri Narendra Modi, dedicated 109 new crop varieties, marking a major advancement in the nation's agricultural sector. These varieties, developed by the Indian Council of Agricultural Research, were released at the research fields of ICAR-Indian Agricultural Research Institute, Pusa, New Delhi.

The Prime Minister released 109 varieties of 61 crops including 34 field crops and 27 horticultural crops. Among the field crops, seeds of various cereals including millets, forage crops, oilseeds, pulses, sugarcane, cotton, fibre, and other potential crops were released, whereas the horticultural crops consisted of different varieties of fruits, vegetable crops, plantation crops, tuber crops, spices, flowers, and medicinal crops were released. The ceremony highlighted their importance in enhancing food security, boosting agricultural diversity, and tackling pressing nutritional issues in the country. These new varieties are climate-resilient, nutritionally rich, and adaptable to environmental changes. The launch of these varieties represents a significant advancement in the government's effort to strengthen and future-proof Indian agriculture.

The new varieties encompass a wide range of crops, including cereals (rice, wheat, maize), millets (barley, sorghum, pearl millet, finger millet), pulses (chickpea, pigeon pea, lentil, field pea, faba bean, mung bean), oilseeds (safflower, soybean, groundnut, sesame), fibre (cotton, jute), forage (peral millet, berseem, oats, maize, sorghum), sugar crops (sugarcane), potential crops (buckwheat, amaranth, winged bean, adzuki bean, pillipesara, kalingda, perilla), fruits (mango, pomegrnate, guava, bael, pummelo, musk melon, water melon), vegetables (potato, tomato, sem, bottle gourd, okra), flowers (crossandra, gladiolus, marigold, tuberose,), plantation crops (coconut, coca, cashew), spices (ajwain, fennel, mango ginger, nutmeg, small cardamom) and medicinal plants (ashwagandha, mandukparni, velevt bean).

Source:https://icar.gov.in/pm-dedicates-109-climate-resilient-and-bio-fortified-varieties-crops#:~:text=The%20new%20varieties%20encompass%20a,%2C%20forage%20(peral%20millet%2C%20berseem

HEALTH

The many benefits (and some drawbacks) of adding cinnamon powder to curd

The combination of cinnamon powder (dalchini) and curd is more than just a delicious treat. But is it suitable for everyone? Let's find out

Consuming dalchini (cinnamon) powder with curd can offer several health benefits, especially for women, say experts. “Cinnamon has properties that can help in hormone regulation. Also, the antibacterial properties of cinnamon combined with the soothing effects of curd can help in improving overall skin texture. But it’s essential to understand how it works and take precautions,” said Manpreet Kaur Paul, executive nutritionist, Cloudnine Group of Hospitals, Faridabad.

Benefits of cinnamon and curd

Regulates blood sugar levels: For women with diabetes or at risk of developing the condition, the combination of curd and cinnamon can be beneficial. “Cinnamon helps in lowering blood sugar levels and improving insulin sensitivity, while the probiotics in curd can aid in maintaining healthy blood sugar levels,” said Manpreet.
Improves insulin sensitivity: For women, especially those with polycystic ovary syndrome (PCOS), improving insulin sensitivity is vital. Cinnamon can help enhance insulin sensitivity, which in turn can help manage symptoms of PCOS and regulate menstrual cycles, stressed Manpreet.

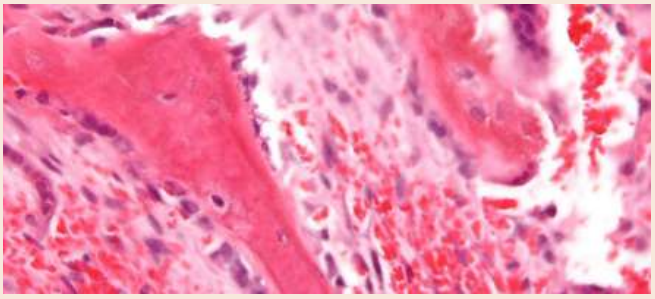
Anti-inflammatory properties: Chronic inflammation can disrupt hormonal function contributing to conditions like PCOS and also help in regulating menstrual cycles. “Cinnamon has anti-inflammatory properties that may help reduce inflammation and support overall hormonal health,” said Manpreet.

Antioxidant properties: Cinnamon is rich in antioxidants such as polyphenols, which can protect the body from oxidative stress. Oxidative stress can negatively impact hormone production and balance, mentioned Manpreet.

Source:https://indianexpress.com/article/lifestyle/food-wine/dalchini-cinnamon-powder-curd-benefits-expert-9465248/

Scientists find ‘hidden’ hormone keeping mice mothers’ bones healthy

Scientists have suspected that there is another way in which the body strengthens bones, independent of oestrogen



Osteoblasts (purple) rimming a bony spicule (pink, on diagonal). In this tissue, the osteoblasts have retracted and are separated from each other and from their underlying matrix

Osteoporosis is a condition in which the body’s bones become weak and brittle. There are more than 10 million cases of osteoporosis every year in India, and it disproportionately affects ageing women more than men. The hormone oestrogen plays a crucial role in this condition because it stimulates the growth and formation of new bone. After menopause, the decreased function of ovaries leads to oestrogen being depleted in the body, resulting in the loss of bone mass.

In a recent study published in the journal Nature, researchers at the Universities of California in San Francisco and Davis reported uncovering a novel brain-derived hormone that they say is responsible for increased bone mass in postpartum lactating mothers. The hormone is called CCN3.

A ‘secret’ path

Oestrogen plays a crucial osteoanabolic role: it stimulates the growth and formation of new bone. Consider oestrogen as a manager who tells (or signals) the members of her bone construction crew when to start and finish their jobs. During breastfeeding, the body signals to suppress oestrogen production in the ovaries, diverting energy away from the reproductive system to focus on milk production. This drop in oestrogen should lead to weaker bones.

But surprisingly, mothers’ bones become stronger in this time to meet the high calcium demands of their babies and to make up for bone loss during pregnancy. As a result, scientists have suspected that there is another way in which the body strengthens bones, independent of oestrogen.

For their studies, the researchers started with mice genetically modified to not produce a protein called oestrogen receptor alpha in the hypothalamus. Through systematic studies with these mice, they found that specific neurons, called KISS1 neurons, used the CCN3 hormone to maintain bone mineralisation during lactation. CCN3 belongs to the CCN family of proteins. They are involved in several biological processes, including embryonic development, tissue repair, wound healing, and cancer progression.

Source:https://www.thehindu.com/sci-tech/science/scientists-find-hidden-hormone-keeping-mice-mothers-bones-healthy/article68496064.ece

HEALTH

Hidden dangers of irrational use of antibiotics on microbiome

Antibiotics, especially the broad-spectrum ones, can wipe out a large portion of the gut bacteria. This disruption, known as dysbiosis, can have severe and long-lasting effects. Even a single course of antibiotics can produce dysbiosis that lasts for months or even years

Antibiotics are often hailed as miracle drugs, capable of curing once-deadly infections and saving countless lives. However, the overuse and misuse of antibiotics in humans, animals, and agriculture have severe and often overlooked consequences. While the world is acutely aware that such practices drive antimicrobial resistance (AMR), a more insidious danger lies beneath the surface. The true peril is the profound disruption antibiotics cause to the microbiome — a disruption that ripples out to affect every organ and function of our bodies.

The human body is home to a vast, intricate community of microorganisms collectively known as the microbiome. This includes bacteria, fungi and viruses. Astonishingly, our bodies host approximately 38 trillion microbial cells, outnumbering our own cells, which total around 30 trillion. This means we are more microbial than human. The gut microbiome, in particular, plays a crucial role in maintaining our health. It aids in digestion, supports the immune system, produces essential nutrients like vitamin K and certain B vitamins, and protects against pathogens. The diversity and balance of these microbial communities are vital for our well-being.

While antibiotics are essential for treating bacterial infections, their irrational use can wreak havoc on the microbiome. Antibiotics do not discriminate between harmful pathogens and beneficial bacteria. When we take antibiotics, especially the broad-spectrum ones, they wipe out a large portion of the gut bacteria. This disruption, known as dysbiosis, can have severe and long-lasting effects. Even a single course of antibiotics can produce dysbiosis that lasts for months or even years.

Source:https://www.thehindu.com/sci-tech/science/hidden-dangers-of-irrational-use-of-antibiotics-on-microbiome/article68506009.ece

What is the new Alzheimer's blood test?

How will it help treat the disease better? Is it more affordable? Will India be able to introduce it soon?

According to statistics, one in five women and one in 10 men develop dementia due to AD (Alzheimer's disease).

The story so far: Researchers have developed a new blood test to detect Alzheimer's disease that helps diagnose the disease even at the early stage of mild cognitive impairment. Scientists at Lund University in Sweden have shown that PrecivityAD2, a new blood test, is about 90% accurate in identifying AD in people experiencing cognitive symptoms. The paper 'Blood Biomarkers to Detect Alzheimer Disease in Primary Care and Secondary Care' by Sebastian Palmqvist et al was published in the July 28 edition of peer-reviewed journal JAMA.

Why are practitioners excited about the test?

According to statistics, one in five women and one in 10 men develop dementia due to AD (Alzheimer's disease). Individuals with cognitive symptoms are first seen in primary care, with a minority being referred to secondary care, authors of the article pointed out. Further they added that symptomatic AD is misdiagnosed in 25% to 35% of patients treated at even specialised clinics and likely even more patients treated in primary care.

For long, a blood test has been the Holy Grail for diagnosis of AD, since even current, modern methods of diagnosis involve very expensive and complex amyloid or Tau Positron Emission Tomography (PET) scans. The other alternative is to draw cerebrospinal fluid via a painful procedure, lumbar puncture. "The big goal is a serum study," explains neuropsychiatrist E.S. Krishnamoorthy of Buddha Clinic who has a special interest in dementia, whose most prevalent type is Alzheimer's disease. This blood test comes as close to the target as possible, and in that sense will make the diagnosis of AD very simple. Blood tests will not only reduce the costs of diagnosis, but also simplify the diagnostic procedure — involving as it does, just drawing of blood. There have been a few commercial attempts that went live before this test, but the current study has provided some definitive results.

Source:https://www.thehindu.com/sci-tech/health/what-is-the-new-alzheimers-blood-test/article68482512.ece

HEALTH

Common diabetes drug may lower dementia risk, study in Korea shows

The study found that those with diabetes, who took SGLT-2 inhibitors for more than two years, had a 48 per cent reduced risk of dementia

SGLT-2 inhibitor drugs help patients manage diabetes by preventing kidneys from reabsorbing sugar that the body creates.

A common diabetes drug could prevent dementia, with longer treatment being related to more benefits, a study in Korea has suggested. The study that used data from South Korea's national health insurance database, was published in the British Medical Journal.

In over two lakh adults aged 40-69 years with type 2 diabetes, researchers found a 35 per cent reduced risk of dementia associated with taking a class of drugs known as sodium glucose cotransporter 2 inhibitors or SGLT-2 inhibitors, compared to those taking dipeptidyl peptidase-4 inhibitors or DPP-4 inhibitors, also known as gliptins. Further, treatment with SGLT-2 drugs over a long duration was found to have more pronounced effects -- a 48 per cent reduced risk of dementia for more than two years of treatment. Examples of SGLT-2 drugs available in India include remogliflozin and dapagliflozin, while those of DPP-4 drugs are sitagliptin, vildagliptin, and teneligliptin.

Randomised controlled trials needed

However, the researchers, including those from the Seoul National University Bundang Hospital, cautioned that the effects could have been overestimated and said that randomised controlled trials, or RCTs, are now needed to confirm these findings. RCTs are considered the gold-standard of clinical trials.

The team noted that details of health behaviour, such as smoking and alcohol habits, and the duration for which the patients had diabetes, were not fully available. However, the authors pointed out that this was a large study based on nationally representative data, including relatively younger people with type 2 diabetes, and the results were highly consistent across subgroups.

Source:https://www.thehindu.com/sci-tech/health/common-diabetes-drug-may-lower-dementia-risk-study-in-korea-shows/article68580654.ece

Understanding the sudden rise of type 2 diabetes in children

The metabolic disorder was long known as a disease of adulthood. Now it's spiking in children and teens, with worrisome consequences

The appearance of type 2 diabetes in children and teens puzzled physicians from the start. Fida Bacha recalls working as a paediatric endocrinology fellow in Pittsburgh shortly after 2000 when young, overweight and obese patients began to arrive at the clinic, some describing increased thirst, more frequent trips to the bathroom and other symptoms of what was then called adult-onset diabetes.

"It was a new realization that we are dealing with a disease that used to be only an adult disease that is now becoming a disease of childhood," says Bacha, who practices at Texas Children's Hospital in Houston.

More than two decades later, physicians and researchers are still trying to unravel what's driving the emergence and proliferation of youth-onset disease, particularly among marginalised communities including Hispanics/Latinos. The increasing prevalence of obesity among young people is clearly one contributor, but researchers are also scrutinising the potential influence of other lifestyle and environmental factors — everything from exposure to chronic stress and air pollution to sugar-rich diets. Along with physiological factors, such as where they carry excess fat, youths from lower socioeconomic levels may be vulnerable due to aspects of daily life beyond their control, such as more limited access to healthy food and opportunities to safely exercise in less-polluted neighbourhoods.

As researchers try to sort out the interplay among genetics, metabolic factors and environmental influences in Hispanic and other populations, their goal is to answer this key question: Why do some seemingly at-risk adolescents progress to diabetes while others do not?

Source: https://www.thehindu.com/sci-tech/science/understanding-the-sudden-rise-of-type-2-diabetes-in-children/article68505661.ece?cx_testId=78&cx_testVariant=cx_undefined&cx_artPos=0&cx_experienceId=EXPO56ZDYSGX&cx_experienceActionId=showRecommendationsK3ISWQAB50AM20#cxrecs_s

India, Malaysia upgrade strategic partnership, discuss BRICS membership

Malaysian PM praises India's multi-aligned approach; both sides put aside past tensions after "no holds barred" conversation; India agrees to one-time allocation of two lakh tonnes of white rice to Malaysia

Prime Minister Narendra Modi with his Malaysian counterpart Anwar Ibrahim during a meeting at Hyderabad House in New Delhi on August 20, 2024.

India and Malaysia decided to upgrade ties to a 'Comprehensive Strategic Partnership' on August 20, 2024, during talks between Prime Minister Narendra Modi and Malaysian Prime Minister Anwar Ibrahim, as part of a visit aimed at moving beyond several years of tensions over a number of issues.

The two leaders announced the decision to upgrade the 2010 Strategic Partnership, that had been made an 'Enhanced Strategic Partnership' in 2015, along with a number of agreements and MoUs signed in their presence., including on workers' mobility, digital technology, culture, tourism, sports, and education. India will also work with Malaysia on its request to join the BRICS grouping that Mr. Ibrahim has been pushing for, officials said. The two Prime Ministers also discussed geopolitical challenges, including the current conflicts and tensions in the Indo-Pacific region.

"Malaysia is an important partner of India in ASEAN and the Indo-Pacific region," Mr. Modi said after the meeting. "We are committed to freedom of navigation and overflight in accordance with international laws. And, advocate peaceful resolution of all disputes," he added.

Indian Ocean stability

Speaking at the Indian Council for World Affairs on Tuesday evening, Mr. Ibrahim praised India's "unique, multi-aligned approach" and "astute and adept compartmentalisation of priorities and challenges" that he said Malaysia should learn from in dealing with global conflicts.

Source:https://www.thehindu.com/news/national/india-malaysia-elevate-ties-to-comprehensive-strategic-partnership/article68546006.ece

UN chief issues 'SOS' for Pacific Islands worst hit by warming ocean

Climate change and security are dominating discussions at the week-long annual leaders meeting, where the 18 members of the Pacific Islands Forum span atoll nations threatened by sea level rise

United Nations Secretary-General Antonio Guterres said on August 27, 2024 ocean temperatures are rising in the Pacific Islands at three times the rate worldwide, and its population was "uniquely exposed" to the impact of rising sea levels.

Speaking to reporters in Tonga where the Pacific Islands Forum is being held, Guterres highlighted the findings of a report that showed the South West Pacific was worst hit by sea level rises, in some places by more than double the global average in the past 30 years.

"I am in Tonga to issue a global SOS – Save Our Seas – on rising sea levels," he said.

"Rising seas are amplifying the frequency and severity of storm surges and coastal flooding. These floods swamp coastal communities. Ruin fisheries. Damage crops. Contaminate fresh water. All this puts Pacific Island nations in grave danger," he said.

Water expands as it warms, contributing to sea level rise, he said.

Climate change and security are dominating discussions at the week-long annual leaders meeting, where the 18 members of the Pacific Islands Forum span atoll nations threatened by sea level rise such as host Tonga, and one of the world's biggest exporters of coal, Australia.

Asked by a reporter about Australia's export of fossil fuels, Guterres said fossil fuels must be phased out globally, although "the situation in different countries is different" and there would be different ways to do this. The report released on August 27, 2024 by the World Meteorological Organization showed ocean temperatures in the South West Pacific are increasing at up to three times the rate worldwide.

Source:https://www.thehindu.com/sci-tech/energy-and-environment/un-chief-issues-sos-for-pacific-islands-worst-hit-by-warming-ocean/article68571912.ece

Global South Highlighted During the Second High-Level Conference of the Forum on Global Action for Shared Development

Between 11 and 13 July 2024, the Second High-Level Conference of the Forum on Global Action for Shared Development was held in Beijing.

The event, hosted by the China International Development Cooperation Agency (CIDCA), focused on the theme "Promoting Sustainable Development: Continuous Actions for a Better Future." Representatives from over 160 countries, UN agencies and international organizations (IGOs) participated both online and in person. In the nearly three years since the Global Development Initiative (GDI) was announced, it was noted that China has partnered with more than 20 UN agencies and IGOs across 60 countries and implemented over 140 cooperation projects. More than 40,000 practitioners have benefitted from over 1,000 capacity-building programs for developing countries.

During the Conference, the United Nations Office for South-South Cooperation (UNOSSC), in collaboration with the Global Development Promotion Centre (GDPC) of CIDCA and the University of International Business and Economics (UIBE) of China, co-organized a Sub-forum on "Promoting Modernization in the Global South: New Pathways, New Visions."

Over 300 guests attended the event, including ministers and senior officials from more than 50 countries, and representatives from the UN system, and other IGOs and think tanks. Strengthened South-South and triangular cooperation was highlighted as essential for advancing modernization and development collaboration. This involves promoting equitable access to technology and education, fostering inclusive innovation ecosystems, and empowering marginalized communities to actively participate in and benefit from the modernization process.

Source:https://unsouthsouth.org/2024/08/02/global-south-highlighted-during-the-second-high-level-conference-of-the-forum-on-global-action-for-shared-development/

The Global South Session at Tokyo UN Studies Conference Calls for Strengthening Institutional Negotiating Capacities

Ambassador Amr Aljowaily, the strategic advisor to the African Union Commission, chaired a special session on the Global South forum at the annual conference of the Academic Council on United Nations Studies (ACUNS), urging the importance of enhancing negotiating capabilities through institutional memory among the negotiators of the Global South.

The conference, which was held in Tokyo, was jointly organized by the United Nations University and the University of Tokyo.

Speakers at the session included Secretary-General of the Organisation of Southern Cooperation Sheikh Manssour Bin Mussallam; Executive Director of the South Centre Dr. Carlos Correa; Director of United Nations Office for South-South Cooperation (UNOSSC) Dima Al-Khatib; Senior Specialist, of the United Nations Institute for Training and Research (UNITAR) Philippe Aubert; and Professor Katie Verlin Laatikainen editor of "Group Politics in UN Multilateralism".

"The global development cooperation architecture is witnessing a significant transformation," said Dima Al-Khatib, Director of the United Nations Office for South-South Cooperation (UNOSSC). "Southern development partners are playing an increasingly influential role in multilateral fora, bringing new perspectives, resources, and innovative approaches to the forefront of the international development agenda."

For example, the 2023 21st Session of the High-Level Committee on South-South Cooperation underscored the importance of a cohesive United Nations system-wide strategy to leverage South-South and triangular cooperation to support Member States. "In recent years," Director Al-Khatib said, "demand from Member States for UN system assistance in this area has surged, as illustrated by various inter-governmental processes, including Third South Summit, LDCV, and SIDS4."

Source:https://unsouthsouth.org/2024/07/02/the-global-south-session-at-tokyo-un-studies-conference-calls-for-strengthening-institutional-negotiating-capacities/

HLPF: Exchanges of Innovative Solutions for Debt Relief – Country Experiences and the Role of South-South and Triangular Cooperation

The United Nations Office for South-South Cooperation (UNOSSC) in partnership with the Government of Sri Lanka, serving as the President of the High-Level Committee on South-South Cooperation, organized an High-Level Political Forum on Sustainable Development side-event entitled "Exchanges of Innovative Solutions for Debt Relief: Country Experiences and the Role of South-South and Triangular Cooperation" on 11 July 2024.

The event harnessed the potential of South-South and triangular cooperation in addressing debt distress through knowledge exchanges, underscoring the importance of collaborative efforts in finding sustainable solutions. The event is a direct response to the UN General Assembly resolution on South-South Cooperation its 78th session which urged the UN development system to facilitate knowledge exchanges on debts.

"The implications of debt distress on sustainable development in the Global South are profound," said UNOSSC Director Ms. Dima Al-Khatib in her welcoming remarks, noting the alarming rise in external debt and its detrimental effects on sustainable development. She emphasized the need for innovative solutions and reforms in international financial architecture to better support developing countries. She highlighted that debt distress is a pressing challenge that affects numerous countries across Africa, Latin America, and Asia.

The external debt stocks of developing countries have surged to an alarming $11.4 trillion in 2023, more than double what it was a decade ago. This growing burden, exacerbated by economic shocks and the current international financial architecture, significantly hinders sustainable development.

Source:https://unsouthsouth.org/2024/07/11/hlpf-exchanges-of-innovative-solutions-for-debt-relief-country-experiences-and-the-role-of-south-south-and-triangular-cooperation/

2024 High-Level Political Forum Highlights the Importance of South-South and Triangular Cooperation in Achieving the SDGs

The 2024 High-Level Political Forum (HLPF) on Sustainable Development spotlighted the pivotal role of South-South and triangular cooperation in advancing the global development agenda. During the HLPF numerous successful initiatives were highlighted where countries of the Global South have driven progress in areas such as poverty reduction, healthcare, and climate resilience, among others. These partnerships not only foster mutual growth and innovation but also serve as vital mechanisms for achieving the Sustainable Development Goals and all other internationally agreed development goals.

The HLPF emphasized the need to strengthen and expand South-South and triangular cooperation to enhance development impact.

Speaking at the HLPF plenary meeting on Small Island Developing States: Implementing the outcomes of the fourth SIDS Conference, UNOSSC Director Dima Al-Khatib, emphasized that transfer of knowledge, experiences and solutions is the backbone of UNOSSC's SIDS support toward coherent implementation of the new Antigua and Barbuda Programme of Action for SIDS (ABAS).

"UNOSSC stands ready to work closely with all partners to achieve their aspirations through SDG-anchored development," said the Director. "For example, our Global Thinkers Network offers ready intellectual capital, while our newly revamped South-South Galaxy knowledge-sharing platform offers over 950 solutions specific to Global South priorities." She also encouraged participants to read and utilize the new Guidelines for the Integration of South-South and Triangular Cooperation into the Country- and Regional-level Work of the United Nations Development System.

Source:https://unsouthsouth.org/2024/07/25/2024-high-level-political-forum-highlights-the-importance-of-south-south-and-triangular-cooperation-in-achieving-the-sdgs/

OTHERS

Do some spiders exploit firefly's flashing signals to lure more prey?

"The signals made by male fireflies in webs with spiders looked a lot more like the signals of free females.

Fireflies rely on flashing signals to communicate with other fireflies using light-emitting lanterns on their abdomens. In fireflies of the species Abscondita terminalis, males make multi-pulse flashes with two lanterns to attract females, while females make single-pulse flashes with their one lantern to attract males. Researchers now have evidence that an orb-weaving spider (Araneus ventricosus) manipulates the flashing signals of male fireflies ensnared in its web such that they mimic the typical flashes of a female firefly, thereby luring other males to serve as their next meal. Researchers suspected that the spiders might be attracting males to their webs by somehow manipulating their flashing behaviour. During field experiments they found that the spider's web more often captured male fireflies when the spider was present. The signals made by male fireflies in webs with spiders looked a lot more like the signals of free females. Specifically, the ensnared males used single-pulse signals using only one of their lanterns, not both. The findings suggested that the males weren't altering their flashes as a distress signal. The researchers propose that the spiders alter the firefly's signal.

Source:https://www.thehindu.com/sci-tech/science/do-some-spiders-exploit-fireflys-flashing-signals-to-lure-more-prey/article68559208.ece

The chemical treasury in garlic

A fraction: Of the over 2,300 chemicals in garlic cloves, barely 70 chemicals figure in nutrition charts.

Plants, unlike animals, cannot escape predators. They are literally rooted to one spot. They have overcome this disadvantage by arming themselves with a vast chemical armory as a defense.

Those parts of a plant that are below the ground are particularly vulnerable to attack. Bacteria, fungi, nematodes, larvae, snails, mice — the list of threats is long. Not surprisingly, plants such as onion and garlic, which store food for future growth in underground bulbs, have equipped themselves with defensive chemicals of every conceivable hue and variety.

2,300 chemicals

A recent inventory of the molecular army of garlic, using very sensitive analytical tools of chemistry has shown that there are over 2,300 chemicals in its cloves. Most of them are there for reasons that we do not comprehend yet. Barely 70 of these figure in today's nutrition charts. These include manganese, selenium and vitamin B6: three human nutrients that garlic is particularly rich in.

Many of the other constituents – thiosulfinates, lectins, saponins and flavonoids, to name a few - can play protective roles in humans too. It is not surprising that humans have a long history of incorporating garlic into their diets. Sumerian clay tablets from 4000 years ago have recipes that use garlic. And beyond nutritive value, garlic has been used for its medicinal properties in many cultures.

In our tradition

In Ayurveda, warm garlic-infused milk, Lasuna Ksheerapaka, is beneficial for respiratory conditions such as asthma, cough and common cold, and for generally improving body strength. Similarly, garlic-infused water (lasuna phata) is used as a tonic, improving digestion by stimulating the secretion of digestive enzymes, and by its carminative properties, which reduce gas formation.

Source:https://www.thehindu.com/sci-tech/agriculture/the-chemical-treasury-in-garlic/article68559174.ece