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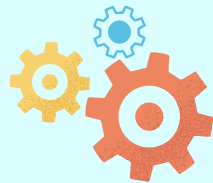


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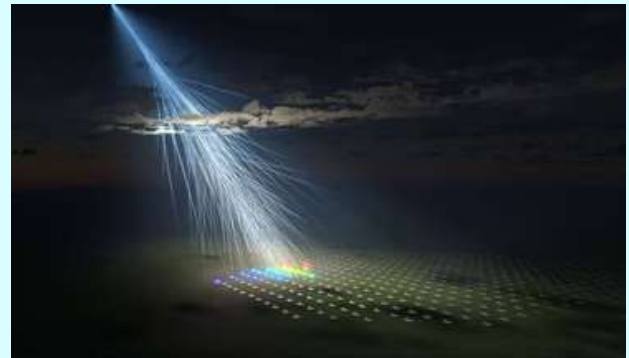


SCIENCE & TECHNOLOGY

HIGH-ENERGY 'SUN GODDESS' PARTICLE 'FROM NOWHERE' COLLIDES INTO EARTH

Researchers have discovered an extremely high-energy particle that seemingly came from a part of the universe where there is nothing. It was named "Amaterasu" after a Japanese goddess.

Scientists have detected one of the most powerful cosmic rays ever slamming into Earth but they have no idea what caused it or where it came from. The extremely high-energy particle has been named "Amaterasu" after the Japanese Sun goddess, and it seemingly arrived from a void in space where nothing is known to exist.



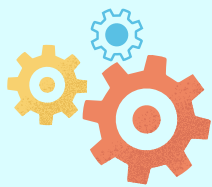
Artist's illustration of the extremely energetic cosmic ray observed by a surface detector array of the Telescope Array experiment. (KYOTO UNIVERSITY/YUYUNOSUKE TAKESHIGE)

The Amaterasu particle has an energy exceeding 240 exa-electron volts (EeV), according to The Guardian. It is millions of times more powerful than the particles produced by the Large Hadron Collider, which is the most powerful accelerator ever built. It is second only to the "Oh-My-God" particle, another high-energy cosmic ray detected in 1991, that came in at 320 EeV.

Toshihiro Fujii, who is an astronomer at the Osaka Metropolitan University in Japan, observed some peculiar signals while he was doing a routine data check at the Telescope Array Project in Utah. The signals that came on May 27, 2021, suggested that something super-energetic had smashed into the facilities' detectors, but he was sceptical about it. The measurements pointed towards ultra-cosmic rays.

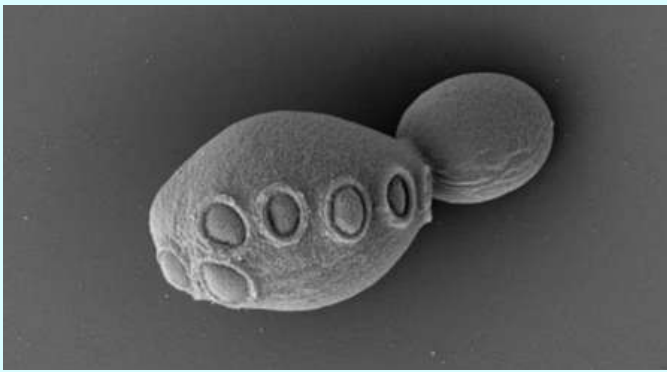
However, when the researchers tried to find the source of the energy spike, they found nothing, according to Nature. Ultra-high energy particles like Amaterasu usually travel through space quite smoothly since they don't bounce off magnetic fields, like low-energy cosmic rays.

Source: <https://indianexpress.com/article/technology/science/high-energy-sun-goddess-particle-9041653/>



SCIENTISTS PRODUCE YEAST STRAIN WITH MORE THAN HALF SYNTHETIC DNA IN MAJOR BREAKTHROUGH

In a major breakthrough, scientists have developed a strain of yeast with more than half of its genome being made of synthetic DNA.



Crucially, the yeast cell was able to reproduce normally by splitting in two despite the synthetic chromosomes. (Cell via Nature)

Scientists have accomplished a major milestone in the journey of creating complex cells with an entirely synthetic genome. Biologists created a strain of yeast which has a genome that is more than 50 per cent synthetic DNA. Half of the 16 chromosomes of the strain were designed and created from scratch. The impressive feat was the result of a collaboration of a group of labs that have been trying to create a strain of yeast with a fully synthetic genome for the last 15 years—the Sc2.0 consortium. Their latest achievement has been described in a series of papers in the journals *Cell* and *Cell Genomics*.

Scientists have already engineered some viruses and bacteria to have completely synthetic genomes, according to *Nature*, but they all had simple genetic structures. Apart from their simple genetic structures, they also had simple inner configurations.

The Sc2.0 teams worked on brewer's yeast for their research, but the idea was to get a better understanding of complex cells so that they create strains for industrial use in the future, according to *New Scientist*. For example, they could create strains of yeast that make medicines and biofuels instead of beer.

Interestingly, the scientists have completed creating synthetic versions of all 16 yeast chromosomes. But actually putting them in a single strain of yeast could take another year or so. According to project lead Jef Boeke, the issue is not physically assembling the strain, rather, it is “debugging the synthetic chromosomes”.

Source: <https://indianexpress.com/article/technology/science/yeast-strain-synthetic-dna-chromosomes-9021615/>

AI SYSTEM SELF ORGANISES TO BECOME MORE LIKE HUMAN BRAIN IN A STUDY

Researchers at the University of Cambridge applied a very simple physical constraint to an artificial intelligence system. Interestingly, that application made the AI adapt some characteristics of the human brain.



Scientists at the University of Cambridge put physical constraints on an artificial intelligence system, similar to how human and other animal brains have to develop and operate with both physical and biological constructs. The system then developed some features of the brains of complex organisms to solve tasks.

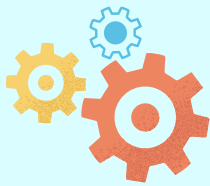
In a study published in the journal *Nature Machine Intelligence* today, Jascha Achterberg and Danyal Akarca from the Medical Research Council Cognition and Brain Sciences Unit (MRC CBSU) at the University of Cambridge worked with their colleagues to develop a simplified version of the brain and applied some physical constraints before giving the system tasks. This technology could potentially be used to develop more efficient AI systems and even understand the human brain itself better.

Developing a system with the same limitations as the brain

Instead of using real neurons or brain cells, they used computational nodes. This is because both neurons and nodes have similar functions. They both take an input, transform it, and produce an output. Also, a single node or neuron might connect to multiple others, with all of them outputting and inputting information.

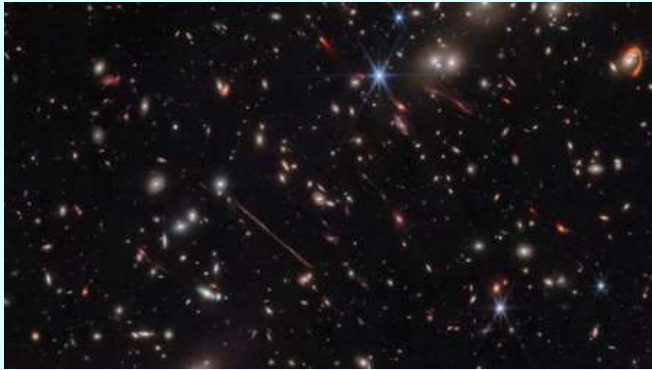
The physical constraint they placed on their system of computational nodes was similar to a constraint experienced by neurons in the brain—each node was given a specific location in a virtual space, and the further it was away from another, the more difficult it was for the two to communicate.

Source: <https://indianexpress.com/article/technology/science/ai-system-like-human-brain-9035124/>



'TEENAGE GALAXIES' CAPTURED IN EXTRAORDINARILY DETAILED VIEW BY JAMES WEBB SPACE TELESCOPE

The James Webb Space Telescope took one of the most detailed images of "teenage galaxies," helping scientists understand how galaxies form and evolve.



Webb's infrared image of the galaxy cluster El Gordo ("the Fat One") reveals hundreds of galaxies, some never before seen at this level of detail. (NASA, ESA, CSA)

"Teenage galaxies" that formed just two to three billion years after the Big Bang are unusually hot and glow with light from elements like nickel. Looking into these galaxies tell scientists more about how these massive systems of stars grow and evolve.

Research published in The Astrophysical Journal Letters is part of the (Chemical Evolution Constrained using Ionized Lines in Interstellar Aurorae) survey. Scientists in July pointed the James Webb Space Telescope at 33 ancient galaxies whose light travelled more than 10 billion years to reach us and looked at them for more than a day. In the process, they captured the most detailed view of these galaxies ever captured.

Some galaxies that existed in the universe's youth, like the 33 chosen for the study, went through periods of intense star formation. More modern galaxies, like the Milky Way, still form stars but not nearly as fast. Some others have completely stopped forming stars. This new research can help astronomers understand how different galaxies go through these different paths, according to the Carnegie Institution for Science.

Scientists working on the CECILIA project observed spectra from these distant galaxies. They separated the light into component wavelengths. This helped them measure the temperature and chemical composition of the sources of light. Using this technique, they identified eight different elements — hydrogen, helium, nitrogen, oxygen, silicon, sulphur, argon, and nickel. The team was particularly surprised to detect nickel.

Source: <https://indianexpress.com/article/technology/science/teenage-galaxy-james-webb-space-telescope-9036017/>

WE WILL SOON NEED 'NEURO RIGHTS' TO PROTECT OUR BRAINS AND THOUGHTS FROM TECHNOLOGY

The question is not whether there will be a machine that can read your mind. Rather, it is when. Before that, governments across the world need to consider "neurorights" to protect citizens' brains against neurotechnology.



An artistic illustration of a future world where more people have brain implants. (AI generated using DALL-E)

In today's digital world, nothing you do and nothing you say is private. Not only do the walls have ears but they are also connected to the internet. There is only one space in the world that is truly private to you and that is your mind. But even that won't be true for long.

Elon Musk's Neuralink may seem like it borders on science fiction. But the day is not far when there will be a machine that can read and maybe even alter your mind. Some advocates for Neurorights, or human rights specifically aimed at protecting the brain, want to put in place regulations before this becomes a reality. Jack Gallant, a cognitive scientist at UC Berkeley, and other researchers published a paper elaborating on a rudimentary way of "reading minds." Volunteers in a study were asked to watch hours of video clips while their heads were inside an MRI machine. The researchers then trained a neural network on a dataset that linked recorded brain activity to each corresponding frame of video. After that, the researchers asked the volunteers to watch new videos while still recording MRI data. They then fed the data into the AI model that they trained earlier. The model was able to generate a very vague but identifiable reconstruction of some of the imagery that the volunteers watched. The paper, by the way, was published in 2011.

Source: <https://indianexpress.com/article/technology/science/neurorights-neurotechnology-brain-implant-9030260/>



ENVIRONMENT

WHAT THE RAPID ICE MELT IN WEST ANTARCTICA MEANS

The rapid melting of ice sheet in West Antarctica is now unavoidable, according to a new study. What is an ice sheet? Why does its melting matter? Is all hope lost?



Calving front of an ice shelf in West Antarctica.

The rapid melting of West Antarctica's ice sheet due to warm waters around it is now unavoidable, no matter how much carbon emissions are cut, according to a new study. If lost completely, the ice sheet would raise the global mean sea level by 5.3 metres or 17.4 feet — a potentially devastating consequence for millions of people living in vulnerable coastal cities across the world, including in India.

Even under a best-case scenario of limiting global warming to 1.5 degree Celsius above pre-industrial levels, water in West Antarctica will continue to get warmer three times faster than in the 20th century, leading to an increased melting of the region's ice sheet, the analysis has found.

The study, 'Unavoidable future increase in West Antarctic ice-shelf melting over the twenty-first century', was published by the journal *Nature* last week. It was carried out by Kaitlin Naughten and Paul R Holland, both of whom work at the British Antarctic Survey, and Jan De Rydt of the Northumbria University (UK).

But first, what is an ice sheet?

An ice sheet is essentially a mass of glacial ice that covers more than 50,000 square kilometres of land — roughly large enough to blanket Uttarakhand in ice. There are two major ice sheets in the world today: Greenland ice sheet and Antarctica ice sheet. Together, they contain about two-thirds of all the freshwater on Earth

"This means that over time, when ice sheets gain mass, they contribute to a fall in global mean sea level, and when they lose mass, they contribute to a rise in global mean sea level," according to a report by the National Aeronautics and Space Administration (NASA).

Source: <https://indianexpress.com/article/explained/explained-climate/ice-sheet-melt-west-antarctica-9006179/>

HOW CLIMATE CHANGE IS DISPLACING ANIMALS

Climate change-linked extreme weather events have become more common as well as more severe. A study sheds light on their profound impact on ecosystems, especially on native species.



A wildlife biologist holding a baby spectacled caiman, an aquatic cousin of alligators and crocodiles, but not native to the United States, near Homestead, Florida, October 16, 2023. Caimans are an invasive species in Florida, where they ran wild over half a century ago. (Jason Gully/The New York Times)

A new analysis published this week suggests that extreme weather linked to climate change might be much harder on native species than on non-native ones.

As the planet warms, extreme weather events — heat waves, cold snaps, droughts and floods — are becoming more common and destructive. The new paper, published Monday in the journal *Nature Ecology & Evolution* by a team from the Chinese Academy of Sciences, suggests that these sudden, violent changes in conditions could be helping to fundamentally reshape ecosystems.

In a statement, the team said that research on the impacts of extreme weather on ecosystems, while still in its early stages, was "critically important" to our ability to understand the effects of global warming on biodiversity.

The researchers, led by Xuan Liu, an ecologist at the Academy of Sciences, analyzed 443 studies that examined the responses of 1,852 native and 187 non-native species — from land, freshwater and marine habitats — to extreme weather.

On average, no-native species tended to show more positive responses to extreme weather, or, at least, less negative ones. Where non-native land species might take a hit in population numbers from a disaster, for example, the effects on native land species could sometimes be more far-reaching, with native populations also losing geographic distribution and struggling to recover.

Source: <https://indianexpress.com/article/explained/explained-climate/climate-change-displacing-animals-9019249/>



ENVIRONMENT

COP, CARBON MARKET, LOSS AND DAMAGE: A GLOSSARY OF CLIMATE TERMS

The 28th edition of the Conference of the Parties (COP) will begin in Dubai on November 30. Here is a look at the key terms that you might come across.



A protest calling for money for climate action at the COP27 UN Climate Summit, November 11, 2022, in Sharm el-Sheikh, Egypt. (AP Photo/Peter Dejong, File)

With the COP28 summit just around the corner, terms like the Paris Agreement, Kyoto Protocol, loss and damage, and NDCs will soon make headlines.

Here is a guide to key terms in the climate change conversation.

COP

COP is an international climate meeting organised annually by the United Nations (UN). COP is short for Conference of the Parties. ‘Parties’ is a reference to (now) 198 countries that have joined the international treaty called the UN Framework Convention on Climate Change (UNFCCC). ‘Parties’ to the treaty have pledged to take voluntary actions to prevent “dangerous anthropogenic [human-caused] interference with the climate system.”

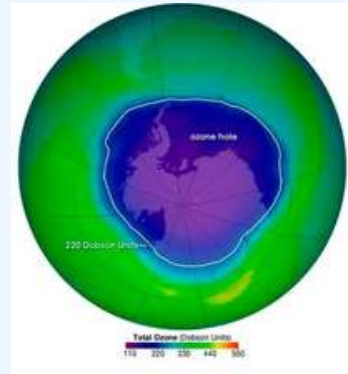
Kyoto Protocol

The Kyoto Protocol was an international treaty that placed obligations on the set of rich and industrialised countries to cut their greenhouse gas emissions by assigned amounts. It was adopted in Kyoto, Japan, in 1997, and came into effect in 2005. The treaty formally expired in 2020 and was replaced by the Paris Agreement as the main international treaty for coordinating global action against climate change.

Source: <https://indianexpress.com/article/explained/explained-climate/glossary-climate-change-terms-9044683/>

LARGE OZONE HOLE DETECTED OVER ANTARCTICA: IS IT A MATTER OF CONCERN?

The ozone hole over Antarctica is one of the biggest on record, roughly three times the size of Brazil. It's a natural phenomenon, but scientists are concerned climate change could begin reopening ozone holes.



The ozone hole is the region over Antarctica with total ozone of 220 Dobson Units or lower. This map shows the ozone hole on October 4, 2004. The data were acquired by the Ozone Monitoring Instrument on NASA's Aura satellite.

Satellite measurements over Antarctica have detected a giant hole in the ozone layer. The hole, which scientists call an “ozone-depleted area” was 26 million square kilometers (10 million square miles) in size, roughly three times the size of Brazil. The European Space Agency Copernicus Sentinel-5P satellite made the recordings on September 16, 2023, as part of the EU’s environmental monitoring program.

Claus Zehner, the agency’s mission manager for Copernicus Sentinel-5P, told DW that this is one of the biggest ozone holes they’ve ever seen. “The satellite measured trace gases in the atmosphere in order to monitor the ozone and climate. It showed that this year’s ozone hole started earlier than usual, and had a big extension,” said Zehner. Experts believe the hole in the ozone is not likely to increase warming on the surface of Antarctica.

Ozone holes grow and shrink every year

The ozone layer is a trace gas in the stratosphere, one of the four layers of the Earth’s atmosphere. It functions as a protective gas shield that absorbs ultraviolet radiation, protecting humans and ecosystems from dangerous amounts of UV. Most skin cancers are caused by exposure to high amounts of UV radiation, so anything that shields us from UV rays helps reduce cancer rates. The size of the ozone hole over Antarctica fluctuates each year, opening each year in August and closing again in November or December.

Source: <https://indianexpress.com/article/explained/explained-climate/large-ozone-hole-antarctica-explained-8979396/>



ENVIRONMENT

MADAGASCAR HEATWAVE ROOTED IN HUMAN-CAUSED CLIMATE CHANGE: STUDY

Over 13,000 people in Africa have died in extreme weather events in 2023, more than any other continent this year



A truck is seen parked on the dried river bed of the Manambovo river, in Tsihombe, Androy region, Madagascar, February 13, 2022. Picture taken with a drone.

A prolonged heatwave that hit Madagascar in October would not have occurred without human-caused climate change, a scientific study said. Scientists from the World Weather Attribution (WWA) group said the heatwave in the Indian Ocean island, which affected millions of people, "would have been virtually impossible without human-caused climate change".

The study by 13 researchers looked at three variables to investigate the heatwave: the island's average temperatures over October and the seven-day minimum and maximum temperatures in the country's capital Antananarivo. "The analysis found that human-caused climate change made the month-long heat, seven-day maximum temperatures and seven-day minimum temperatures about 1-2°C hotter," the WWA report said.

While the temperature increase might not seem like much, Sayanti Sengupta, technical advisor at Red Cross Red Crescent Climate Centre, said "an increase of even half a degree can push thousands more people to their physiological limit". Sengupta added that it could also cause "heat stress" and loss of life. Over 13,000 people in Africa have died in extreme weather events in 2023, more than any other continent this year, according to the EM-DAT international disaster database.

Yet extreme heat is severely underreported and understudied in Africa, the WWA said, which made it difficult to identify reported impacts of the dangerous temperatures in Madagascar and also impacts climate financing. Around 91% of Malagasy people live in poverty, with many lacking access to clean water and electricity, which makes them "highly vulnerable to extreme heat".

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/madagascar-heatwave-rooted-in-human-caused-climate-change-study/article67565419.ece>

PERU LOST MORE THAN HALF OF ITS GLACIER SURFACE IN JUST OVER HALF A CENTURY, SCIENTISTS SAY

The factor that causes the greatest impact is the increase in the average global temperature, causing an accelerated retreat of glaciers



A boy fishes for trout at lake Rajupaquinan at Huascaran natural reserve in Ancash. Peru has more tropical glaciers than any other nation but rising temperatures linked to global warming are shrinking the ice masses, filling existing lakes to the brim and spawning hundreds of new ones. Picture taken November 29.

Peru has lost more than half of its glacier surface in the last six decades, and 175 glaciers became extinct due to climate change between 2016 and 2020, Peruvian scientists from the state agency that studies glaciers said. "In 58 years, 56.22% of the glacial coverage recorded in 1962 has been lost," said Mayra Mejía, an official with Peru's National Institute of Research of Mountain Glaciers and Ecosystems, or Inaigem.

The factor that causes the greatest impact is the increase in the average global temperature, causing an accelerated retreat of glaciers, especially those in tropical areas, Jesús Gómez, director of glacier research at Inaigem, told The Associated Press. The South American country has 1,050 square kilometers (405 square miles) of glacial coverage left, an area representing about 44% of what was recorded in 1962, when the first glacier inventory was carried out.

Mejía, an expert in glaciology, said there are some mountain ranges in Peru where glaciers have almost disappeared, namely Chila, which has lost 99% of its glacial surface since 1962. Chila is key because the first waters that give rise to the Amazon River, the longest and mightiest in the world, descend from the glacier.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/peru-lost-more-than-half-of-its-glacier-surface-in-just-over-half-a-century/article67565395.ece>



AGRICULTURE

CORTEVA AGRISCIENCE PARTNERS WITH BUDDY4STUDY TO EMPOWER WOMEN IN AGRICULTURAL SCIENCES



This partnership aligns with Corteva Shiksha CSR programme championing exceptional women pursuing master's or PhD degrees in agricultural sciences, especially those facing financial challenges

Corteva Agriscience has joined forces with Buddy4Study India Foundation, for empowering women pursuing advanced agriscience degrees. This non-governmental organisation (NGO) hosts India's leading scholarship platform, connecting scholarship aspirants with financial aid providers.

This partnership aligns with the Corteva Shiksha CSR programme championing exceptional women pursuing master's or PhD degrees in agricultural sciences, especially those facing financial challenges. The programme provides financial aid and mentorship, fostering inclusivity and elevating women in science, cultivating a vibrant agriscience community.

Through this collaboration, Corteva is bridging the gender gap and creating a more inclusive future. Diverse talents and perspectives are the driving forces behind curiosity, creativity, and innovation. By providing financial support to women pursuing careers in STEM, Corteva aims to cultivate a vibrant pool of talent. This talent, in turn, will play a pivotal role in fuelling India's ambition to strengthen its innovation economy.

Buddy4Study India Foundation shares in this enthusiasm, with their spokesperson saying, "We are honoured to partner with Corteva Agriscience in their mission to empower women in science. This collaboration aligns seamlessly with our own vision of enabling educational opportunities for deserving individuals. Together, we're committed to removing barriers and propelling aspiring women scientists to achieve greater success."

Source: <https://agriculturepost.com/agri-research/corteva-agriscience-partners-with-buddy4study-to-empower-women-in-agricultural-sciences/>

ICAR-CMFRI IDENTIFIES TWO MORE SEER FISHES FROM INDIAN WATERS



One is Arabian sparrow seer fish which is entirely new to science while the other, previously a synonym of spotted seer fish, has been resurrected as a distinct species

In a breakthrough in the marine fisheries sector, the researchers of the ICAR–Central Marine Fisheries Research Institute (CMFRI) have identified two more species of seer fish, the most sought-after high-value marine fish. They discovered one species named Arabian sparrow seer fish (*Scomberomorus avirostrus*) as entirely new to science and resurrected the other, Russell's spotted seer fish (*Scomberomorus leopardus*) which was previously a synonym of the spotted seer fish.

According to the findings by a team of taxonomists led by Dr EM Abdussamad, Principal Scientist of CMFRI, the spotted seer fish (*Scomberomorus guttatus*) that was once considered a single species, is a complex of three distinct species. These include the newly discovered seer fish, the resurrected seer fish, and the existing spotted seer fish. With this finding, the total number of top-demanding seer fish species in Indian waters rose to six from the existing four species. This discovery emerged from a comprehensive taxonomic study on spotted seer fish found along the Indian coast. The study highlighted considerable divergence in the morphometry and genetic structure of these fishes collected from different regions of the coast.

The new species was given the common name of Arabian sparrow seer fish by the CMFRI team, owing to its typical bird-beak-like snout. This inhabits the Arabian Sea coast north of Mangalore and its distribution extends up to the Arabian Gulf based on the available scientific information. Distribution of the other two was along the Bay of Bengal coast north of Nagapattinam, including the Andaman and China seas.

Source: <https://agriculturepost.com/agri-research/icar-cmfri-identifies-two-more-seer-fishes-from-indian-waters/>



AGRICULTURE

UPL INAUGURATES GLOBAL NPP RESEARCH CENTER TO ADVANCE INNOVATION IN SUSTAINABLE AGRICULTURE



At the heart of the partnership is Assam's goal of boosting the cultivation, production and consumption of three native millet crops: Finger millet, Foxtail millet, and Proso millet

UPL Ltd, a global provider of sustainable agricultural solutions, announced the opening of its Global NPP Research Center in Ramos Arizpe, Mexico.

The Global NPP Research Center, a state-of-the-art facility will advance natural solutions through scientific and applied excellence. This modern greenhouse with specialised equipment, will be a hub for experienced researchers, fostering collaborations with local and international universities and research centres, and serve as a platform for agricultural knowledge and innovative solutions.

Biosolutions refer to agricultural inputs developed with naturally derived active ingredients, ranging from seaweed extracts to micro-organisms. UPL is a global leader in biosolutions and the extensive Natural Plant Protection (NPP) portfolio covers a range of applications, including increasing crop resilience to disease, pests, and environmental conditions, supporting crop nutrition, and improving soil health, while reducing residues and environmental impacts.

Mike Frank, CEO of UPL Corporation, said, “We are so proud to inaugurate the Global NPP Research Center today, this significant investment will continue to add value for growers and strengthen our focus on differentiated and sustainable solutions. This facility represents a significant milestone in advancing agricultural practices worldwide.”

Speaking at the occasion, Jai Shroff, Group CEO & Chairman, UPL, said, “The NPP Research Center reflects UPL’s mission to reimagine sustainability and our OpenAg commitment to building an ecosystem of connectivity and collaboration. This centre-of-excellence will help address key challenges such as heat and water stress, soil health and positively impact global food security.”

Source: <https://agriculturepost.com/farm-inputs/agrochemicals/upl-inaugurates-global-npp-research-center-to-advance-innovation-in-sustainable-agriculture/>

ICRISAT JOINS HANDS WITH ASSAM MILLET MISSION TO BOOST MILLET PRODUCTION



At the heart of the partnership is Assam's goal of boosting the cultivation, production and consumption of three native millet crops: Finger millet, Foxtail millet, and Proso millet

The International Crop Research Institute for Semi-Arid Tropics (ICRISAT) and the Government of Assam, India, have joined forces to advance climate-resilient and nutritionally enhanced food systems through the Assam Millet Mission. At the heart of the partnership is Assam’s goal of boosting the cultivation, production and consumption of three native millet crops: Finger millet (Maruadhan), Foxtail millet (Kaun), and Proso millet (Cheena Bajra).

Presently, millets are only cultivated in 6,000 hectares of land in 15 districts of Assam, including Nagaon, Bongaigaon, and Dhubri, contributing 97 per cent of the state’s millet production. Given Assam’s susceptibility to floods and its historical preference for rice over millets, there’s a growing imperative to transition toward diversified agriculture that incorporates resilient and nutritious millets.

Director General of ICRISAT, Dr Jacqueline Hughes, lauded the partnership and hailed the Assam Millet Mission as pioneering, particularly considering the region’s limited history of millet consumption. “As the world’s largest millet producer and a driving force behind the International Year of Millets – 2023 (IYoM), India stands at the forefront of the resurgence of millets,” she added.

“ICRISAT is delighted to contribute its deep expertise in millet research to complement Assam’s visionary approach and ambitious millet consumption targets,” said, Dr Hughes.

Source: <https://agriculturepost.com/agri-research/icrisat-joins-hands-with-assam-millet-mission-to-boost-millet-production/>



AGRICULTURE

75 YEARS OF RESEARCH EXCELLENCE: CMFRI RELEASES CORPORATE MY STAMP AND POSTAL COVER



CMFRI has emerged as a leading tropical marine fisheries and mariculture research hub in the world. Presently, it runs 11 regional research centres along with 17 field centres and two Krishi Vigyan Kendras

In a momentous celebration of its 75th anniversary, The ICAR-Central Marine Fisheries Research Institute (CMFRI) has unveiled a commemorative Corporate My Stamp and special postal cover, signifying the institute's rich legacy and contributions to the field of India's marine fisheries research and development.

Sayed Rashid, IPoS, Postmaster General, Kochi officially released the stamp and cover by handing it over to Dr A Gopalakrishnan, Director of CMFRI. In the special release, 5000 sheets of stamps, each containing 12 stamps, have been made available, making them a prized collectable for philatelists and marine enthusiasts alike. The stamp's design encapsulates CMFRI's dedication to marine research, bearing the inscription '75 Years of Research Excellence' alongside the institute's logo and the image of CMFRI headquarters in Kochi.

From a humble beginning in 1947, the institute has emerged as a leading tropical marine fisheries and mariculture research hub in the world. Presently, CMFRI has 11 regional research centres all along the peninsular coast of the country at Mandapam, Visakhapatnam, Veraval, Mumbai, Chennai, Calicut, Karwar, Tuticorin, Vizhinjam, Mangalore and Digha, along with 17 field centres and two Krishi Vigyan Kendras (KVK) under its wings.

Speaking on the occasion, CMFRI Director, Dr A Gopalakrishnan said, "This is a proud moment for CMFRI. It is a testament to the institute's unwavering commitment to advancing marine fisheries and mariculture research and development for the socio-economic betterment of the coastal communities."

Source: <https://agriculturepost.com/agri-research/75-years-of-research-excellence-cmfri-releases-corporate-my-stamp-and-postal-cover/>

ICRISAT-CORTEVA JOINT RESEARCH DECODES PEARL MILLET'S CLIMATE RESILIENCE AND NUTRITIONAL SECRETS



Its remarkable ability to endure scorching temperatures, prolonged droughts, and nutrient-deprived soils, sets pearl millet apart as a top solution to bolstering global food and nutritional security

A collaboration between the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Corteva Agriscience has yielded three 'platinum-standard' genome sequences for pearl millet varieties, providing valuable insights into the crop's genetic composition.

The study, published in Nature's Communications Biology, paves the way for the development of more climate-resilient and nutritionally enhanced crops. Pearl millet, a climate-resilient grain, serves as a lifeline to over 90 million people in South Asia and sub-Saharan Africa. Its remarkable ability to endure scorching temperatures, prolonged droughts, and nutrient-deprived soils, sets pearl millet apart as a top solution to bolstering global food and nutritional security in the context of climate change.

Director General of ICRISAT, Dr Jacqueline Hughes commended the collaboration and said the transformative study would augment ICRISAT's and its partners' ability to continue progress towards the creation of crop varieties that transcend the boundaries of nutrition and climate resilience. "The benefits of these insights are not confined to pearl millet alone; they also extend to closely related cereal crops like foxtail millet, sorghum, wheat, and rice," said Dr Hughes.

ICRISAT's pioneering work in developing the initial draft genome of pearl millet in 2017 laid the foundation for the current breakthrough. Leveraging advanced technologies, scientists have meticulously pieced together the genetic puzzle, eliminating gaps in the draft genome.

Source: <https://agriculturepost.com/agri-research/icrisat-corteva-joint-research-decodes-pearl-millet-climate-resilience-and-nutritional-secrets/>



HEALTH

WHY HAVE MORE MILLETS THIS WINTER?

It is that time of the year to switch to nutritious, hearty food, and what better than millet? Here's a guide from nutrition experts on why to incorporate millets in your diet this winter



One can feel the chill in the air now that the winter season is here. It is a time to indulge in hearty, nutritious food that can help you feel more fresh. Experts opine that it is important to include more millets in your diet this season. Are you wondering why? Here's a guide.

Millets are rich in essential nutrients such as fibre, vitamins, minerals, and antioxidants. This nutrient powerhouse provides the body with sustained energy, helping you stay active and warm throughout the winter season. Dr Shwetal Gadhavi, senior consultant, preventive healthcare, HCG Hospitals, Ahmedabad said that high fibre content aids in digestion, preventing common winter woes like indigestion and constipation.

Dr Bhavna Sharma, India head, nutrition science department, ITC Limited said that during the winter season, including millets in one's diet can be a game-changer. "Millets like pearl millet (bajra), foxtail millet (kangni), and finger millet (ragi) are not just delicious but also provide warmth and nourishment," said Dr Sharma. These millets are rich in complex carbohydrates, which release energy slowly, keeping one warm and energised throughout the chilly months.

"Ragi consumption helps in maintaining good bone health, good skin health, and hair during this dry season, given high calcium and protein content. Additionally, their high fibre content aids digestion and boosts immunity, making millets the perfect choice to stay healthy and hearty during winter," said Dr Sharma.

Millets also have a low glycemic index, which means they help regulate blood sugar levels, reducing the risk of sudden spikes and crashes, mentioned Dr Gadhavi. "This is particularly important during the holiday season when sweet treats abound. Furthermore, millets are gluten-free, making them an excellent option for those with gluten sensitivities or celiac disease," added Dr Gadhavi.

Source: <https://indianexpress.com/article/lifestyle/food-wine/millets-winter-health-benefits-easy-recipe-9018557/>

RACE CANNOT BE USED TO PREDICT HEART DISEASE, SCIENTISTS SAY

The American Heart Association will release a new clinical tool that removes race as a factor in predicting who will have heart attacks or strokes.



Doctors have long relied on a few key patient characteristics to assess risk of a heart attack or stroke, using a calculus that considers blood pressure, cholesterol, smoking and diabetes status, as well as demographics: age, sex and race. Now, the American Heart Association is taking race out of the equation. The overhaul of the widely used cardiac-risk algorithm is an acknowledgment that, unlike sex or age, race identification in and of itself is not a biological risk factor.

The scientists who modified the algorithm decided from the start that race itself did not belong in clinical tools used to guide medical decision making, even though race might serve as a proxy for certain social circumstances, genetic predispositions or environmental exposures that raise the risk of cardiovascular disease.

The revision comes amid rising concern about health equity and racial bias within the U.S. health care system, and is part of a broader trend toward removing race from a variety of clinical algorithms.

"We should not be using race to inform whether someone gets a treatment or doesn't get a treatment," said Dr. Sadiya Khan, a preventive cardiologist at Northwestern University Feinberg School of Medicine, who chaired the statement writing committee for the American Heart Association, or A.H.A. The statement was published on Friday in the association's journal, *Circulation*. An online calculator using the new algorithm, called PREVENT, is still in development. "Race is a social construct," Dr. Khan said, adding that including race in clinical equations "can cause significant harm by implying that it is a biological predictor."

Source: <https://www.nytimes.com/2023/11/14/health/heart-disease-race.html#:~:text=The%20scientists%20who%20modified%20the,race%20the%20risk%20of%20cardiovascular>



HEALTH

INDIA HAD HIGHEST NUMBER OF TB CASES GLOBALLY IN 2022: WHO

According to the report, India recorded 2.8 million (28.2 lakh) TB cases in 2022, with a case fatality ratio of 12 per cent. Officials stated that “The best estimate of the number of deaths in India from TB was 3,42,000 (3,31,000 among HIV-negative people and 11,000 among those with HIV).”



India accounted for the highest number of tuberculosis (TB) cases in the world in 2022. (Representational image via Canva)

India accounted for the highest number of tuberculosis (TB) cases in the world in 2022, representing a staggering 27 percent of the global burden, as revealed by the new World Health Organization (WHO) 2023 Global TB report released on Tuesday.

Overall, 30 high burden TB countries accounted for 87 per cent of the world’s TB cases in 2022. Among the top eight high burden countries, Indonesia (10 per cent), China (7.1 per cent), the Philippines (7.0 per cent), Pakistan (5.7 per cent), Nigeria (4.5 per cent), Bangladesh (3.6 per cent), and the Democratic Republic of Congo (3.0 per cent) are included.

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The report highlights that multidrug-resistant TB (MDR-TB) remains a public health crisis, with 1.1 lakh cases recorded in India in 2022. Dr Tereza Kasaeva, Director of WHO’s Global TB Programme, pointed out a major global recovery in the number of people diagnosed with TB and treated in 2022, after two years of COVID-related disruptions.

Source: <https://indianexpress.com/article/cities/pune/india-had-highest-number-of-tb-cases-globally-in-2022-who-9018116/>

GENERIC DRUGS TO TREAT FOUR RARE DISEASES LAUNCHED

These indigenous products will lead to drug prices for rare diseases being slashed up to 100 times of their current market value



Tablets of Avigan, a drug approved as an anti-influenza drug.

Providing relief to patients with rare diseases across India, the Union Health Ministry has made available generic drugs to support the care and treatment of four ailments: Tyrosinemia-Type 1, Gauchers Disease, Wilson’s Disease, and the Dravet-Lennox Gastaut Syndrome. This means that the cost of these drugs will be slashed by anywhere between 60 and 100 times of their current market value.

The Ministry is also in the process of making available drugs for more rare diseases, including Phenylketonuria and Hyperammonemia, over the next few months. “The approvals for these drugs are awaited,” said V.K. Paul, NITI Aayog’s member with expertise on health issues. He added that this initiative would also result in patients’ costs dropping from crores annually to mere lakhs. Additionally, a sickle cell disease drug formulation will now be made available for children.

A rare disease is a health condition of particularly low prevalence that affects a small number of people. It collectively afflicts 6-8% of the population in any country at any given time, so India could have 8.4 crore to 10 crore such cases, according to the Ministry. Nearly 80% percent of these diseases are genetic in nature.

Priority diseases

“To bring in these drugs a special initiative was taken, and discussions were held with academia, pharma industries, organisations, the Drug Controller, and the Department of Pharmaceuticals. Thirteen rare diseases were prioritised. We particularly worked on sickle cell disease, and on the syrup for children under five who can’t be administered tablets,” said Health Minister Mansukh Mandaviya.

Source: <https://www.thehindu.com/sci-tech/health/four-generic-made-in-india-drugs-to-treat-rare-diseases-offer-relief-for-patients-more-in-pipeline/article67570839.ece>



HEALTH

INDIAN IMMUNOLOGICALS LAUNCHES MEASLES AND RUBELLA VACCINE FOR CHILDREN

Developed in partnership with Polyvac Institute of Vietnam, IIL launched Mabella vaccine as part of the 25th celebrations of Human Biologicals Institute



Indian Immunologicals MD K.Anand Kumar and others at the 25th celebrations of Human Biologicals Institute (HBI)

Vaccine maker Indian Immunologicals (IIL) has launched measles and rubella vaccine Mabella for children.

A live-attenuated MR vaccine developed in an exclusive partnership with Polyvac Institute of Vietnam, Mabella was launched as part of the 25th celebrations of the IIL division Human Biologicals Institute (HBI) in Udhamandalam (Ooty), Tamil Nadu.

The vaccine has been proven to be safe and effective through extensive human clinical trials. The launch addresses the urgent need for control of deadly measles and rubella that claim about one lakh lives of children globally, IIL said.

In a release on the work of the division that was established in 1998, the vaccine maker said HBI, in the same year, had indigenously developed the country's "first safe vero-cell rabies vaccine Abhayrab [thus] paving way for the government of India to phase out the painful nerve tissue vaccine. Abhayrab today is the largest selling anti-rabies vaccine in the world." Subsequently, HBI introduced a number of vaccines for children such as DPT, Pentavalent Vaccine, TT, Hepatitis-B MR and Td.

Speaking on the occasion, IIL managing director K.Anand Kumar said the company had emerged as one of the largest suppliers of human vaccines to the universal immunisation programme of the Centre. Deputy MD Priyabrata Pattnaik said IIL has adequate infrastructure to meet the national requirements.

Source: <https://www.thehindu.com/sci-tech/health/indian-immunologicals-launches-measles-and-rubella-vaccine-for-children/article67573084.ece>

WHY DRINKING COFFEE TWICE A DAY CAN PROTECT YOUR LIVER

As studies prove the complementary role of coffee in reducing the risk of NAFLD, Dr Priyanka Rohatgi, Chief Nutritionist, Apollo Hospitals, explains its benefits.



In recent years, coffee has emerged as a surprising ally in the battle against non-alcoholic fatty liver disease.

In recent years, coffee has emerged as a surprising ally in the battle against non-alcoholic fatty liver disease (NAFLD), a condition marked by the accumulation of fat in the liver unrelated to excessive alcohol consumption.

Research studies have unveiled a promising link between coffee consumption and a reduced risk of developing NAFLD, shedding light on the multifaceted benefits it offers for liver health. The liver, a vital organ responsible for various metabolic processes, is susceptible to damage from factors such as poor diet, obesity and sedentary lifestyles, which contribute to the onset and progression of NAFLD. Amidst this health landscape, coffee stands out as a potential shield, exhibiting several mechanisms that positively influence liver function and combat NAFLD.

How does coffee shield the liver?

One of coffee's key components, caffeine, stimulates the central nervous system and triggers numerous biological responses. It enhances the breakdown of fat by activating enzymes involved in fat metabolism. By doing so, it potentially prevents the accumulation of fat within liver cells, thwarting the progression of NAFLD. Furthermore, caffeine stimulates bile production, aiding in the digestion of fat and facilitating its excretion from the body, thereby alleviating the burden on the liver.

However, caffeine alone doesn't account for coffee's full therapeutic potential for liver health. Antioxidants, notably chlorogenic acids and polyphenols, abundant in coffee beans, exhibit potent anti-inflammatory and antioxidant properties. These compounds scavenge harmful free radicals, reducing oxidative stress and inflammation in liver tissues—two critical factors implicated in the progression of NAFLD.

Source: <https://indianexpress.com/article/health-wellness/why-drinking-coffee-twice-a-day-can-protect-your-liver-9034043/>



S&T COOPERATION FOR GLOBAL SOUTH

INDIA, BHUTAN AGREE TO EXTEND ENERGY PARTNERSHIP TO NON-HYDRO RENEWABLES

The statement said that India and Bhutan enjoy long-standing and exceptional bilateral ties characterized by utmost trust, goodwill, and mutual understanding at all levels



Bhutan King Jigme Khesar Namgyel Wangchuck Met Prime Minister Narendra Modi

India and Bhutan on Monday agreed to extend the existing energy partnership to non-hydro renewables such as solar as well as green initiatives for hydrogen, with Prime Minister Narendra Modi reaffirming India's abiding commitment to its unique ties of friendship and cooperation with the neighbouring country.

Bhutan King Jigme Khesar Namgyel Wangchuck, who is on a visit to India, met Prime Minister Narendra Modi in Delhi on 6th November 2023. A joint statement issued during the Bhutan King's visit said that the two leaders held discussions on the entire gamut of bilateral cooperation and regional and global issues of mutual interest.

The visit provided an opportunity for the two sides to discuss various aspects of the multi-faceted bilateral ties and forge an understanding to further cooperate across diverse sectors. The two leaders expressed satisfaction with the significant progress made since their last meeting in April 2023. They positively assessed the expanding partnership between the two countries, including in new areas of connectivity in its broadest form, cross-border trade infrastructure, trade and mutual investments, energy, health, education, skill development, space technology, and environment conservation, and close people-to-people contacts..

Source: https://www.business-standard.com/world-news/india-bhutan-agree-to-extend-energy-partnership-to-non-hydro-renewables-123110601424_1.html

INDIA INVITES GLOBAL SOUTH TO JOIN BIOFUEL ALLIANCE

India has extended an invitation to countries in the Global South to join the recently inaugurated Global Biofuels Alliance. The announcement was made on 17th November 2023, underlining India's willingness to share its expertise in biofuels with developing and less developed nations. The Global Biofuels Alliance was launched during the Group of 20 leaders meeting in September, aiming to collectively reduce emissions in the transportation and industrial sectors.



India on 17th November 2023 invited Global South to join the recently launched Global Biofuels Alliance, saying it is willing to share its expertise with developing and less developed nations. A global alliance for promoting biofuels was launched at the Group of 20 leaders meeting in September with a view to reducing emissions in the transportation and industrial sectors.

The Global Biofuel Alliance, which includes top producers Brazil and the US, will help build the worldwide market for trade in biofuel, which is obtained from biomass.

Speaking at the 2nd Voice of Global South Summit, Honourable Minister for Petroleum & Natural Gas Hardeep Singh Puri said India achieved the target of mixing 10 per cent ethanol in petrol in May 2022, five months ahead of the deadline, and has advanced the deadline for doping 20 per cent ethanol in petrol by five years to 2025.

Turning biomass into fuel helped the world's third largest energy consumer provide an additional source of income for farmers as well as cut emissions.

The Global Biofuels Alliance is a multi-stakeholder alliance of governments, international organisations and industries which is intended to expedite global uptake of biofuels. The alliance presently has 22 member countries and 12 international organisations and is continuously expanding.

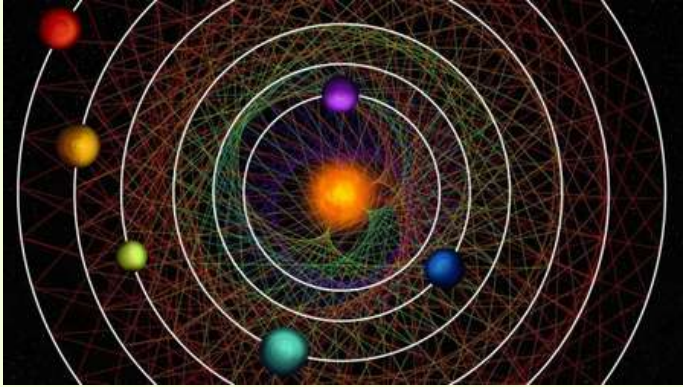
Source: https://economictimes.indiatimes.com/industry/renewables/india-invites-global-south-to-join-biofuel-alliance/articleshow/105297480.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst



OTHERS

SCIENTISTS DISCOVER RARE SYSTEM WITH 6 PLANETS ORBITING IN SYNC

Astronomers have for the first time in history found a 6-planet system that is in "orbital resonance."



Artist's impression of six planets orbiting a star in resonance. Roger Thibaut (NCCR PlanetS)

Astronomers have discovered an exceptionally rare phenomenon in a nearby star system — six planets that orbit their central star in sync with a rhythm. The planets move around in a pattern so precise that it can be set to music. The six planets orbit a star called HD110067, which is about 100 light-years away from the Earth in the northern constellation of Coma Berenices. NASA's Transiting Exoplanet Survey Satellite (TESS) in 2020 detected the star's brightness dipping, indicating that planets were passing in front of it.

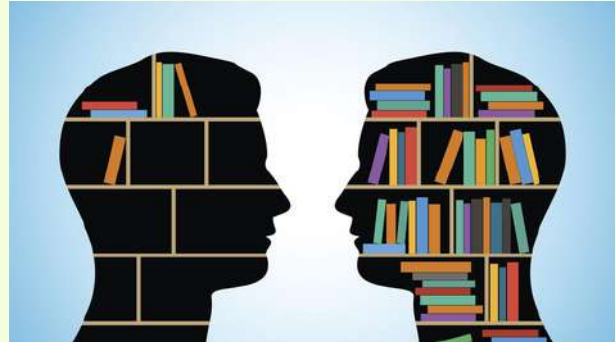
A team of researchers combined data from TESS and the European Space Agency's (ESA) Cheops (CHaracterising ExOPlanet Satellite) and ended up discovering a planetary configuration that had never been seen before. Multiplanet systems may be common in our galaxy, but ones in a tight gravitational formation known as "resonance" are rarely observed.

In this particular case, the planet closest to the star makes three orbits for every two of the next planet. This is called a $3/2$ resonance and is repeated among the four closest planets. Among the two outermost ones, a $4/3$ resonance pattern was identified, meaning that one takes four orbits for every three of the outermost one. Such "orbitally resonant" systems are quite important because they tell astronomers about the formation and evolution of planetary systems. Typically, planets around stars tend to form in resonance, but that can easily be disturbed.

For example, a very massive planet or a close encounter with a passing star or even a giant impact can all disrupt a planetary system that was once in balance. Due to this, many multiplanet systems are not in resonance, but they are close enough that they look like they may once have been in resonance.

Source: <https://indianexpress.com/article/technology/science/6-planet-orbit-resonance-9048426/>

HOW DOES OUR BRAIN LEARN TO READ?



It is estimated that half the people of the world can speak more than one language. In South India, a large percentage of the population is conversant in at least two languages. Thanks to a high rate of literacy, many of them can read and write in those languages too. We humans know a great deal about the languages of the world, and the scripts that they are written in. But we still have a lot to learn about how our brains read and comprehend languages.

The process of learning to read begins with getting acquainted with the letters of the alphabet and understanding how they produce sounds. As reading skills develop, children become increasingly adept at perceiving letter sounds and how these come together to form words. Eventually this becomes a subconscious action. Research has indicated that this progress is aided by the development of the visual word form area (VWFA) in the brain, which is formed in the part of the brain that is responsible for recognizing visual signals such as facial features and objects. With only a few months of education, this portion of the cortex is able to recognize the script that has been learned. When someone speaks multiple languages, patches of the VWFA are dedicated to recognising each language.

Source: <https://www.thehindu.com/sci-tech/science/how-does-our-brain-learn-to-read/article67570098.ece>



OTHERS

THIS SEA WORM'S 'BUTT' SWIMS AWAY TO REPRODUCE. NOW, RESEARCHERS KNOW WHY

The mystery of how some sea worms' rear ends swim away independently to mate has perplexed scientists for decades. Now, we might have an answer.



A mature *Megasyllis nipponica* with a developing female stolon. (University of Tokyo)

Truth can be stranger than fiction, especially when it comes to the animal kingdom. Some annelid worms or segmented worms reproduce with a process called stolonisation, where the posterior part of their body with reproductive parts detach from the original body. That detached part is called the stolon, and it swims around by itself and spawns when it meets the opposite sex.

For it to be able to swim by itself, it needs to develop its own eyes, antennae and swimming bristles while still attached to the original body. But that has been perplexing scientists for quite a while—how does the “stolon head” form in the middle of the original body?

To study that, researchers investigated the developmental gene expression patterns of sexually maturing worms. Typically, “head formation genes” are not expressed as much in the middle of the body. But when the worms' reproductive parts develop, those genes are highly expressed in the middle of the rear end of the original body.

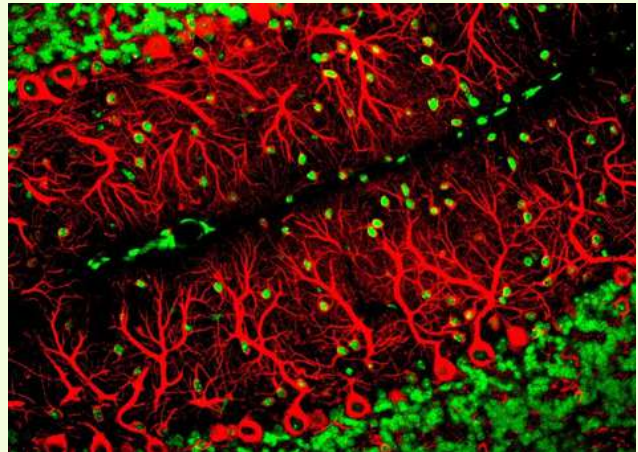
“Hox genes” determine the body segmentation along the worms' bodies. The researchers initially thought that these genes would be expressed differently along the “anterior-posterior” axis.”

“Interestingly, the expressions of Hox genes that determine body-part identity were constant during the process,” said Miura, co-author of a paper published in the journal *Scientific Reports*, in a press statement. As a result, the stolons don't have a differentiated digestive tract and have repeated uniform body segments (except for the head and tail). “This indicates that only the head part is induced at the posterior body part to control spawning behavior for reproduction.”

Source: <https://indianexpress.com/article/technology/science/sea-worm-butt-swims-away-9041765/>

THE HUMAN BRAIN HAS A DIZZYING ARRAY OF MYSTERY CELLS

Researchers identified some 3,300 types of brain cells, an order of magnitude more than was previously known, and have only a dim notion of what most of them do.



Purkinje cells, one of the main types of nerve cells contained in the brain. Scientists have known since the 1830s that the brain was made up of different types of cells.

An international team of scientists has mapped the human brain in much finer resolution than ever before. The brain atlas, a \$375 million effort started in 2017, has identified more than 3,300 types of brain cells, an order of magnitude more than was previously reported. The researchers have only a dim notion of what the newly discovered cells do.

The results were described in 21 papers published on Thursday in *Science* and several other journals. Ed Lein, a neuroscientist at the Allen Institute for Brain Science in Seattle who led five of the studies, said that the findings were made possible by new technologies that allowed the researchers to probe millions of human brain cells collected from biopsied tissue or cadavers.

“It really shows what can be done now,” Dr. Lein said. “It opens up a whole new era of human neuroscience.” Still, Dr. Lein said that the atlas was just a first draft. He and his colleagues have only sampled a tiny fraction of the 170 billion cells estimated to make up the human brain, and future surveys will certainly uncover more cell types, he said.

Biologists first noticed in the 1800s that the brain was made up of different kinds of cells. In the 1830s, the Czech scientist Jan Purkinje discovered that some brain cells had remarkably dense explosions of branches. Purkinje cells, as they are now known, are essential for fine-tuning our muscle movements.

Source: <https://www.nytimes.com/2023/10/12/science/human-brain-cells-atlas.html#:~:text=Researchers%20identified%20some%203%2C300%20types,what%20most%20of%20them%20do.&text=Sign%20up%20for%20Science%20Times.cosmos%20and%20the%20human%20body>