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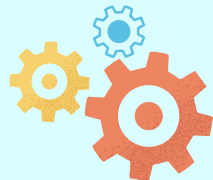


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SCIENCE & TECHNOLOGY

INDIAN SCIENTISTS MAKING HIGH-PURITY POLYSILICON INGOTS FROM RECYCLED PV CELLS

Indian scientists have produced high-purity polysilicon ingots from recycled solar cells using “spark plasma sintering” (SPS), and claim they may achieve a purity level comparable to commercially available products.

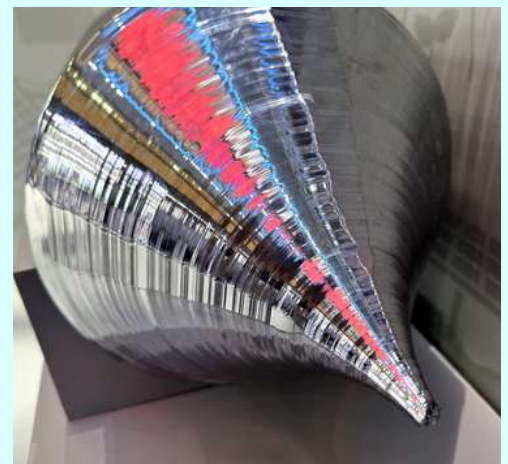
Researchers at the Academy of Scientific and Innovative Research (AcSIR) and the CSIR-National Physical Laboratory, New Delhi, in India have used the SPS technique to produce polysilicon ingots from recycled solar cells in end-of-life PV modules. They claim to have produced small-sized ingots with purity levels of 98% to 99%.

These purity levels slightly exceed the 3N purity level, which the scientists say is greater than that of metallurgical-grade silicon. It is also “good enough” for applications other than solar cells, like battery materials.

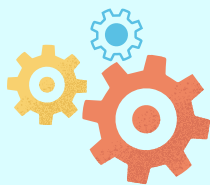
“Currently, we are working towards the purification process of recovered silicon to grow ingot better than 5N, so that same can be used in the fabrication of new solar cells,” researcher Sushil Kumar told pv magazine. “This work is expected to be completed in the next few months.”

The scientists used a modified hot pressing technology known as SPS, involving the passage of pulsed direct current with millisecond pulse widths, high current, and low voltage through the pressing tool and sintered body. This approach enables rapid heating and short processing times, typically within a few minutes. The researchers specifically applied this technique to consolidate the silicon powder obtained from the recycled solar cells.

Source: <https://www.csir.res.in/sites/default/files/2023-10/16%20To%2020%20September%202023.pdf>

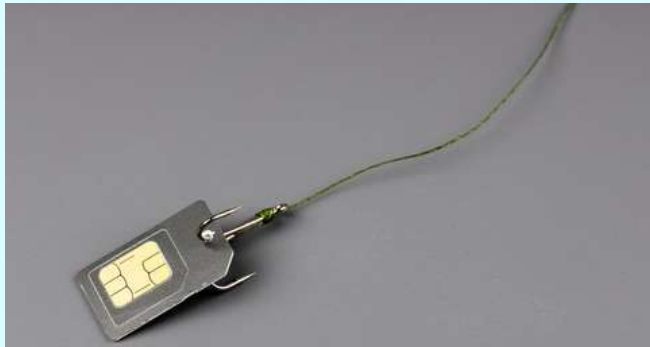


Polysilicon ingot



HOW DO SIM CARDS WORK?

SIM cards are the ID cards of the cellular world, and they have evolved in step with cellular networks.



In 2021, there were more than 14 billion cellular devices in the world even though there were only 7 billion people. The ubiquity of these devices – but especially smartphones – has come to define the contemporary era together with climate change, antimicrobial resistance, and war. But for smartphones' outsize mark on history, one essential component of theirs has flown somewhat under the radar: the SIM card.

What is a SIM card?

'SIM' stands for 'subscriber identification module'. Specifically, it is an integrated circuit, or a microchip, that identifies the subscriber on a given network.

Imagine each cellular network is a city whose residents are identified by a number, called the international mobile subscriber identity (IMSI), and their locations by some data. The SIM card is a subscriber's ID card in this city. When someone wishes to contact a subscriber in this city, the network uses the subscriber's SIM card to find them and confirm their identity.

In order for a mobile phone to connect to any cellular network that follows the Global System for Mobile Communications (GSM) standard, a SIM card is mandatory. This relationship is established using a unique authentication key – a piece of data that a user needs to 'unlock' access to the network. Every SIM card stores this data and it is designed such that the user can't access it through their phone. Instead, signals sent by the phone into the network are 'signed' by the key, and the network uses the signature to understand whether the phone's connection is legitimate. It is possible to duplicate a SIM card by accessing its key and storing it in multiple cards.

Source: <https://www.thehindu.com/sci-tech/science/how-sim-cards-work-explained/article67453370.ece>

WHAT IS MULTIMODAL ARTIFICIAL INTELLIGENCE AND WHY IS IT IMPORTANT?

In multimodal systems, users can engage with AI in several ways

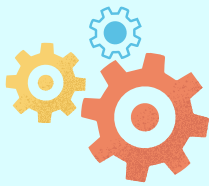


For anyone curious about what the next frontier of AI models would look like, all the signs are pointing towards multimodal systems, where users can engage with AI in several ways. People absorb ideas and form context by drawing meaning from images, sounds, videos and text around them. A chatbot, even though it can write competent poetry and pass the U.S. bar, hardly matches up to this fullness of cognition. If AI systems are to be as close a likeness of the human mind as possible, the natural course would have to be multimodal.

A new race opens up

As another good old tech race shapes up, leading AI companies are already playing catchup. On September 25, ChatGPT-maker OpenAI announced that it had enabled its GPT-3.5 and GPT-4 models to study images and analyse them in words, while its mobile apps will have speech synthesis so that people can have full-fledged conversations with the chatbot. The Microsoft-backed company had promised multimodality in March, during the release of GPT-4 and kept the addition on the backburner. However, the company has rushed the release after a report by The Information revealed that Google's new yet-to-be-released multimodal large language model called Gemini, was already being tested in a bunch of companies.

Source: <https://www.thehindu.com/sci-tech/technology/what-is-multimodal-artificial-intelligence-and-why-is-it-important/article67401139.ece>



SCIENCE & TECHNOLOGY

IIT MANDI, DBT-INSTEM BENGALURU SCIENTISTS FIND HOW DENGUE MOSQUITO EGGS ARE SO HARDY

The research could pave way for for innovative mosquito control methods, potentially reducing disease transmission



Researchers from the Indian Institute of Technology (IIT) Mandi and the Institute for Stem Cell Science and Regenerative Medicine (inStem) in Bengaluru have discovered the biochemical processes that enable the eggs of the dengue causing mosquito to survive harsh conditions and rejuvenate when favourable conditions return.

The research could potentially aid the battle against mosquito-borne diseases by enabling more effective vector-control measures.

The details of the research have been published in the journal PLOS Biology. The paper was co-authored by Baskar Bakthavachalu, assistant professor, School of Biosciences and Bioengineering, IIT Mandi, along with Anjana Prasad, Sreesa Sreedharan, and Sunil Laxman from DBT-inStem. Karnataka has been facing a dengue outbreak, with 11,576 cases this year as of October. Bengaluru recorded the highest number of cases in the State, with 6,093 cases over the same period.

Mosquitoes, viral vectors for various diseases, deposit their eggs in water, where they hatch. The eggs of dengue and zika-carrying Aedes mosquitoes can endure extended periods without water, akin to plant seeds patiently waiting for germination in the absence of moisture. Despite the knowledge of this phenomenon, the molecular reasons behind the desiccation tolerance and post-rehydration survival remained a mystery until now.

Source: <https://www.thehindu.com/sci-tech/science/researchers-from-iit-mandi-and-dbt-instem-bengaluru-unveil-biochemistry-behind-resilience-of-dengue-mosquito-eggs/article67458358.ece>

IISC RESEARCH UNCOVERS LINK BETWEEN CELL BIOMECHANICS AND WOUND HEALING

Inefficient wound healing results in tissue fibrosis, a process that can cause scar formation and may even lead to conditions like cardiac arrest, said IISc



The Indian Institute of Science, Bengaluru

An interdisciplinary team of researchers from the Indian Institute of Science have uncovered how the stiffness of a cell's microenvironment influences its form and function. The findings are expected to provide a better understanding of what happens to tissues during healing of wounds.

Scar formation

“Inefficient wound healing results in tissue fibrosis, a process that can cause scar formation and may even lead to conditions like cardiac arrest. Changes in the mechanical properties of tissues like stiffness also happen in diseases like cancer,” IISc said.

The research team was led by Prof. Namrata Gundiah from the Department of Mechanical Engineering and Prof. Paturu Kondaiah from the Department of Developmental Biology and Genetics. Change in stiffness

In the study, published in Bioengineering, the team cultured fibroblast cells, the building blocks of our body's connective tissue, on a polymer substrate called PDMS with varying degrees of stiffness.

They found that a change in the stiffness altered the cell structure and function. Fibroblast cells are involved in extensive remodelling of the extracellular matrix (ECM) surrounding biological cells.

Source: <https://www.thehindu.com/sci-tech/science/iisc-research-uncovers-link-between-cell-biomechanics-and-wound-healing/article67457835.ece>



ENVIRONMENT

DRAGONFLY: THE FACES OF WETLANDS IN INDIA

The Dragonfly Festival, being conducted across 11 States in India by WWF India in collaboration with other organisations, aims to create awareness for the conservation of these insects



Rhyothemis triangularis captured by David Raju as part of the Dragonfly Festival.

The world over as the threat of depleting wetlands loom large, it has had a cascading effect on one of the most enigmatic species of the insect world – the dragonflies and damselflies. Scientific studies say that these tiny lesser-known species are under threat and plummeting in numbers. To closely examine the population trend of odonates (an order of flying insects that includes the dragonflies and damselflies), a multi-pronged, long-term approach is required for the conservation of these important indicator species.

In cities across India, a number of organisations and individuals have embarked on a journey to document the dragonflies and damselflies during the Dragonfly Festival. Initiated by WWF-India in partnership with Bombay Natural History Society, India Biodiversity Portal, Indian Dragonfly Society and other like-minded partners, the Dragonfly Festival is a citizen science movement that has been running for the past five years.

The sixth edition of the festival is happening across 11 States such as Tamil Nadu, Kerala, Telangana, West Bengal, Madhya Pradesh and Assam. The festival will continue till December with a line-up of events planned in the weeks ahead. “The festival demystifies dragonflies and damselflies and celebrates their role in keeping our environment healthy,” says Farida Tampal, State Director, WWF India, Hyderabad office. Started in the last week of September, the Dragonfly Festival aims at involving children, youth and citizen through various on-ground and digital activities like expert talks, workshops and citizen science surveys.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/dragonfly-the-faces-of-wetlands-in-india/article67383106.ece>

WHY INDIA IS LAUNCHING A NATIONAL FRAMEWORK FOR CLIMATE SERVICES

Spearheaded by the IMD, the National Framework for Climate Services will allow India to meet the ever rising challenges posed by climate change.



What the NFCS is based on

The Global Framework for Climate Services (GFCS) is a partnership of governments and organisations at a global level, for the production and better usage of climate information and services. The GFCS aims to facilitate researchers and users of climate information and services to join hands in order to make informed and actionable decisions for the long-term betterment.

The announcement to establish a GFCS was made during the third World Climate Conference held in Geneva in 2009. This framework, led by National Meteorological and Hydrological Services (NMHS) in their respective nations, includes active participation of policymakers, planners, investors and vulnerable communities or sectors, as they need climate information and services in a user-friendly format, so that they can prepare for expected trends and changes in the long run.

GFCS envisages to generate high-quality data from national and international databases on temperature, rainfall, wind, soil moisture and ocean conditions and other vital weather parameters. This is aimed at creating long-term historical averages of these parameters, as well as maps, risk and vulnerability analyses, assessments and long-term projections and scenarios.

The five major components under GFCS are Observations and Monitoring, Research, Modelling and Prediction, Climate Services Information System, User Interface Platform and Capacity Building. At present, the priority sectors where the GFCS focuses upon are agriculture and food security, energy, health, water and disaster risk reduction.

Source: <https://indianexpress.com/article/explained/explained-climate/national-framework-for-climate-services-nfcs-8972568/>



ENVIRONMENT

CMFRI CALLS FOR CLIMATE SMART VILLAGES TO CHECK RISKS IN COASTAL REGION



ICAR-Central Marine Fisheries Research Institute has suggested the setting up of climate smart villages to check risks in the coastal region. The institute is prioritising the development of climate smart villages by providing training and resources to fishers and farmers in vulnerable villages to help them adapt to the climate crisis.

The challenges from climate change range from flooding and shoreline changes to disease outbreaks. Water clinics, AI and satellite remote sensing-based prediction of harvest to address inter-annual fluctuations, species distribution models and exploration of untapped deep-sea resources are some of the other solutions from the CMFRI. The CMFRI report was presented at a global conclave on mainstreaming climate change into international fisheries governance organised under the leadership of the Food and Agriculture Organisation in collaboration with the Union Department of Fisheries and the Bay of Bengal Programme Inter-Governmental Organisation in Chennai, said a press release here.

The report pointed out that increased frequency of cyclones, subsequent storm surges and coastal flooding were causing social and economic hardships among coastal communities, making them the most vulnerable to climate emergencies. Tropical cyclones, floods, excess rainfall and receding coastline have a cascading impact on fishers' safety and livelihoods, resulting in loss of income, loss of property, health problems and unemployment, said Grinson George, head of the Marine Biodiversity Management and Environment Division of the CMFRI while presenting the report at the conclave. Water clinics to tackle disease outbreaks, smart solutions like integrated multi-trophic aquaculture, seaweed farming and mangrove forestation were also suggested by the CMFRI.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/cmfri-calls-for-climate-smart-villages-to-check-risks-in-coastal-region/article67449226.ece>

ECO-RESTORATION PROJECT COVERS ANAMUDI SHOLA NATIONAL PARK AREA IN MUNNAR WITH NATURAL GRASSLANDS

Munnar Wildlife Division has converted a park filled with exotic species of trees into 50 hectares of forest land, encouraging wildlife presence and food and water for animals in an anticipatory step towards curbing human-animal conflict.



A view of the natural grassland at Pazhathottam in Anamudi Shola National Park in Idukki

From a stark burnt-out land, the Pazhathottam area in Anamudi Shola National Park, near Munnar, in Idukki has transformed into a green heaven teeming with life, thanks to an initiative by the Forest department.

The area stands as an example of how an eco-restoration project could help grow natural grasslands and ensure proper food for wild animals. Munnar Wildlife Division converted a park filled with exotic species of trees into 50 hectares of forest land. The project was implemented through the United Nations Development Programme (UNDP). It was started in 2019 and completed in 2022.

“As part of the project, exotic species were cleared from the forest land, and natural grass was planted. Within months, the area was converted into a natural grassland. After changing the area to a natural grassland, the area once again saw the presence of Bison and other wild animals. Now, Nigiri Pipit and such birds are regular visitors in the area, and often, wild elephants arrive here. After the restoration, natural streams in the area were also revived. It also ensures water security in the summer season in the Chilantiyar area that is downstream the Pazhathottam region,” Munnar Wildlife Warden S.V. Vinod said.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/eco-restoration-project-covers-anamudi-shola-national-park-area-in-munnar-with-natural-grasslands/article67318532.ece>



ENVIRONMENT

IN ALARM OVER CONOCARPUS TREES, ECHO OF FAULTY POLICIES ON INVASIVE EXOTICS

Suresh Babu, Professor at the School of Human Ecology and Director of the Centre for Urban Ecology and Sustainability at Dr B R Ambedkar University, Delhi, provides insights on the selection of plant species employed in greening projects in India.



Leaves of the Leucaena leucocephala, which dots the landscape of cities like Delhi, is an example of an invasive species

Concerns over the management of the invasive Conocarpus species of trees have recently led Gujarat and, last year, Telangana, to ban their use. Several other states could follow suit — which is likely to discourage horticulturists and nurseries from multiplying the species and using lakhs of its saplings in afforestation and landscaping projects across the country over the next year.

This has brought fresh attention to the process of selection of species in urban landscaping projects in particular, which favours the use of exotics for beautification and greening. The Indian Express spoke to Suresh Babu, Professor at the School of Human Ecology and Director of the Centre for Urban Ecology and Sustainability at Dr B R Ambedkar University, Delhi, for insights on the matter. Problem with exotic plant species

It has been shown repeatedly that many species that were introduced to India previously for greening or ornamental projects eventually turned invasive. Native species that failed to compete for space and soil resources were driven to extinction, and significant costs were incurred to ensure the management of the invasive species. The list of these species is long — among the notable stories are those of Eucalyptus, Prosopis juliflora (vilayati kikar), Acacia mangium, and Lantana camara — and they continue to be used until considerable focus is brought on to their invasive characteristics.

Source: <https://indianexpress.com/article/explained/explained-climate/expert-explains-gujarat-conocarpus-trees-invasive-plants-8964032/>

EARTH IS NOW WELL OUTSIDE OF THE SAFE OPERATING SPACE FOR HUMANITY'

A new study has found that most of the planetary boundaries have been breached because of human activities. Katherine Richardson, professor of biological oceanography at the University of Copenhagen and lead author of the study, answers five questions about planetary boundaries and their significance.



The hall of historic Waiola Church in Lahaina and nearby Lahaina Hongwanji Mission are engulfed in flames along Waianai Street on August 8, 2023, in Lahaina, Hawaii

Six out of nine planetary boundaries that make Earth healthy and habitable have been transgressed due to human activities like greenhouse gas emissions and deforestation, according to a new study.

The broken boundaries mean the planet's life-support systems have been driven far away from the safe operating space for humanity that existed during the period between the last ice age (about 10,000 years ago) and the start of the Industrial Revolution. This period was characterised by relatively stable and warm planetary conditions.

The analysis, 'Earth beyond six of nine planetary boundaries', has been carried out by a team of 29 scientists and recently published in the journal Science Advances. In an interview with The Indian Express over email, Katherine Richardson, professor of biological oceanography at the University of Copenhagen (Denmark) and lead author of the study, explains what planetary boundaries are, what is the significance of the study's findings, and if there is still time to reverse the damage done to the Earth system — the interacting physical, chemical, and biological processes. Below are the edited excerpts.

Source: <https://indianexpress.com/article/explained/explained-climate/earth-planetary-boundaries-breached-expert-explains-8953339/>



AGRICULTURE

WHAT THE GI TAG CAN MEAN FOR THE CASHEW INDUSTRY IN GOA

How did cashew come to Goa, and how did it become a major contributor to its economy? What challenges were cashew producers facing recently, and how will the GI tag help them?



Cashew apples being squashed in Chorao, Goa.

Goa Chief Minister Pramod Sawant hailed the recognition as a great opportunity for the cashew industry in the state and “a milestone towards Swayampurna Goa mission”. In a post on X, formerly Twitter, Sawant said, “Goan cashew has a long and cherished heritage and this GI status helps to preserve our legacy.” A GI tag is conferred upon products originating from a specific geographical region, signifying unique characteristics and qualities. Essentially, it serves as a trademark in the international market. It is given by the Geographical Indications Registry in Chennai.

What does the GI tag mean for the cashew industry in Goa?

Cashew manufacturers and processors in Goa said they hoped the GI tag would help consumers differentiate between authentic Goan cashews and cashews sourced from outside the state, which are often marketed as ‘Goan cashews’. The application for the GI tag for the Goan cashew — derived from the Portuguese name ‘caju’ or ‘kaju’ in Konkani — was filed by the Goa Cashew Manufacturers’ Association (GCMA), with the Department of Science, Technology and Waste Management, Government of Goa, acting as facilitator.

Deepak Parab, nodal officer, patent facilitation centre at the State Council for Science and Technology, said, “Goan cashew will come with the GI logo. Traders cannot use Goa cashew logo on the packets without registration. The government will take steps to promote it.”

Source: <https://indianexpress.com/article/explained/goan-cashew-gets-gi-tag-how-this-can-help-the-industry-in-the-state-8978577/>

CORTEVA, ICRISAT, ICAR RESEARCH PROJECT ACHIEVES MILESTONE BY RESEQUENCING PEARL MILLET GENOMES



The innovative approach has led to the development of new molecular markers, opening the door to creating millet cultivars with exceptional yield performance and improved nutritional quality

In an era marked by growing global population and climate change concerns, a collaborative research project between Corteva Agriscience, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and the Indian Council of Agricultural Research (ICAR) was undertaken. The research has achieved a significant milestone by resequencing pearl millet genomes. This innovative approach has led to the development of new molecular markers, opening the door to creating millet cultivars with exceptional yield performance and improved nutritional quality.

Until now, the world of millet lacked reliable DNA markers. However, with this collaboration, three high-quality platinum-grade genome assemblies have emerged, representing the active global breeding germplasm. This remarkable achievement represents a 7000-fold improvement over previously published data. These newly identified DNA markers provide an invaluable roadmap for enhancing pearl millet productivity on a global scale, with far-reaching implications for addressing food security challenges.

At this pivotal juncture, the timing of this research is particularly important, given the recent G20 conversations on finding solutions to address food security and nutritional security, with millets being recognised as a key crop due to their exceptional nutrition and climate resilience. Moreover, with 2023 being recognised as the International Year of Millets by the United Nations General Assembly, further underscores the importance of millets in the face of global climate change.

Source: <https://agriculturepost.com/agri-research/corteva-icrisat-icar-joint-research-project-achieve-milestone-by-resequencing-pearl-millet-genomes/>



AGRICULTURE

GOVERNMENT OF INDIA NOTIFIES THE SETTING UP OF NATIONAL TURMERIC BOARD



The Government of India on 4th October 2023 notified the constitution of the National Turmeric Board. The National Turmeric Board will focus on the development and growth of turmeric and turmeric products in the country, Ministry of Commerce & Industry, Government of India.

The National Turmeric Board will provide leadership on turmeric-related matters, augment the efforts, and facilitate greater coordination with the Spices Board and other Government agencies in the development and growth of the turmeric sector. “There is significant potential and interest worldwide in the health and wellness benefits of turmeric, which the Board will leverage to further increase awareness and consumption, develop new markets internationally to increase exports, promote research and development into new products, and develop our traditional knowledge for value-added turmeric products. It will especially focus on capacity building and skill development of turmeric growers for harnessing greater benefits out of value addition. The Board will also promote quality and food safety standards and adherence to such standards. The Board will also take steps to further safeguard and usefully exploit turmeric’s full potential for humanity.”

The activities of the Board will contribute towards greater well-being and prosperity of the turmeric growers through their focussed and dedicated attention to the sector and the larger value addition closer to the farms, which would provide better realisation to the growers for their produce. The Board’s activities in research, market development, increasing consumption, and value addition will also ensure that growers and processors continue to maintain their pre-eminent position in the global markets as exporters of high-quality turmeric and turmeric products, the ministry informed.

Source: <https://agriculturepost.com/agribusiness/government-of-india-notifies-the-setting-up-of-national-turmeric-board/>

GOVT LAUNCHES AI CHATBOT FOR PM-KISAN SCHEME

The ministry said in a statement that the AI chatbot launch marks a “significant” step towards enhancing the efficiency and reach of the PM-KISAN scheme, while providing the farmers with “prompt, clear and accurate” responses to their queries.



The Ministry of Agriculture and Farmers’ Welfare on Thursday launched an AI chatbot — the first of its kind to be integrated with a major flagship scheme of the central government — for the PM-KISAN scheme.

The AI chatbot was launched by Kailash Choudhary, Minister of State for Agriculture and Farmers’ Welfare, in presence of Agriculture Secretary Manoj Ahuja and Additional Agriculture Secretary Pramod Meherda. During the event, Meherda gave a detailed presentation on features of the chatbot and how it is beneficial for the farmers.

The ministry said in a statement that the AI chatbot launch marks a “significant” step towards enhancing the efficiency and reach of the PM-KISAN scheme, while providing the farmers with “prompt, clear and accurate” responses to their queries.

“It has been developed and improved with the support of EkStep foundation and Bhashini. The introduction of the AI Chatbot in the PM-KISAN grievance management system is aimed at empowering farmers with a user-friendly and accessible platform. In the first phase of the development, the AI Chatbot will assist farmers in seeking information related to their application status, payment details, ineligibility status and other scheme-related updates... The AI Chatbot, accessible through the PM-KISAN mobile application, is integrated with Bhashini which offers multilingual support, catering to the linguistic and regional diversity of the PM-KISAN beneficiaries. This integration of advanced technology will not only enhance transparency but also empower farmers to make informed decisions,” it added.

Source: <https://indianexpress.com/article/india/govt-launches-ai-chatbot-for-pm-kisan-scheme-8950725/>



AGRICULTURE

HIGHER ACADEMIC INSTITUTIONS AGREE ON FORMING INDIA'S FIRST HEIS-LED AGRI-CONSORTIUM



An in-principal framework was adopted by participating institutions during the 'Agri-Entrepreneurship in South Asia' Consortium-2023, recently organised at IIM Kashipur

In a significant move, India's higher educational institutes (HEIs) have agreed, in essence, to create a HEI-led Agri-Consortium – a move initiated by IIM Kashipur. An in-principal framework in this regard was adopted by participating institutions (HEIs) during the 'Agri-Entrepreneurship in South Asia' Consortium-2023, recently organised by the Foundation for Innovation & Entrepreneurship Development (FIED), an incubation centre of IIM Kashipur, in collaboration with the Ministry of Agriculture and Farmers Welfare.

The two-day Agri Consortium 2023 aimed to provide a common platform for academicians, researchers, students, and industry professionals to interact and deliberate on the latest trends and advancements in technology, research, funding avenues, and industry requirements in the agriculture industry.

During the consortium, higher education institutions (HEIs) and universities agreed upon a principled agreement with three steps: first, sharing of startup databases among consortium members; second, dissemination of incubation or startup support programmes; and finally, networking and sharing best practices on the platform.

Prof. Kulbhusan Balooni, Director of IIM Kashipur, thanked everyone for the successful completion of the two-day 'Agri-Entrepreneurship in South Asia' Consortium 2023.

In another development, the RKVY RAFTAAR Scheme, supported by the Ministry of Agriculture & Farmers Welfare, Government of India through FIED, IIM Kashipur, has provided funding of 1 crore 60 lakh rupees to 10 startup companies. These companies operate in the fields of drone technology, agricultural supply chain, food processing, hydroponics, waste to wealth, and agricultural biotechnology industries.

Source: <https://agriculturepost.com/agri-research/higher-academic-institutions-agree-on-forming-indias-first-heis-led-agri-consortium/>

ICRISAT INKS AGREEMENT WITH CGIAR TO TRANSFORM FOOD, LAND AND WATER SYSTEMS IN CLIMATE CRISIS

ICRISAT has signed the CGIAR Integration Framework Agreement (IFA), which was developed by the research centre boards and CGIAR leadership to confirm and clarify the path to a united One CGIAR.



Bonn, Germany: Hyderabad, India-headquartered, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), a leader in tropical dryland agrifood system innovation, has, recently, joined the One CGIAR integrated partnership, comprising the CGIAR System Organization and 12 One CGIAR research centres. The expansion of the One CGIAR integrated partnership supports a united approach to transforming food, land, and water systems in a climate crisis.

ICRISAT has signed the CGIAR Integration Framework Agreement (IFA), which was developed by the research centre boards and CGIAR leadership to confirm and clarify the path to a united One CGIAR. All existing parties to the IFA have welcomed ICRISAT into the integrated partnership.

"The challenges the world faces today are so complex and interconnected that we can best deliver a food and nutrition secure future by working together," said Professor Lindiwe Majele Sibanda, CGIAR System Board Chair. "ICRISAT plays a vital role in delivering that goal in the semi-arid tropics, and its welcome participation in the integrated partnership will enable One CGIAR to deliver greater impact where it is needed most."

Following an April 2023 resolution by the Governing Board of ICRISAT on the intent to join the One CGIAR integrated partnership, a joint statement was issued by the CGIAR System Board Chair and ICRISAT's Board Chair, paving the way for ICRISAT to sign the IFA.

Source: <https://agriculturepost.com/agri-research/icrisat-inks-agreement-with-cgiar-to-transform-food-land-and-water-systems-in-climate-crisis/>



HEALTH

INDIA NEEDS YOUTH MENTAL HEALTH FOCUS TO STRIKE DEMOGRAPHIC GOLD

World Mental Health Day: Is India paying enough attention to its youth against the backdrop of a demographic dividend?



India is a country teeming with more than 1.4 billion people, and is in the throes of a demographic transformation. Its adolescent population, aged 10-19 years, accounts for a substantial portion of the national total, some 253 million. This demographic segment is a significant part of what economists and demographers have come to call the 'demographic dividend'.

These young minds hold the promise of economic prosperity and development – but few also acknowledge that this potential actually hinges on these young men's and women's physical as well as mental well-being.

Youth mental health out of focus

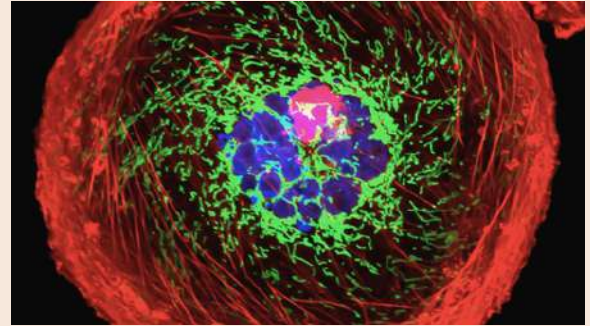
Adolescent health and well-being have become important in public health discourses worldwide. Acknowledging the adolescent cohort's pivotal role in society, the governments of both the States and the nation have introduced numerous policies and programmes to protect and respond to the health-wise needs of these young individuals. However, a closer look reveals that mental health does not figure as predominantly as warranted in many of these policies.

Adolescence is a time of profound transformation. It marks the transition from childhood to adulthood, and is laden with challenges – including those related to the perception of one's body and body image issues. Society's expectations regarding the 'ideal' behaviour and body types can significantly affect physical and mental health. The weight of academic expectations, peer pressure, and concerns about the future also take a toll on mental health at this time.

Source: <https://www.thehindu.com/sci-tech/science/youth-mental-health-focus-demographic-dividend/article67399051.ece>

HOW DO SOME CANCER CELLS SURVIVE CHEMOTHERAPY? SCIENTISTS FIND ONE WAY

The finding opens a door to develop new ways to ensure anti-cancer drugs remain potent.



Treating cancer is expensive, costing up to several lakh rupees depending on the type of cancer, the treatment options available, and the treatment setting (public or private). It can also take time, removing an individual from their work and family for extended periods, and be painful. Sometimes, while an individual may have successfully forced a cancer into remission, there may be a risk of relapse. One way this happens is when a few cancer cells are able to resist the drugs used to destroy them: they lay in wait and produce a show of strength later. Understanding this resistance could eliminate the different ways in which it happens, and reduce the odds of a relapse.

In a new study, published in *Cell Reports* on September 20, researchers from the Netherlands Cancer Institute investigated the resistance of some cancer cells to a drug called Taxol. They have reported that the culprit could be the location of a particular gene inside the cancer cells' nucleus.

The oncologist's challenge

A characteristic feature of cancer cells is that they divide rapidly, in uncontrolled fashion. Anti-cancer drugs – i.e. chemotherapeutic agents – work by stalling or blocking this proliferation. When the division of a cancer cell is arrested, it generally responds by triggering a pathway of programmed cell death, called apoptosis. So in this way, chemotherapy eliminates the cancer cells without affecting other non-cancerous cells nearby that are not dividing.

But this is also why chemotherapy deals a lot of collateral damage. Any tissue with a significant number of normal cells that are also dividing – such as cells in the digestive tract, the bone marrow, and hair follicles – are also affected by chemotherapeutic agents and suffer apoptosis. This cell death underlies the unpleasant side-effects of chemotherapy, such as painful inflammation of the oral cavity and the gut, and nausea, diarrhoea, anaemia, and hair loss.

Source: <https://www.thehindu.com/sci-tech/science/cancer-cells-taxol-resistance-survive-chemotherapy-study/article67406827.ece>



HEALTH

STROKE COULD LEAD TO NEARLY 10 MILLION DEATHS ANNUALLY BY 2050, WARNS REPORT

The Lancet Neurology journal report has emphasised the critical role of evidence-based, pragmatic solutions in combating this looming crisis



Stroke, a highly preventable and treatable condition, could lead to nearly 10 million deaths annually by 2050, primarily affecting low- and middle-income countries (LMICs), warns a report published in the Lancet Neurology journal on October 9.

The projection comes from the collaborative effort of the World Stroke Organization and the Lancet Neurology Commission under which four studies have been published. The report underscores that stroke deaths are expected to surge from 6.6 million in 2020 to a daunting 9.7 million by 2050. By 2050, it is estimated that the contribution of stroke deaths in LMICs will see an increase from 86% to 91%.

The report has emphasised the critical role of evidence-based, pragmatic solutions in combating this looming crisis and notes that implementing and rigorously monitoring the commission's recommendations, which are firmly grounded in evidence, could lead to a significant reduction in the global stroke burden, effectively countering this ominous projection.

Country-specific models

Speaking about India, Dr. Rajiv Bahl, Director General, Indian Council of Medical Research (ICMR), stressed the importance of implementing evidence-based stroke care to mitigate disability and prevent new strokes. He said the council was actively engaged in crafting country-specific ambulatory care models at the primary care level to combat non-communicable diseases.

Source: <https://www.thehindu.com/sci-tech/health/stroke-could-lead-to-nearly-10-million-deaths-annually-by-2050-warns-report/article67401165.ece>

HOW SCIENTISTS FIGURED OUT HOW BRAIN CELLS DIE, AND HOW THIS IS HELPING ALZHEIMER'S TREATMENT

About 55 million people live with dementia worldwide. New research into why brain cells die is enabling scientists to develop effective Alzheimer's drugs.



About 55 million people worldwide live with some form of dementia — of which Alzheimer's is just one such disease. Two-thirds of people with dementia live in developing countries. As the global population ages, it is estimated that the number of dementia cases will grow to about 139 million by the year 2050. People in China, India, Latin America and Sub-Saharan Africa are likely to be worst hit.

Researchers have been looking for medical treatments for Alzheimer's for decades, but their successes have been limited.

There has been new hope, however, since the discovery of an active agent called Lecanemab. The drug was approved for use by the US Food and Drug Administration in 2023 and shows signs that it slows the development of Alzheimer's in its early stages.

Complex processes in the brain

It's been challenging to develop medicines against Alzheimer's because researchers have yet to fully understand what happens in the brain when the disease takes hold. One of the most pressing questions is why brain cells die.

Researchers know that amyloid and tau proteins develop in the brain, but until recently, they did not know how they function together or influence cell death. But researchers in Belgium and the UK say they can explain what's happening now.

Source: <https://indianexpress.com/article/explained/explained-health/brain-cells-death-alzheimers-8952696/>



HEALTH

ICMR PROJECT TO ACCELERATE CANCER SCREENING AT DISTRICT LEVEL

Projections indicate a 57.5% rise in cancer cases in India between 2020 and 2040; ICMR project to rope in ASHA workers to reach target population, encourage home-based cancer screening



With only a few districts across India being able to effectively implement cancer screening measures in accordance with Health Ministry norms, the Indian Council of Medical Research (ICMR) is gearing up to bring in remedial measures. It has invited Expressions of Interest on the implementation of research to accelerate cancer screening, early diagnosis, and treatment.

The Council noted cancer poses a significant and pressing public health challenge in India, which currently ranks third in cancer incidence after China and the United States. According to Global Cancer Observatory projections, however, India is expected to witness a substantial 57.5% increase in cancer cases between 2020 and 2040.

In the long run, the Council is looking at improving the coverage and quality of cancer screening through the existing healthcare system using accepted and validated methods. It plans to engage non-specialist physicians and other health care workers within a supportive healthcare system for the screening of cancer as well as pre-cancerous conditions. The Council also wants to ensure that all those who test positive are linked to facilities for early diagnosis and treatment. The involvement of local communities is key to encourage the target population to undergo screening for early diagnosis and treatment.

Key role for ASHA workers

“Research has indicated that frontline health workers, such as Accredited Social Health Activists (ASHAs), have the potential to play a crucial role in promoting and conducting home-based cancer screening. Home screening has resulted in higher compliance rates because it offers the privacy and convenience necessary for individuals to participate actively in the screening process,” the Council noted.

Source: <https://www.thehindu.com/sci-tech/health/icmr-project-to-accelerate-cancer-screening-at-district-level/article67375694.ece>

UNDERSTANDING THE ABCS OF DENGUE FOR CONTROL AND BETTER MANAGEMENT

Frequent vomiting during the first one or two days of fever and low white cell blood count on day two are pointers for early diagnosis of dengue fever, say doctors



Dengue season is here. While prevention is key, seeking medical help on time once you notice symptoms, prompt diagnosis and treatment, and understanding warning signs play a crucial role in management of the vector-borne disease. Data updated till September 17 on the National Centre for Vector Borne Diseases Control website shows the country reported 94,198 cases of dengue and 91 deaths. Kerala, Karnataka and Maharashtra reported the most cases.

“We look for classic symptoms. If they seek treatment during the acute viremic phase - one to three days - we do not admit them,” says E. Theranirajan, dean, Rajiv Gandhi Government General Hospital (RGGGH), in Chennai. “We inform them of the warning signs and when to seek medical help. If they come to the hospital at the end of the third or fourth day, we admit them unless they are stable or have primary dengue. This is because day four to six is the critical phase in dengue and they need to be closely monitored. Their vital signs and haematocrit levels are closely watched,” he adds.

In dengue, day one to three are called the acute viremic phase, while day four to six are the critical phase followed by recovery, he added. What are the symptoms? Three days of continuous fever, with temperatures more than 101 degrees Fahrenheit - a high-grade fever that does not respond to routine paracetamol - is one the main symptoms, he said. “Patients will experience varying levels of headache, severe myalgia and maculopapular rash that typically begins on the third day,” he said.

Source: <https://www.thehindu.com/sci-tech/health/understanding-the-abc-of-dengue-for-control-and-better-management/article67353643.ece>



S&T COOPERATION FOR GLOBAL SOUTH

INDIA, BRAZIL, SOUTH AFRICA SEEK TO AMPLIFY THE GLOBAL SOUTH'S VOICE AT IBSA MEETING

India, Brazil and South Africa (IBSA) vow to uphold independent foreign policies, voice frustration on paralysis of UNSC reform talks, call for wider Africa, Asia, Latin America representation on UNSC



External Affairs Minister S. Jaishankar with Brazil Foreign Minister Mauro Vieira and South Africa's Minister of International Relations and Cooperation Naledi Pandor. Photo: X/@DrSJaishankar

External Affairs Minister S. Jaishankar, who is visiting the United States, met with his Brazilian and South African counterparts as part of the IBSA group, to further strengthen South-South cooperation.

"A very productive IBSA meeting with Foreign Ministers Mauro Vieira and Naledi Pandor on #UNGA78 sidelines," Mr. Jaishankar said, remarking that the meeting's outcome demonstrated solidarity between nations of the Global South. The Minister is in New York to address the 78th session of the United Nations General Assembly (UNGA) and for plurilateral and bilateral meetings.

Global South interests

IBSA's joint communique, released on Saturday, announced that a standalone meeting of Foreign Ministers would be held in the first quarter of 2024. The statement reaffirmed the "strategic significance" in advancing and protecting the interests of the Global South, noting the countries were focused on, among other things, "upholding independent foreign policies", while calling for the peaceful resolution of conflicts.

The Ministers reaffirmed their commitment to principles of the UN Charter, "such as equal sovereignty and non-interference in other countries' internal affairs, greater democracy and the rule of law in international relations", as per the communique.

Source: <https://www.thehindu.com/news/national/india-brazil-south-africa-seek-to-amplify-the-global-souths-voice-at-ibsa-meeting/article67337148.ece>

SRI LANKA TO TAKE OVER AS CHAIR OF INDIAN OCEAN RIM ASSOCIATION

Sixteen foreign dignitaries, including External Affairs Minister S. Jaishankar, expected to attend Council of Ministers meeting on October 11



External Affairs Minister S. Jaishankar is expected to attend the Council of Ministers meeting of the Indian Ocean Rim Association on October 11. File | Photo Credit: ANI

Several Foreign Ministers, including those of India, Bangladesh, Mauritius, Iran, Malaysia and South Africa, will participate in the Indian Ocean Rim Association (IORA) Council of Ministers meeting in Colombo on October 11, 2023, according to the Sri Lankan government, which is preparing to take over as Chair of the regional grouping this week.

The Council of Ministers meeting in Colombo will see the participation of 16 Ministers, including the Foreign Ministers of Bangladesh, India, Iran, Mauritius, Malaysia and South Africa as well as ministerial and senior level participation from Australia, Comoros, France, Indonesia, Kenya, Madagascar, Maldives, Mozambique, Oman, Seychelles, Singapore, Sri Lanka, Somalia, Tanzania, Thailand, United Arab Emirates and Yemen (member countries) and from China, Egypt, Saudi Arabia, Germany, Italy, Japan, Republic of Korea, Russia, Turkiye, the United Kingdom and United States of America (dialogue partners), a statement from President Ranil Wickremesinghe's office said.

Sri Lanka's Foreign Minister Ali Sabry will chair the Council, the highest decision-making body of the IORA, taking over from the Foreign Minister of Bangladesh, the current Chair, for the next two years. The Ministers will deliberate on ways to cooperate on six priority areas identified by the IORA, including Trade and Investment, Maritime Safety and Security, Fisheries Management, Disaster Risk Management and Blue Economy. The Council will be preceded by the 25th meeting of the Committee of IORA Senior Officials on October 9 and 10.

Established in 1997 as an intergovernmental organisation of States on the rim of the Indian Ocean, the IORA has members from Africa, West Asia, South Asia, Southeast Asia and the Oceania. The Association's membership has expanded to 23 member states and 11 dialogue partners.

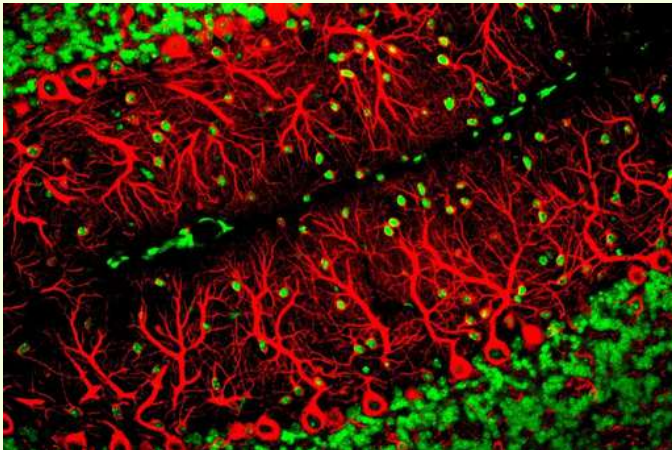
Source: <https://www.thehindu.com/news/international/sri-lanka-to-take-over-as-chair-of-indian-ocean-rim-association/article67398819.ece>



OTHERS

NEURAL NETWORKS: HUMAN BRAIN HAS 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. Credit...Science History Images/Alamy

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,w hat%20most%20of%20them%20do.&text=Sign%20up%20for%20Science%20Times,cosmos%20and%20the%20human%20body>

HOW BAT GENOMES PROVIDE INSIGHTS INTO IMMUNITY AND CANCER

Bats are wonderfully unique creatures. We couldn't have known that without genome-sequencing.



Close-up of two fruit bats hanging upside down in a tree in Australia.

Bats are extraordinary organisms in many ways. They are the only mammals on the earth that can maintain sustained flight. They also have relatively long life-spans and are relatively more protected from a variety of diseases, including cancer. They also have a unique ability in echolocation, whereby they use sound to navigate and locate objects, freeing them from being constrained by the availability of light like humans are.

By population, bats make up 20% of all mammals. There are more than 1,400 species of bats today around the world; more than 60 are endangered and 170-odd are classified as vulnerable. The bumblebee bat weighs only 2 grams whereas the flying foxes, which have a wingspan of 1.5 metres, weigh up to 1.6 kg.

In all bats play crucial roles in maintaining the ecological balance, and are essential for pollination, insect control, etc. However, bats have grabbed the headlines of late for the wrong reasons. Their notoriety stems from the fact that many deadly viruses use bats as a reservoir host, including coronaviruses, Nipah, Ebola, Marburg virus, and Hendra virus, among others. The COVID-19 pandemic also cast a bright spotlight on the habits of bats.

Bats do host a wide variety of pathogens, including ones deadly to other mammals, but they themselves don't get infected. Scientists have been curious about the source of this protection.

The bat genomes

Scientists' first object of study is the bat genome. Over the years, researchers have unearthed significant insights by sequencing the genomes of many bat species. Bats are also unique because they have a relatively small genome, around 2 billion bases.

Source: <https://www.thehindu.com/sci-tech/science/bats-virome-genome-long-read-sequencing-interferons/article67448746.ec>



OTHERS

THE MOON IS 40 MILLION YEARS OLDER: WHAT A NEW STUDY SAYS

Scientists have said lunar dust collected in 1972 shows the moon is older than they thought. Here's what you need to know.



NASA Lunar sample 15498 on display at NASA's Johnson Space Center in Houston, Texas

More than 50 years after astronauts returned with the last batch of Apollo-era moon rock, scientists have said they made a finding that would have been impossible in 1972.

That was the year astronauts Eugene Cernan and Harrison Schmitt, the first scientist-astronaut, became the last humans — so far — to land on the moon. Cernan and Schmitt landed in the Taurus-Littrow Valley on the edge of Mare Serenitatis because it was thought to be a geologically diverse site.

They collected a total of 110.5 kilograms (243.6 pounds) of lunar rock and soil — 741 samples in all. The samples include the three major lunar rock types: basalt, breccia and highland crustal rocks.

So, how old is the moon?

The new study appears to show that the moon is about 40 million years older than previously thought. It now seems to have formed about 4.46 billion years (or “GA” — giga annum) ago — putting its formation within the first 110 million years of the birth of our solar system.

Many lunar samples have been studied over the years, but a good amount has been stored and released to researchers only slowly, because scientists predicted early on that technology would improve over time and enable better insights. The findings published in *Geochemical Perspectives Letters* on October 23, 2023, are themselves based on a new technology called atom probe tomography (APT).

Source: <https://indianexpress.com/article/explained/explained-sci-tech/moon-40-million-years-older-study-9005806/>

FEMALE FROGS SOMETIMES FAKE DEATH TO AVOID UNWANTED MALE ADVANCES, FINDS STUDY

A new study found that female European common frogs sometimes avoided unwanted advances from males by faking their death.



Illustrative image depicting two frogs mating

Unwanted advances are overwhelming whether you are a human or a frog. But a new study has found that female frogs may have a particularly interesting technique to avoid unwanted advances from males—they fake their own death.

The study published in the *Royal Society Open Science* journal on Wednesday looks at the mating behaviour of the European common frog. It found that when females of the species were at the receiving end of unwanted advances, they had three methods of avoidance—“rotating,” “release calls,” and feigning death. Before getting into that, let us understand how frogs mate. They do it through a process known as “amplexus,” a process where the male grabs the female with his front legs during the mating process.

European common frogs are known as an “explosive breeding species,” which means that they have a very short breeding season. During this time, they gather together in ponds and mate in large numbers. Sometimes, aggressive attempts to mate from the males can cause female deaths. Scientists observed that there are three ways in which female frogs try to avoid this process when it is unwanted.

Rotating is when the female starts rotate around their own body axis when amplexed by a mail. Release calls are two different kinds of calls—a grunt and a squeak—that the female frogs make to dissuade the males. But that last bit is the most interesting. “Tonic immobility” or feigning death. In the last case, the females stretch out their arms and legs and stiffen their bodies.

Source: <https://indianexpress.com/article/technology/science/female-frogs-sometimes-fake-death-mating-8979832/>