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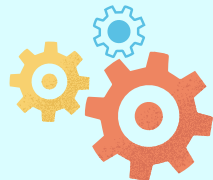


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SCIENCE & TECHNOLOGY

CSIR IITR DEVELOPS RAPID HAEMOGLOBIN TESTING KIT; FAST AND AFFORDABLE TEST AT ₹10

Priced at just ₹10 per test, this self-test kit gives results in 30 seconds. Traditional methods for checking haemoglobin levels typically required sophisticated instruments and access to clinical laboratory settings, making them impractical in remote or rural areas.

Now, with a motive to provide a cost-effective and accurate solution for testing Lucknow's CSIR-Indian Institute of Toxicology Research (IITR) has launched an indigenous rapid haemoglobin testing kit called 'SenzHb'.

This kit costs a small fraction of cost of other haemoglobin assay kits available in the market. Furthermore, this kit can be used by anyone and gives accurate results in just 30 seconds.

Costs significantly less than other Haemoglobin Assay kits available in the market.

Portable haemoglobin assay kits have existed in the market from quite a while. These kits enable quick and precise results without the need for extensive laboratory equipment or facilities. Unfortunately, the affordability of portable haemoglobin assay kits remains a concern. The cost of these kits can be relatively high, making them inaccessible to a significant portion of the population.



In contrast, IITR's SenzHb kit is a cost-effective and user-friendly paper-based haemoglobin test kit. Priced at just ₹10 per test, it offers an economical solution for haemoglobin testing. Additionally, the kit is designed to be easy to use, eliminating the need for an expert medical professional to administer the test.

Reportedly, this indigenously developed product is yet another breakthrough from CSIR-IITR and to ensure the accuracy and reliability of SenzHb, extensive validation was also conducted.

Source: <https://www.knocksense.com/lucknow/lucknow-news-csir-iitr-develops-rapid-haemoglobin-testing-kit-fast-and-affordable-test-at-10>



FIRST CONSIGNMENT OF CSIR-IICT DEVELOPED IMPORT SUBSTITUTE HYDROGEN HYDRATE OUT

GACL and CSIR-IICT have jointly received patents from India and the U.S. for the indigenous process to manufacture Hydrazine Hydrate.



The construction site of hydrazine hydrate plant at Gujarat Alkalies & Chemicals Limited in Dahej. File | Photo Credit: Special arrangement

Gujarat Alkalies and Chemicals Limited (GACL) flagged off the first lot of Hydrazine Hydrate (80%) from their Dahej complex, Gujarat, last week completing another milestone. The technology for making Hydrogen Hydrate was initially developed by CSIR-IICT at laboratory and bench scale, in Hyderabad.

Subsequently, it was scaled up to pilot plant scale with GACL as industry partner. Hydrazine Hydrate, as an import substitute product with world-class quality will help in reducing the country's dependency on imports, thereby saving valuable foreign exchange.

GACL and CSIR-IICT have jointly received patents from India and the U.S. for the indigenous process to manufacture Hydrazine Hydrate (H_6N_2O). A ₹405 crore commercial plant of 10,000 TPA 80% Hydrazine Hydrate was designed by CSIR-IICT and was established by GACL at their Dahej complex.

Hydrazine Hydrate has applications in pesticides, agrochemicals, water treatment, pharmaceuticals, blowing agent in polymer industry, fine chemicals etc. The GACL plant was opened by Prime Minister Narendra Modi on October 10, 2022. The first batch of the product was flagged off and was attended by CSIR-IICT director D.Srinivasa Reddy, GACL MD P. Swaroop and others.

Source: <https://www.thehindu.com/news/national/telangana/first-consignment-of-csir-iict-developed-import-substitute-hydrogen-hydrate-out/article67072005.ece>

OUTSTANDING MULTI-FUNCTIONAL LUMINESCENT PIGMENT BASED GOLDEN INK WITH INNUMERABLE SECURITY FEATURES TO CURB COUNTERFEITING OF PASSPORT



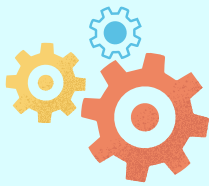
In this evolving world, counterfeiting is also evolving in advanced ways and counterfeiters are turning out to be more proficient to counterfeit security features effectively by utilising all advanced technologies and tools to perform their unethical activities.

Over the decades, a huge amount has been invested in developing several anti-counterfeiting technologies to limit the opportunities for passport fraud, but authorities are still struggling to stay one step ahead of the counterfeiters. So far, numerous multimodal luminescent materials have been explored using various combinations for the fabrication of security inks. But the biggest concern with these anti-counterfeiting technologies is that they all entirely rely on luminescence only. Although the pairing of materials is rare, they still get easily decoded using advanced technological instruments and tools by deciphering their chemical composition, structures, and ratio.

To overcome these obstacles, a new class of multi-functional security pigments has been introduced with two properties combined — optical and magnetic — to obtain more efficient security inks for important documents such as banknotes and bank cheques which can be easy to detect and trace but hard to replicate.

CSIR-National Physical Laboratory (CSIR-NPL), New Delhi, has proposed a cost-effective golden ink that is one step ahead to provide more security to important documents. It is a new strategy to design a novel and inexpensive Multi-functional Luminescent Pigment (MLSP) based Golden Ink and has demonstrated its potential applications to save the authenticity of passports with a golden appearance in visible light.

Source: <https://csirnews.nispr.res.in/homel/article/545>



ISRO'S CHANDRAYAAN-3 MISSION: EVERYTHING YOU NEED TO KNOW

Here is everything you need to know about ISRO's Chandrayaan-3 mission, which is scheduled to launch on Friday, July 14.



The LVM-3 rocket and Chandrayaan-3 spacecraft at the launchpad in Sriharikota (ISRO via Twitter)

Indian Space Research Organisation (ISRO) said that the integrated Chandrayaan-3 spacecraft and LVM-3 rocket are at the launchpad at the Sathish Dhawan Space Centre in Sriharikota ahead of its launch, which is scheduled to launch at 2.30 PM on July 14. Here is everything you need to know about the mission.

Objective of the Chandrayaan-3 mission

Chandrayaan-3 is a follow-on to the unsuccessful Chandrayaan-2 mission, and it has the same objective—to demonstrate the capability of soft landing on the Moon by delivering a lander and a rover to the lunar surface.

The Chandrayaan-2 mission ended in tears on September 6, 2019, when the mission's Vikram lander failed to make a soft landing. The failure happened about 13 minutes after the spacecraft began its descent. So far, only three countries have actually managed to land on the Moon—the United States, the erstwhile Soviet Union and China.

Chandrayaan-3 spacecraft

The Chandrayaan-3 spacecraft consists of three parts—the lander module, propulsion module and a rover. The lander is designed to make a soft landing at a specific site on the Moon and deploy the rover. The rover will carry out chemical analysis of the lunar surface. Both the lander and the rover carry many scientific payloads for experiments on the lunar surface.

Source: <https://indianexpress.com/article/technology/science/isro-chandrayaan-3-launch-details-8826801/>

“ABSOLUTELY STUNNING” – SCIENTISTS DISCOVER METALS THAT CAN HEAL THEMSELVES



For the first time, scientists have observed metal spontaneously healing its microscopic cracks, a phenomenon that contradicts conventional material theories and opens a new frontier in engineering and materials science. (Artist's concept.)

Microscopic cracks vanish in experiments, revealing possibility of self-healing machines.

In a groundbreaking discovery, scientists have for the first time observed metal spontaneously healing its microscopic cracks, upending traditional material theories. This observation could lead to self-healing machines, significantly enhancing their safety and lifespan. The phenomenon, confirming a theory proposed in 2013, may pave the way for an engineering revolution, though further research is necessary to fully understand its practical applicability.

Discovery of Self-healing Metal Phenomenon

For the first time, scientists have observed pieces of metal spontaneously cracking and then fusing back together. This groundbreaking observation contradicts long-held scientific theories and may pave the way for an engineering revolution. If the newly discovered phenomenon can be harnessed, the potential applications are wide-ranging and include self-healing engines, bridges, and airplanes that could autonomously repair damage caused by wear and tear, thereby enhancing their safety and longevity.

The discovery was made by a research team from Sandia National Laboratories and Texas A&M University. Their findings were described on July 19 in the journal Nature.

Source: https://scitechdaily.com/absolutely-stunning-scientists-discover-metals-that-can-heal-themselves/?expand_article=1



ENVIRONMENT

WHITE-RUMPED VULTURE FACES A PERILOUS FUTURE IN NILGRIS' SIGUR PLATEAU

Despite the protective measures, the future remains extremely perilous for the critically endangered white-rumped vulture (*Gyps bengalensis*) in the Sigur plateau in the Nilgiris, the last southernmost viable breeding population for the species in India.

A study has highlighted the stagnation of the population in Sigur. It was conducted by Samson Arockianathan for his doctoral thesis, 'Studies on Population, Breeding Ecology and Conservation Threats of Critically Endangered White-rumped vulture in the Mudumalai Tiger Reserve'.

Research done in Sigur between 2013 and 2017 has shown that the population had hovered between 152 individuals in 2013 to a peak of 167 individuals in 2017. Along with the late expert tracker R. Bomman, of Chemmanatham village, Mr. Samson spent the best part of four years studying the species that, along with the long-billed vulture and the Asian king vulture, inhabits the Sigur plateau.

Data from the recent synchronous vulture census in Kerala, Tamil Nadu and Karnataka have shown that the white-rumped vulture population remains roughly in the same range, with very few signs of a significant recovery from the last decade.



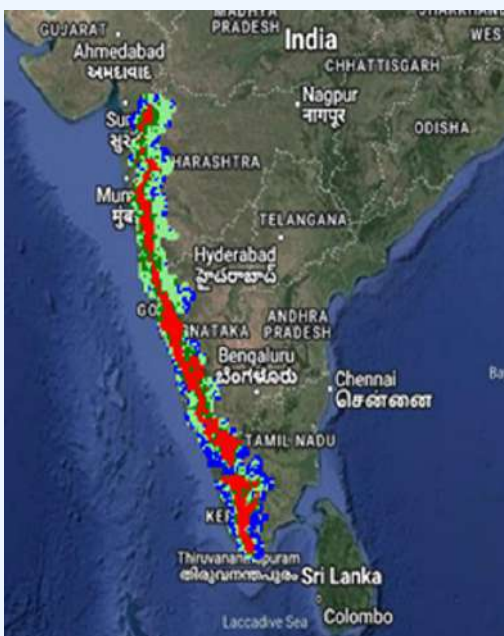
Research done in the Sigur plateau in the Nilgiris between 2013 and 2017 has shown that the species' population had hovered between 152 individuals in 2013 to a peak of 167 individuals in 2017. Photo: Special Arrangement

The white-rumped and other vulture species in India have been decimated by the use of diclofenac and a few other Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in cattle.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/white-rumped-vulture-faces-a-perilous-future-in-sigur-plateau/article67033709.ece>

WESTERN GHATS LOST 5% EVERGREEN FOREST COVER, SHOWS ANALYSIS

Western Ghats Spatial Decision Support System launched by the IISc also shows that interior forest constitutes only 25% of the forest landmass, depicting the fragmentation pressure, impacting local ecology



The Western Ghats, which is among 36 global biodiversity hotspots, saw a loss of 5% evergreen forest cover with an increase of 4.5% built-up cover, and 9% agriculture area, according to the spatiotemporal analyses of land use, highlighting anthropogenic induced developmental thrust. Fragmentation analyses also highlight that interior forest constitutes only 25% of the forest landmass, depicting the fragmentation pressure, impacting local ecology.

These revelations come from the Indian Institute of Science's Energy and Wetlands Research Group launched the Western Ghats Spatial Decision Support System (WGSDDS), which has been designed as part of the ongoing ecological research in the Western Ghats. This, researchers say, enhances governance transparency while meeting societal needs, which helps in the prudent management of ecologically and hydrologically vital Sahyadri hill ranges.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/western-ghats-lost-5-evergreen-forest-cover-shows-analysis/article67079915.ece>



ENVIRONMENT

EARTH RECORDS HOTTEST DAY EVER ON JULY 4: CAUSES, WHAT LIES AHEAD

The average temperature on July 3 was measured to be 17.01 degree Celsius. The next day recorded 17.18 degree Celsius.

Continuing an astonishing series of record-breaking warming events this year, the past Monday and Tuesday, July 3 and July 4, have been measured to be the hottest two days for the earth ever. July 3 was the first time that the global average daily temperature crossed the 17 degree Celsius mark. That record was broken within a day, with July 4 turning out to be even hotter.

The average temperature on July 3 was measured to be 17.01 degree Celsius. The next day recorded 17.18 degree Celsius.

Scientists expect more such record-breaking events in the near future.

But 17 degree Celsius is not hot

A 17 degree Celsius temperature may not appear to be particularly warm. But this temperature was not over any one place or region. Instead, this is a measure of the global average temperature for the day, the average over both land and ocean, including the ice sheets in the polar region and the snow of the high mountains where surface temperatures are well below zero degree Celsius.



Scientists expect more such record-breaking events in the near future.

Source :

<https://indianexpress.com/article/explained/explained-climate/earth-records-hottest-day-ever-causes-what-lies-ahead-8780023/>

CENTRE MOOTS 'MARKET' SCHEME TO PROMOTE SUSTAINABLE LIVING

New scheme will incentivise a host of activities such as afforestation, water conservation, waste management and air pollution mitigation by generating 'Green Credits' that can be traded for money



“A Green Credit Programme is proposed to be launched at national level to leverage a competitive market-based approach for Green Credits thereby incentivising voluntary environmental actions of various stakeholders. Apart from incentivising individual/community behaviour,” says the notification that is open to public comment for 60 days, “the Green Credit Programme will encourage private sector industries and companies as well as other entities to meet their existing obligations, stemming from other legal frameworks, by taking actions which are able to converge with activities relevant for generating or buying Green Credits.”

The Environment Ministry has issued a draft notification detailing a proposed 'Green Credit Scheme' that will incentivise a host of activities including afforestation programmes, water conservation, waste management and remedying air pollution by allowing individuals and organisations to generate 'Green Credits.' These credits, through a yet to be specified mechanism, can also be traded for money.

A senior official in the Ministry, who declined to be identified, told The Hindu that the government's immediate priority was to “create supply (of Green Credits)” via voluntary actions and then “create demand by bringing in laws or rules that will incentivise companies and organisations to buy credits that can then be traded.”

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/centre-moots-market-scheme-to-promote-sustainable-living/article67020152.ece>



GROUNDWATER EXTRACTION SHIFTED THE EARTH'S AXIS: WHAT A NEW STUDY SAYS

The water sucked out from the ground for irrigation and meeting the world's freshwater demands, eventually, goes into the oceans, contributing to global sea level rise.



A tubewell extracting groundwater in Rajasthan. (Photo: Rohit Jain Paras/ Express Archive)

The excessive extraction of groundwater for drinking and irrigation has shifted the Earth's axis of rotation, according to a new study. Noting that humans pumped out around 2,150 gigatons of groundwater between 1993 and 2010, the study says that the planet's axis has drifted at the rate of 4.36 cm per year towards the east.

The study, 'Drift of Earth's Pole Confirms Groundwater Depletion as a Significant Contributor to Global Sea Level Rise 1993–2010', was published in the journal *Geophysical Research Letters*, earlier this month.

It was carried out by Ki-Weon Seo, Taewhan Jeon, Jae-Seung Kim, Kookhyoun Youm of the Seoul National University (South Korea), Dongryeol Ryu of the University of Melbourne (Australia), Jooyoung Eom of the Kyungpook National University (South Korea), Jianli Chen of the Hong Kong Polytechnic University (Hong Kong), Clark R Wilson of the University of Texas at Austin (USA).

Although the shift isn't significant enough to have real-life consequences, the study shows that humans have extracted so much water from the ground that it has impacted the planet's axis and contributed to global sea level rise.

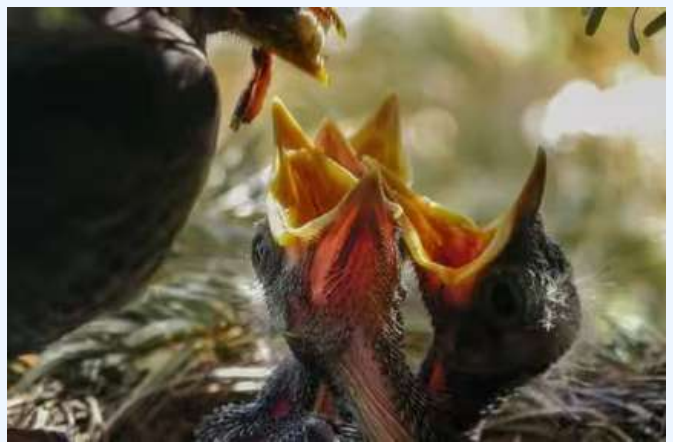
Earth's axis keeps shifting

Earth spins around an imaginary axis which passes through the north pole, its centre of mass and the south pole — just like a top spins around its spindle. Scientists for years have known that the poles and the axis keep shifting naturally as the mass distribution in and on the planet changes. This phenomenon is known as "polar motion".

Source: <https://indianexpress.com/article/explained/explained-climate/groundwater-extraction-shifted-earths-axis-study-8692912/>

CLIMATE CHANGE MAY CAUSE BIRDS TO RAISE FEWER YOUNG, FINDS STUDY

In a new study, researchers found that the changing climate could mess with birds' ability to time their breeding right, meaning that they will produce less young.



Scientists have long hypothesised that animal lifecycles could get mismatched compared to plant lifecycles. (Illustrative image: Pixabay)

Climate change will have a massive impact on biodiversity in many ways that we do not fully understand yet. Recently, we learned that the changing climate could disrupt insect evolution. In a new study, researchers have found that the changing climate could cause birds to start breeding too early or late in the season, which will mean that they will have fewer young.

Birds are finding it harder to know when it is spring and time to breed due to rising temperatures, according to a study published in *Proceedings of the National Academy of Sciences*. Climate change has meant that springlike weather occurs earlier, meaning that birds are unable to keep up, according to the researchers.

Essentially, there is a mismatch between the start of spring and the readiness of the birds to reproduce, and this is only likely to get worse as the world warms. When birds start breeding too early or too late in the season, they produce a lot fewer young. This could have massive consequences that could prove cataclysmic for many bird populations.

Typically, the breeding seasons of birds begin when the first green plants and flowers appear after winter, which is happening earlier and earlier as the climate warms.

Source: <https://indianexpress.com/article/technology/science/climate-change-bird-fewer-young-8735070/>



AGRICULTURE

ABOUT XVI AGRICULTURAL SCIENCE CONGRESS



The XVI Agricultural Science Congress is being organized by the National Academy of Agricultural Sciences (NAAS). The Congress will be hosted by the ICAR-Central Marine Fisheries Research Institute (CMFRI), Kochi from 10 to 13th October 2023 in offline mode. The venue of the congress is HotelLe Méridien, Kochi, Kerala. The President, NAAS, New Delhi, cordially invites you to attend the Congress and actively participate in the deliberations.

The theme of the Congress is "Transformation of Agri-Food Systems for Achieving Sustainable Development Goals" With the increasing demand for food, degrading environmental conditions, and looming climate change challenges, it becomes imperative that we transform our agri-food systems into sustainable enterprises to facilitate its benefits to be just, equitable and last for generations to come. The Congress aims to bring together leading academicians, researchers, research scholars, students, farmers, entrepreneurs, etc. to exchange and share their research findings, ideas and experiences on all aspects of agri-food systems to enable the formulation of the way forward to transform our agri-food system to meet the sustainable development goals (SDGs) of the United Nations. The UN SDGs aim to end poverty, protect the planet, and ensure that by 2030 all people on Earth enjoy peace and prosperity. The SDGs address poverty, inequality, climate change, environmental degradation, peace and justice; hence are blueprints to achieve a better and more sustainable future for all.

Source: <https://www.16asc2023.in/about-16ASC.html>

INDIAN INSTITUTE OF HORTICULTURAL RESEARCH IDENTIFIES THIRD UNIQUE FARMER'S JACKFRUIT VARIETY FOR PROMOTION

The new variety which is bigger in size is deep orange in colour and suitable for processing to make products like jam and squash



The unique characteristic of the new variety is that it is not only tasty and nutritious but also suitable for commercial processing for making products like jam, squash and fruit bar.

Enthused by the massive response to two farmers' varieties of jackfruit — iddu and Shankara — which were promoted by it, the Bengaluru-based Indian Institute of Horticultural Research (IIHR) has identified one more variety of jackfruit being grown by a farmer for promotion. Its unique characteristic is that it is not only tasty and nutritious but also suitable for commercial processing for making products like jam, squash and fruit bar, said IIHR Director Sanjay Singh.

Heavier fruit

Unlike the earlier two, whose fruits were small, the new one weighs 25 to 32 kg, he said. It has been identified in the field of Nagaraj in Hessarghatta on Bengaluru's outskirts. Presently there is only one such tree in his field.

Dr. Singh said IIHR scientists, who have been observing the tree for the last three years to study its characteristics, conducted tests to ascertain the nutritious value of the fruits from this variety. It also gives fruit during the off season (August to October) which is a rare trait for jackfruit.

Source: <https://www.thehindu.com/sci-tech/agriculture/iihr-identifies-third-unique-farmers-jackfruit-variety-for-promotion-after-siddu-and-shankaras-success/article67045500.ece>



AGRICULTURE

SEAWEED-BASED FERTILISER BASED ON CSIR-CSMCRI TECHNOLOGY LAUNCHED



Contributing to 'AtmaNirbhar Bharat Abhiyan' of the Govt of India, a seaweed-based bio-stimulant for various crops named 'Sivarika' using an indigenous technology developed by CSIR-Central Salt & Marine Chemicals Research Institute, Bhavnagar, Gujarat, was launched in the market in 2023 by Krishak Bharati Cooperative Limited (KRIBHCO).

KRIBHCO is a premier national level Cooperative Society of India engaged in fertiliser production and distribution and is registered under Multi State Cooperative Societies (MSCS) Act, 2002. CSIR-CSMCRI is a pioneer R&D laboratory in the area of seaweed research in the country.

CSIR-CSMCRI has developed seaweed-based agrotechnologies for enhancing the yields and quality of several crops including flowers, spices, vegetables as well as arable crops using seaweed biostimulants.

Dr Kamalash Prasad, the divisional chair of the Natural Products and Green Chemistry group in CSIR-CSMCRI informed that seaweed-based biofertiliser 'Sivarika' modulates the antioxidant system and expression of differential gene expression which could explain better crop growth and yield response upon application of this natural fertiliser.

Dr Kanti Bhooshan Pandey, Senior Scientist and Public Relation Officer of the institute informed that CSIR-CSMCRI has exhaustive research expertise in seaweed research and has developed animal feed additives, commercial cultivation of seaweeds and generation of energy through microalgal feedstock in addition to the biostimulant. All these findings formed the basis of several policy decisions taken by the Govt of India recently to promote the seaweed sector. This product is cultivated and harvested from the Indian coast and is a source of livelihood for many fishermen families. 'Sivarika' is manufactured using patented know-how transferred to M/s Pushpa J Shah-Ankleswar in 2019, he added.

Source: <https://esirnews.nispr.res.in/home/article/528>

PUNJAB AGRICULTURAL UNIVERSITY DEVELOPS NEW WHEAT VARIETY TO KEEP DIABETES AND OBESITY IN CHECK

The Ludhiana-based institution, which played a pivotal role during the Green Revolution to make India surplus in foodgrains by developing high-yielding strains, has bred a new wheat variety with high amylose starch content, known to reduce risks of type-2 diabetes and cardiovascular diseases.



The taste, color and texture of chapatis made from PBW RS-1 is same as normal wheat varieties, say scientists at PAU. (Image source: PAU)

From "quantity" to "quality" and from "food security" to "nutritional security" — this seems to be the new research focus of the Punjab Agricultural University (PAU).

The Ludhiana-based institution, which played a pivotal role during the Green Revolution to make India surplus in foodgrains by developing high-yielding strains, has bred a new wheat variety with high amylose starch content, known to reduce risks of type-2 diabetes and cardiovascular diseases.

Eating chapatis made from this wheat — called PBW RS1, with RS being short for resistant starch — won't cause an immediate and rapid rise in glucose levels. The high amylose and resistant starch, instead, ensure that glucose is released more slowly into the bloodstream. Being slower to digest also increases a feeling of satiety; a person consuming 4 chapatis from normal wheat would now feel full after having just two.

It has total starch content, almost the same as the 66-70 per cent in other wheat varieties. But it has 30.3 per cent resistant starch content as against only 7.5-10 per cent for other varieties including PBW 550, PBW 725, HD 3086 and PBW 766, show trials conducted by PAU over four years. The other varieties have 56-62 per cent non-resistant starch content which is nearly half (37.1 per cent) in PWB RS1. Similarly, PBW RS1 has 56.63 per cent amylose compared to only 21-22 per cent in other varieties.

Source: <https://indianexpress.com/article/education/pau-develops-new-wheat-variety-to-keep-blood-sugar-obesity-in-check-8822510/>



HEALTH

CSIR-CFTRI DEVELOPS SUPERFOOD – NUTRITION-RICH QUINOA GERM



In a significant development, the Central Food Technological Research Institute (CSIR-CFTRI) has successfully developed a dry physical process for the separation of the highly nutritious germ from Quinoa (*Chenopodium quinoa*), a superfood renowned for its exceptional nutritional profile.

The germ, which contains most of the protein, fat reserves, and minerals of the grain, has been found to be a potential individual nutrient-dense component with numerous applications in the food and pharmaceutical industries.

Conventionally, quinoa has posed challenges in separating its germ due to its small grain size and complex structure. However, with the newly developed dry physical process, CSIR-CFTRI has achieved an industrially scalable and eco-friendly solution that surpasses the conventional wet milling method. The process involves conditioning of quinoa grains, gradual milling, aspiration, and sieving operations, leading to a remarkable recovery yield of over 80 per cent and high purity of the extracted germ.

Quinoa germ boasts an outstanding nutritional quality, making it a potential alternative source of plant-based protein. Apart from its high protein content, the germ contains an excellent balance of amino acids, fulfilling daily recommendations for adults, and is classified as a high-quality protein.

Additionally, the germ's fat content is noteworthy, consisting of 88 per cent unsaturated fatty acids, including 60 per cent polyunsaturated fatty acids (PUFA) and 30 per cent monounsaturated fatty acids (MUFA), along with a unique ratio of omega-6 and omega-3 fatty acids, making it a nutritive powerhouse.

The germ also packs a punch when it comes to minerals, with its concentrated mineral content making it the most sought-after component of the quinoa grain. Moreover, quinoa germ is rich in total phenolic content and displays significant antioxidant activity, further adding to its nutritional appeal.

Source: <https://www.mysoorunews.com/csir-cftri-develops-superfood-nutrition-rich-quinoa-germ/>

CSIR-NIIST RESEARCHERS DEVELOP SIMPLE BLOOD TEST TO DETECT CANCER AND ALZHEIMER

The highlight of the new computer-guided SERS-based diagnostic platform is that the early detection of cancers and AD can be offered as routine blood tests on-site, in hospitals and laboratories by using a portable Raman spectrometer. Research team hope to keep the cost below ₹200 per test.



In an exciting new development, a multidisciplinary team of researchers at CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram, has claimed that they are very close to perfecting the clinical validation of a diagnostic platform, which will enable the early detection of many cancers and Alzheimer's disease (AD) through a simple and affordable blood test.

Ground breaking project

“A “ground-breaking” project, we have already completed Phase 1 of the pilot studies for the primary clinical validation of the diagnostic modality we have developed, on the platform of the highly sensitive technique of surface-enhanced Raman spectroscopy (SERS). We hope to perfect this through larger trials involving multiple clinical partners soon,” says Dr. C. Anandharamakrishnan, the Director of CSIR-NIIST.

After research spanning over eight years, the team at NIIST had developed a SERS-based diagnostic platform and functionalised nanoparticle probes which enabled the detection of various grades of cervical cancer and the three major biomarkers for breast cancer from tissue samples. This technology has already been patented.

Source: <https://www.thehindu.com/news/national/kerala/csir-niist-researchers-develop-simple-blood-test-to-detect-cancer-alzheimers/article67070664.ece>



HEALTH

CSIR-CFTRI DEVELOPS BARLEY-SEAWEED BASED ANTI-OBESE SUPPLEMENT “SEASLIM”



Prevalence of obesity in India has increased over the past decade and it ranks third in the world. Market for anti-obese foods is getting propelled owing to rising obesity cases and side effects of drug.

Brown seaweed *Padina tetrastratica* is used in the process, possess highly nutritive food constituents, viz., vitamins, minerals, trace elements, proteins, iodine, and other bioactive substances, viz., carotenoids, phenolic acids, amines, lipids, peptides, fiber (polysaccharides), steroids and fatty acids (PUFAs in particular. Barley is an efficient food to prevent and cure many life-style disorders like diabetes and obesity due to high insoluble fiber content that regulates blood sugar levels, slower absorption of glucose and fat from the intestine.

Owing to the above qualities of brown algae and barley, food SeaSlim was developed to manage obesity.

SeaSlim can be used as potent antioxidant food, as it is a rich source of bio-actives like fucoxanthin, dietary fibers and hydrocolloids. It lowers the fat absorption in small intestine as the food contains soluble dietary fiber and hence, lowers the risk of obesity and diabetes. SeaSlim can be used against laxative in chronic constipation and colon cleansing, digestion problems and poor food assimilation.

The food can provide adequate amount of energy, fat, carbohydrate, and protein. SeaSlim helps in regulating body weight by reducing the food intake, plasma glucose and blood and adipose lipid level and can be used as low-glycemic index food.

NEW STUDY LINKS GUM DISEASE TO BUILD UP OF ALZHEIMER'S PLAQUE FORMATION

Using mouse oral bacteria to cause gum disease in lab mice, the scientists were able to track periodontal disease progression in mice and confirm that the bacteria had travelled to the brain.



Scientists have found a link between periodontal (gum) disease and the formation of amyloid plaque, a hallmark of Alzheimer's disease.

The study, published in the *Journal of Neuroinflammation*, found that gum disease can lead to changes in brain cells called microglial cells, responsible for defending the brain from amyloid plaque, a type of protein that is associated with cell death.

The research provides important insight into how oral bacteria makes its way to the brain, and the role of neuroinflammation in Alzheimer's disease, a brain disorder that slowly destroys memory and thinking skills.

“We knew from one of our previous studies that inflammation associated with gum disease activates an inflammatory response in the brain,” said senior study author, Alpdogan Kantarci, from the Forsyth Institute in the US.

“In this study, we were asking the question, can oral bacteria cause a change in the brain cells?” Kantarci said in a statement. The microglial cells the researchers studied are a type of white blood cell responsible for digesting amyloid plaque.

They found that when exposed to oral bacteria, the microglial cells became overstimulated and ate too much. “They basically became obese. They no longer could digest plaque formations,” Kantarci said.

The finding is significant for showing the impact of gum disease on systemic health. Gum disease causes lesions to develop between the gums and teeth. “The area of this lesion is the size of your palm. It's an open wound that allows the bacteria in your mouth to enter your bloodstream and circulate to other parts of your body, Kantarci explained.

Source: <https://www.mysoorunews.com/cftri-develops-barley-seaweed-based-anti-obese-supplement-seaslim/>

Source: <https://indianexpress.com/article/lifestyle/health/gum-disease-alzheimers-plaque-formation-8826216/>



HEALTH

SMART WATCHES CAN DETECT PARKINSON'S DISEASE BEFORE IT IS DIAGNOSED, FINDS STUDY

Researchers used data from smartwatches to predict which participants will receive a Parkinson's diagnosis.



The researcher's believe that smartwatches could help detect Parkinson's early, before it causes significant nervous system damage. (Pixabay)

Smartwatches are truly incredible devices. To a certain level of accuracy, they can constantly detect your heart rate, blood oxygen saturation, blood pressure and even more. Now, researchers have found that smartwatches could be used to detect Parkinson's disease long before it is detected.

In a study published yesterday in the journal Nature Medicine, researchers have found that wearable movement-tracking devices, like smartwatches with accelerometers, can identify Parkinson's disease long before it is clinically diagnosed. A team of researchers came to this conclusion by analysing more than 103,000 people who wore medical-grade wearables for seven days, measuring their speed of movement continuously, according to Sky News.

Parkinson's disease is a degenerative nervous system disease that mainly affects people's motor systems. Its symptoms usually occur slowly, meaning that often, too much irreversible damage is done before the disease is officially diagnosed. The earliest symptoms include tremors, rigidity, slowness of movement and difficulty with walking. The researchers propose that commonly used smartwatches could be used to detect early signs of the disease.

"We have shown here that a single week of data captured can predict events up to seven years in the future. With these results, we could develop a valuable screening tool to aid in the early detection of Parkinson's. This has implications both for research, in improving recruitment into clinical trials, and in clinical practice, in allowing patients to access treatments at an earlier stage, in future, when such treatments become available," said Cynthia Sandor, corresponding author of the paper, to BBC.

Source:

<https://indianexpress.com/article/technology/science/smartwatch-parkinson-disease-diagnosis-8738541/>

PASSIVELY SCROLLING ON SOCIAL MEDIA LINKED TO ANXIETY, DEPRESSION & STRESS IN NEW STUDY

Passive social media use, where users scroll through others' content without posting their own, has been linked to loneliness, stress and depression in a new study.



The study explored the links between different types of social media use and links to psychological distress. (Image by My Nguyễn from Pixabay)

If you find yourself passively scrolling social media a lot, this might be your sign to take a break. Young adults who browse others' content on social media are more likely to go through anxiety, depression, and stress than active users who share their own content, according to a new study. For the study published in the journal Behaviour & Information Technology, researchers surveyed 288 participants between the ages of 18 and 34 to understand the relationship between various styles of engagement with social media, feelings of loneliness and psychological distress.

The study looked at three types of social media use. This included passive, where users exclusively browsed content by other users, active non-social, where users posted their own content but did not directly engage with other users and active social, where they posted their own content and interacted with other users and their content.

In the study, the researchers found that increased passive social media use was linked to elevated levels of anxiety, depression and stress. Curiously, creating and sharing content while not interacting directly with others online had a positive impact on stress.

"This finding highlights the positive aspects of active non-social media use, such as public content sharing, that allows users to receive feedback, such as likes and positive comments to their posts, but without the demands of direct social interactions. In other words, active non-social media users do not experience the additional pressures from constantly participating or initiating conversations with other people online which can be mentally exhausting," said Constantina Panourgia, corresponding author of the paper, in a press statement.

Source:

<https://indianexpress.com/article/technology/science/social-media-anxiety-depression-stress-8745391/>



S&T COOPERATION FOR GLOBAL SOUTH

NEW OPPORTUNITIES AND A FEW OLD ISSUES AS WICKREMESINGHE COMES CALLING

The Sri Lankan President, who begins his first visit to India after taking charge on July 20, has long been an advocate of close bilateral ties. But he will be in New Delhi for just a day, and he will be carrying some baggage as well.



Prime Minister Narendra Modi shaking hands with his Sri Lankan counterpart Ranil Wickremesinghe before a meeting in New Delhi on October 20, 2018. (Express photo by Tashi Tobgyal)

Sri Lanka's President Ranil Wickremesinghe will arrive in Delhi for two-day official visit on July 20, the first anniversary of his election to office in extraordinary circumstances by the country's Parliament. Sri Lanka's Presidents are directly elected — but Wickremesinghe's predecessor Gotabaya Rajapaksa had been dramatically swept out of office by a popular movement that emerged out of the Sri Lankan economic crisis. Earlier, in an attempt defuse the protests, Rajapaksa had appointed Wickremesinghe as his Prime Minister.

In India-Sri Lanka relations, a year is a long time for a new President to be making his first official visit to New Delhi. Over the last three decades, it has been the practice for India to receive a new Sri Lankan head of state within weeks. In November 2019, External Affairs Minister S Jaishankar had broken that tradition to rush to Colombo within three days of Rajapaksa's election as President, and invited him to New Delhi. Rajapaksa had visited on November 29, 2019, in the same month as he took office.

With Wickremesinghe, New Delhi has been politically standoffish even while helping Sri Lanka with financial assistance and handholding through the negotiations with the IMF for the \$3 bn bailout. Upon his election, India's message lacked the customary warmth conveyed on such occasions.

Source : <https://indianexpress.com/article/explained/explained-global/sri-lanka-president-ranil-wickremesinghe-india-visit-analysis-8846854/>

INDIA SIGNS MOU WITH TANZANIA TO SET UP IIT MADRAS GLOBAL CAMPUS

India signed a Memorandum of Understanding (MoU) with Tanzania on Thursday to establish the first IIT branch abroad, in Tanzania. The campus is expected to open in October 2023, welcoming 50 undergraduate and 20 master's students in its first batch.



External Affairs Minister S Jaishankar and Zanzibar President Hussein Ali Mwinyi at the signing of the agreement on the IIT Madras campus in Zanzibar on Thursday. (ANI)

In a significant development that sets the ball rolling for IIT Madras' global campus to start operations this year, India signed a Memorandum of Understanding (MoU) with Tanzania on Thursday to establish the first IIT branch abroad, in Tanzania.

The IIT Tanzania campus is expected to open in October 2023, welcoming 50 undergraduate and 20 master's students in its first batch. The agreement on Thursday was signed between India's Ministry of Education, IIT Madras and Tanzania's Ministry of Education and Vocational Training Zanzibar. In a tweet on Thursday, External Affairs Minister of India Dr. S. Jaishankar thanked President of Zanzibar Dr. Hussein Ali Mwinyi for being present during the MOU signing that, he said, reflects "India's commitment to the Global South."

Education Minister Dharmendra Pradhan tweeted, "The initiative is an embodiment of PM @narendramodi's commitment to strengthen South-South cooperation as well as forge stronger people-to-people ties with Africa."

IIT Madras is expected to launch four undergraduate and five postgraduate programmes from the Zanzibar campus. While IIT Madras will have the lat word on academic programmes, curricula and student selection criteria, the capital and operating expenditure will be met by the government of Zanzibar-Tanzania, the MEA said in a statement. Students graduating from this camps will be awarded IIT Madras degrees.

Source : <https://indianexpress.com/article/education/india-signs-mou-with-tanzania-to-establish-iit-madras-first-global-campus-in-zanzibar-je-main-je-advanced-2023-8782842/>



S&T COOPERATION FOR GLOBAL SOUTH

DEVELOPMENT CORE ISSUE FOR GLOBAL SOUTH: PM MODI AT G20 MEET

Highlighting the issue of growing data divide, Modi said that high-quality data is critical for meaningful policy-making, efficient resource allocation, and public service delivery.



Prime Minister Narendra Modi addressing the Development Ministers' Meeting of G-20 via video-conferencing. (PTI)

Voicing the concerns of the Global South at the G20 Development Ministers' meeting in Varanasi on Monday, Prime Minister Narendra Modi said that "development is a core issue for the Global South".

"The countries of Global South were severely impacted by the disruptions created by the global Covid pandemic. And, the food, fuel, and fertiliser crises because of geopolitical tensions have delivered another blow... We must ensure that no one is left behind," he said, "It is imperative for this group to send a strong message to the world that we have an action plan to achieve this."

Modi also called for reforms in multilateral financial institutions, particularly in expansion of eligibility criteria, to ensure that "finance is accessible to those in need". He cited India's Aspirational Districts programme. Calling them pockets of under-development, he said, "Our experience shows that they have now emerged as the catalysts of growth in the country. I urge the G20 Development Ministers to study this model of development. It may be relevant as you work towards accelerating Agenda 2030."

Highlighting the issue of growing data divide, Modi said that high-quality data is critical for meaningful policy-making, efficient resource allocation, and public service delivery. He said that "the democratisation of technology is a crucial tool to help bridge the data divide". In India, he said, digitalisation has brought about a revolutionary change where technology is being used as a tool to empower people, make data accessible, and ensure inclusivity.

Source : <https://indianexpress.com/article/india/pm-narendra-modi-g20-development-ministers-meeting-8658089/>

WHAT IS THE FIPIC SUMMIT THAT PM MODI ATTENDED IN PAPUA NEW GUINEA?

The Forum for India–Pacific Islands Cooperation (FIPIC) was launched during PM Modi's visit to Fiji in November 2014 and includes 14 island countries.



Prime Minister Narendra Modi poses with leaders of the Forum for India-Pacific Islands Cooperation (FIPIC) in Port Moresby, Papua New Guinea, Monday, May 22, 2023. (PTI Photo)

What is FIPIC?

The Forum for India–Pacific Islands Cooperation (FIPIC) was launched during PM Modi's visit to Fiji in November 2014. FIPIC includes 14 island countries – Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu – that are located in the Pacific Ocean, to the northeast of Australia.

What was the idea behind FIPIC?

According to the group's website, despite their relatively small size and considerable distance from India, many of these islands have large exclusive economic zones (EEZs). EEZs is the distance up to which a coastal nation has jurisdiction over the ocean, including both living and non-living resources. It generally goes to 200 nautical miles or 230 miles (around 370 km) beyond a nation's territorial sea.

As the website notes, India's larger focus is on the Indian Ocean where it has sought to play a major role and protect its strategic and commercial interests. The FIPIC initiative then marks a serious effort to expand India's engagement in the Pacific region as well. After the summit, PM Modi went for his visit to Sydney, Australia, from May 23 and 24. The references to "developments in the Indo-Pacific region" and a "vision for a free, open and inclusive Indo-Pacific" are believed to be related to China's increasing assertion in the region.

The PM also said at the FIPIC summit, "A friend in need is a friend indeed", and told leaders of the 14 countries that those that they had considered trustworthy were "not standing by our sides in times of need" – again believed to be a reference to China.

Source : <https://indianexpress.com/article/explained/everyday-explainers/fipic-summit-pm-modi-papua-new-guinea-explained-8624416/>



OTHERS

NATIONAL RESEARCH FOUNDATION APPROVED STATE OF SCIENCE: WHERE INDIA LAGS

While India has a large pool of science and engineering students and is involved in frontline research areas globally, it fares poorly on several key parameters, which the NRF has the potential to address.

The government's approval last week for a National Research Foundation (NRF) is being widely welcomed by the scientific community. The NRF has the potential to, single-handedly, address a whole range of deficiencies in India's scientific research sector that have been flagged for years now.

A huge pool of science and engineering graduates, a large network of laboratories and research institutions, and active involvement in some of the frontline areas of scientific research usually puts India among the leading countries with deep scientific abilities. However, in comparative terms, India lags behind several countries, some with much more limited resources, on a variety of research indicators.

Expenditure on R&D

Primary among these is the money India spends on research and development activities. For more than two decades now, the Centre's stated objective has been to allocate at least two per cent of the national GDP on R&D. Not only has this objective not been met, the expenditure on research as a proportion of GDP has gone down, from about 0.8 per cent at the start of this millennium to about 0.65 per cent now. For the last decade or so, this share has remained stagnant.

This does not mean that money for research has not increased. The spending on research has more than tripled in the last 15 years, from Rs 39,437 crore in 2007-08 to over 1.27 lakh crore in 2020-21. But India's GDP has grown faster, and so the share of research has gone down.

At least 37 countries spent more than 1 per cent of their GDP on R&D in 2018, the last year for which data from all countries is available, according to the 2021 UNESCO Science Report. Fifteen of these spent two per cent or more. Globally, about 1.79 per cent of (world) GDP is spent on R&D activities. Unlike India, at the global level, growth in R&D expenditure has outpaced GDP growth.

Source : <https://indianexpress.com/article/explained/explained-sci-tech/national-research-foundation-approved-state-of-science-where-india-lags-8751448/>

CATS' SENSE OF SMELL WORKS JUST LIKE HIGHLY-ADVANCED CHEMICAL ANALYSIS TECH, FINDS STUDY

Did you ever wonder how cats have such a great sense of smell? It could be because their noses work like advanced chemical analysis equipment, as a study found out.



Cats have a much better sense of smell than humans. (Image by Iboya Horváthné Cserfalvi from Pixabay)

It is a running joke on the internet that cats are superior to dogs because they wouldn't work for the police. But there is a good chance that police cats are a great idea because their sense of smell works like highly-efficient chemical analysis equipment, according to a new study.

In the study published in the journal PLOS, researchers found that cats' noses and their complicated internal structures work similarly to "parallel coiled gas chromatographs"—a lab equipment that is used for the highly-efficient analysis of different substances' chemical makeups.

Previous studies have already posited that odour detection in vertebrates might work similarly to basic gas chromatography. Basically, when vertebrates smell something, they are actually inhaling vapourised substances that are carried through a tube, or their nasal system. The different components of the substance interact with this "tube" in different ways, allowing identification of the different components. This is interpreted by the brain as a smell.

Parallel coiled gas chromatography takes the efficiency of gas chromatography to the next level. The technique works just like basic chromatography but boosts it using multiple tubes branching off from one high-speed gas stream. The researchers found a similar situation with cats' olfactory systems.

Source : <https://indianexpress.com/article/technology/science/cats-smell-advanced-chemistry-8694288/>



OTHERS

HONEY BEES CAN MAKE BETTER AND FASTER DECISIONS THAN HUMANS, REVEALS STUDY

A new study finds that bees can use their rudimentary brains to make rapid good decisions.



Rapid and accurate decision-making essential for honeybees. (Image by Pexels from Pixabay)

There will never be enough said about the humble honeybee. They are an important part of many ecosystems, playing the part of pollinators and even producing the highly nutritious and delicious food consumed by many species—honey. New research reveals how these little creatures have been “engineered” over millions of years to make fast decisions that reduce risk.

Not only does the study published in the journal *eLife* yesterday give a better understanding of insect brains, but it can also help us understand how our own brains evolved and how to design better robots, according to Macquarie University. The research paper reveals a model of decision-making amongst bees and also outlines the paths in their brains that allow them to make fast decisions.

“Decision-making is at the core of cognition. It’s the result of an evaluation of possible outcomes, and animal lives are full of decisions. A honey bee has a brain smaller than a sesame seed. And yet she can make decisions faster and more accurately than we can. A robot programmed to do a bee’s job would need the backup of a supercomputer,” said Andrew Barron, corresponding author of the study, in a press statement. Barron is a professor at the university.

According to Barron, this investigation of the bees’ brains will help develop better drones that work autonomously. Most sufficiently advanced drones at the moment could be thought of as “brainless,” since they need to receive commands from somewhere else in order to function. But if the science that powers the sesame seed-sized brains of bees could somehow be translated into the world of drones, we could perhaps have much “smarter” drones, some even capable of working autonomously in remote locations like Mars.

Source :

<https://indianexpress.com/article/technology/science/honey-bee-decision-making-artificial-intelligence-8826543/>

OCTOPUSES' SLEEP FOUND TO HAVE ACTIVE AND QUIET PHASES, SIMILAR TO HUMAN SLEEP

Scientists further determined the waves to occur in octopuses’ brain regions associated with learning and memory



The quiet slumbering periods of octopuses’ sleep have been observed to be interrupted by frenzied activity highlighting remarkable similarities between sleeping behaviours of octopuses and humans. | Photo Credit: Reuters

The quiet slumbering periods of octopuses’ sleep have been observed to be interrupted by frenzied activity, such as twitching of arms and eyes and quickening of breathing rate, highlighting remarkable similarities between sleeping behaviours of octopuses and humans.

Examining neural activity and skin patterning in octopuses during this active period of sleep, researchers found them to resemble those seen when the octopuses were awake, terming it ‘wake-like’ activity.

Wake-like activity also occurs during rapid eye movement (REM) sleep in mammals, or the sleep phase associated with dreaming.

“All animals seem to show some form of sleep, even simple animals like jellyfish and fruit flies. But for a long time, only vertebrates were known to cycle between two different sleep stages,” said senior author, Sam Reiter, who leads the Computational Neuroethology Unit at OIST.

The team also discovered that preventing their sleep or disrupting their active sleep phase only led to the octopuses later entering active sleep sooner and more frequently, thus, “nailing down the active stage as being an essential stage of sleep needed for octopuses to properly function,” according to Aditi Pophale, co-first author of the study published in the journal *Nature* and PhD student at OIST.

Source : <https://www.thehindu.com/sci-tech/science/octopus-human-phases-of-sleep-rem-active-period-of-sleep-dreaming/article67036634.ece>