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Innovations and Contributions by CSIR labs

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CSIR-NEERI Deemed National Centre Of Excellence for Green Crackers

- CSIR–National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur, has been designated as the National Centre of Excellence on Green Firecrackers (NCoE-GF) with the formal inauguration conducted by Dr N Kalaiselvi, director general, CSIR and secretary, CSIR.
- The green firecracker research symbolises a balance between tradition and environmental responsibility.
- With Sivakasi's economy heavily dependent on firecrackers, the new centre would help ensure safer, cost-effective products and faster certification.
- At the same time, the Centre of Excellence on Green Firecrackers (CoE-GF) was inaugurated at CSIR-CECRI, Karaikudi.

CSIR-CCMB maps harmful bacteria across Eastern Ghats reservoirs in first eDNA study

- Scientists from the CCMB's Laboratory for Conservation of Endangered Species (LaCONES) have identified harmful bloom-forming bacteria in several major reservoirs across the country.
- While harmful bloom-forming bacteria were detected in the Pulichintala dam in Andhra Pradesh and the Krishnagiri dam in Tamil Nadu, the Nagarjuna Sagar Dam in Telangana exhibited a contrasting microbial profile characterized by the presence of nitrogen-fixing bacteria.
- This is the first large-scale study of bacterial communities across lakes and reservoirs in the Eastern Ghats. The findings come from a study that used environmental DNA (eDNA) testing to detect bacterial communities in water bodies.

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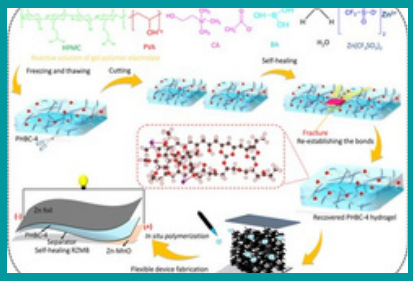

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CSIR-NCL Develops Self-Healing Hydrogel Electrolyte for Safer, Flexible Zinc-Metal Batteries

- **CSIR-National Chemical Laboratory (CSIR-NCL) has announced a major advancement in battery materials science with the development of a Self-Healing Hydrogel Electrolyte designed for next-generation rechargeable zinc-metal batteries.**
- **The Self-Healing Hydrogel Electrolyte, developed by a team led by Dr Sreekumar Kurungot and PhD researcher Priyanka Pandinhare Puthiyaveetil, is a newly engineered hydrogel polymer material named PHBC-4.**
- **Its design integrates hydrogen bonding, dynamic polar covalent B–O interactions, and Zn–O coordination bonding to form a reinforced polymer network that suppresses zinc dendrite formation, the primary cause of short-circuiting and premature failure in conventional zinc-metal batteries.**

India begins commercial operations of its first hydrogen fuel cell vessel in Varanasi

- **India launched its first indigenous hydrogen fuel cell vessel at Namo Ghat, flagged off by Union Minister of Ports, Shipping and Waterways Sarbananda Sonowal on December 11, 2025.**
- **The 24-metre hydrogen-powered catamaran begins regular commercial service, marking a step toward cleaner and modern inland water transport.**
- **The vessel was designed and built indigenously by Cochin Shipyard Limited under the Harit Nauka initiative of the Ministry of Ports, Shipping and Waterways.**
- **Powered by a hydrogen fuel cell and a battery system, the vessel can carry up to 50 passengers and produces zero emissions, releasing only water and heat**

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CMSCRI Scientist develops affordable and easy to use UTI Detection Kit

- **A scientist at Bhavnagar's Central Science and Marine Chemicals Research Institute (CMSCRI) has come out with a kit for detecting urine infection that allows to carry out tests anywhere and is around 80 per cent cheaper than the cost of the test elsewhere.**
- **This kit performs the test in less time and can be particularly useful in rural areas where both men and women contact urinary tract infections (UTIs) while defecating.**
- **Dr. S. Haldar, Chief Scientist at CSMCRI, said that a urine infection can be detected with the naked eye by observing a colour change after creating a simple membrane from a urine sample.**

CSIR-CFTRI plans to customise foods for astronauts, athletes, and India's ageing population

- **The Mysuru-based Central Food Technological Research Institute (CFTRI) is focusing on developing advanced food technologies, including space foods for astronauts, endurance-enhancing foods for sportspersons, and nutrition-rich foods for the elderly.**
- **Scientists at the premier food research institute are working on special food technologies, including a three-meal nutrition kit for senior and super-senior citizens.**
- **Giridhar Parvatham, Director of CFTRI, stated that the institute is developing foods for astronauts with a special emphasis on bone health as bone-related issues have been identified as a concern.**

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Climate resilient building developed by CBRI

- The CSIR–Central Building Research Institute (CSIR– CBRI), Roorkee, has successfully developed a Climate Resilient Building (CRB) at the CSIR– Central Electronics Engineering Research Institute (CSIR–CEERI) campus.
- The building promotes low-carbon, climate-responsive infrastructure, especially for hot-dry regions of India. It reduces carbon emissions, electricity demand, and dependence on mechanical cooling.
- The facility was virtually inaugurated by Dr. N. Kalaiselvi, Director General of the Council of Scientific and Industrial Research (CSIR), who emphasized its importance for sustainable construction and large-scale adoption.

Tiger gut microbes reflect human pressure in India's wildlife reserves, study finds

- CSIR–CCMB studied the gut microbiome of Bengal tigers using faecal samples from five Indian tiger reserves to assess the impact of habitat, season, and human disturbance on gut bacteria.
- The study found that habitat, season, and human disturbance significantly influence tiger gut bacteria, with buffer-zone tigers showing distinct microbial patterns compared to those in core forest areas.
- They used a technique called DNA metabarcoding to read the bacteria in the sample and made a list of thousands of bacterial species.

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CSIR-NIO study links ice ages to volcanic, hydrothermal activity

- **Scientists from CSIR–NIO, Goa, found that ice age periods increased underwater volcanic activity, leading to more carbon dioxide being released into the ocean.**
- **The study looked at deep-sea sediments from the Indian Ocean to understand how changes in sea level affected underwater volcanoes over thousands of years.**
- **By analysing chemical traces in ocean sediments, researchers were able to track past volcanic and hydrothermal activity on the ocean floor.**
- **The findings help scientists better understand how climate changes in the past influenced underwater volcanic systems.**

Researchers develop two-layer implant to repair joint injuries

- **Scientists at the CSIR–Central Leather Research Institute (CLRI) have created a new implant that helps heal damaged joints by repairing both the soft cartilage and the bone underneath together.**
- **Tests on animals showed that damaged knee joints healed almost completely within 12 weeks after using the implant.**
- **The implant is designed like a natural joint, with a soft upper layer to help cartilage grow and a strong lower layer to support bone healing.**
- **Lab tests showed the implant is safe, does not harm living cells, and helps cells grow, making it promising for future joint treatments.**

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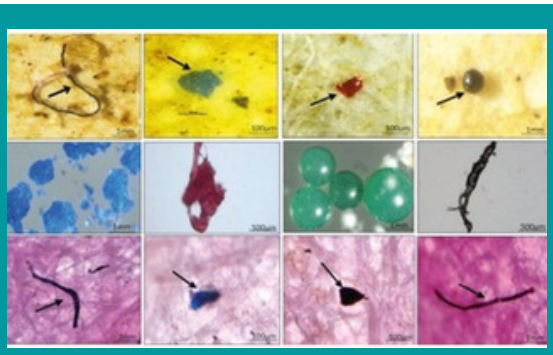

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CSIR-NIO study finds microplastics in urban wastewater

- **Scientists at the CSIR–National Institute of Oceanography (CSIR–NIO), Goa, have found high levels of harmful microplastics in sewage from across Panaji, showing that urban wastewater is a major source of plastic pollution in water bodies.**
- **The study found that everyday household activities, such as washing synthetic clothes and using personal care products, release tiny plastic particles into sewage systems.**
- **Researchers confirmed that sewage acts as a key pathway through which microplastics travel from land into rivers, seas, and oceans.**
- **The scientists suggest that improving wastewater treatment processes could significantly reduce the amount of microplastics entering the aquatic environment.**

Palnadu village startup converts paddy waste into tableware

- **A women-led startup near Narsaraopet is turning farm waste into eco-friendly tableware, offering a plastic-free option for social events and daily use.**
- **The startup, called 'Agriware', is based in Kakani village of Palnadu district and makes biodegradable plates, cups, spoons, and bowls.**
- **These products are made using agricultural waste like rice husk, rice bran, and paddy straw, which break down naturally and do not harm the environment.**
- **The founders started the venture after noticing the heavy use of plastic at functions and invested nearly ₹3 crore to set up a unit focused on reducing plastic pollution.**

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