SCIENCE AND SOCIETY NEWSLETTER

Innovations and Contributions by CSIR labs

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CSIR-IICT Scientists develop cost-effective technology to convert plastic packaging waste into fuel

- Scientists at Indian Institute of Chemical Technology have developed a technology that converts everyday multilayer plastic packaging waste into usable fuel.
- The process targets difficult-to-recycle waste such as biscuit wrappers, chocolate wrappers, and chip packets made of plastic layers with thin metallic coatings.
- The plastic waste is first shredded and tightly compacted before undergoing pyrolysis—a process in which materials are heated at high temperatures in the absence of oxygen to break them down into oil and other products—preventing metal particles from mixing with the oil produced.
- The compacted waste is heated to about 500 °C, producing crude-like oil that is further refined to obtain fuel comparable to conventional diesel.

India's Scientific effort to Secure the Future of Cheetahs

- Nine cheetahs from Botswana have been introduced into Kuno National Park, advancing India's ambitious cheetah reintroduction programme.
- Since the first relocation from Namibia in 2022 and additional arrivals from South Africa in 2023, India's cheetah population has grown to about 39 animals, including cubs born in the country.
- Scientists at CSIR-Centre for Cellular and Molecular Biology are conserving cheetah cells at Laboratory for the Conservation of Endangered Species (LaCONES) to preserve genetic material and ensure the species' long-term survival.

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Discarded silkworm pupae can be used as high-nutritional-value livestock feed: CSIR-CFTRI chief

- Central Food Technological Research Institute director Dr Giridhar Parvatham highlighted that discarded silkworm pupae can be used as a high-nutritional livestock feed instead of being treated as waste.
- At the Reshme Krishi Mela in Mysuru, he noted that silkworm cocoons contain only about 14–23% silk shell, while nearly 80% is pupae, most of which is currently discarded.
- Dried silkworm pupae are highly nutritious, containing 55–60% protein and 30–35% lipids, along with carbohydrates, vitamins, and minerals.
- The lipids in pupae are rich in omega-3 fatty acids, making them beneficial for cardiovascular and brain health and a promising alternative livestock feed resource.

Indian scientists develop Nanofibre membranes that remove 99% toxic dye contamiation from textile waste

- Scientists at Indian Institute of Chemical Technology have developed advanced nano fibre membranes that can effectively remove toxic dye pollutants from textile industry wastewater.
- Textile dyes such as crystal violet, widely used in fabric colouring, can contaminate groundwater when released untreated and pose serious risks to aquatic life and human health, with some dyes being carcinogenic.
- The research team led by Dr Sundergopal Sridhar created the filtration membrane using electrospinning technology, offering a promising low-cost solution for treating textile effluents.
- The membrane incorporates nano-materials like ZIF-67 and graphene oxide, which enhance its ability to capture and remove dye molecules from polluted water.

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Study warns of extinction risk for Lion-Tailed Macaques

- A study by geneticists from Hyderabad and the University of Mysore has revealed a strange paradox: while lion tailed macaque numbers have increased in private forest fragments, the species actually faces a higher risk of long-term extinction.
- While populations remain demographically stable within protected government forest reserves, researchers have issued a "Red Alert" for those living in non-protected areas like private tea and coffee estates.
- Infrastructure and human-dominated disturbances, such as roads and power lines, are creating a worrying and dangerous shift for the endangered primates throughout the Western Ghats.
- Led by Dr. G. Umapathy from the Centre for Cellular and Molecular Biology (CCMB), the research team monitored 37 groups and nearly 800 individual macaques across the Anamalai Hills to reach these findings.

Rare Himalayan Bacterium may hold cure for Cancer, TB: CSIR-IICT Scientists

- Scientists from Indian Institute of Chemical Technology discovered a rare medicinal compound from soil bacteria in the Leh-Ladakh region.
- The compound, named pimprinithine, shows strong potential for treating diseases like cancer and tuberculosis.
- The study, led by Dr R S Prakasam and Dr Linga Bhanot, highlights how soil microorganisms produce valuable bioactive compounds.
- Researchers found that bacteria in extreme cold environments develop unique chemicals, offering promising applications for future medicine.

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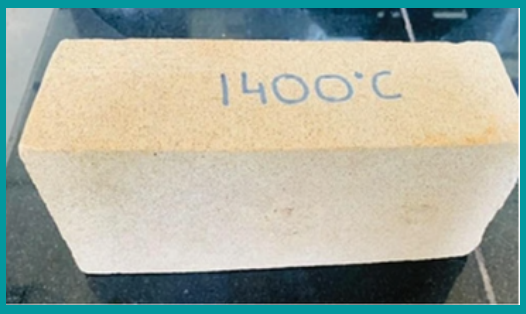

Image Source: newindianexpress.com

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CSIR-IMMT researchers develop eco-friendly brick which can withstand high temperatures

- Researchers at CSIR–Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, have developed innovative refractory bricks by utilizing bauxite mining waste, offering a sustainable and practical solution to industrial waste management.
- These eco-friendly bricks are capable of withstanding extremely high temperatures, making them highly suitable for use in demanding industrial applications such as coke ovens, glass manufacturing units, and kiln roofs.
- Mining activities generate hundreds of billions of tonnes of waste globally each year, with the issue being particularly severe in mineral-rich Indian states like Odisha, Jharkhand, Chhattisgarh, and Goa.
- The use of bauxite waste in brick production helps reduce environmental pollution, including air contamination and water acidity, while also providing a cost-effective and sustainable alternative for industrial use.

Kusunupur village in Odisha selected as CSIR Smart Village, paving way for rural innovation

- Kusunupur in Kendrapara district, Odisha has been chosen under the Council of Scientific and Industrial Research 'Smart Village' initiative, gaining national recognition for rural transformation.
- The village stands out as the only selection from eastern India, placing it on the national map for scientific rural development and innovation-driven growth.
- The programme aims to improve agriculture, livelihoods, nutrition, education, and disaster resilience, treating villages as "living laboratories" for real-world implementation of scientific solutions.
- Kusunupur joins five other villages—Bhada (Gujarat), Chumathang (Ladakh), Jorhat (Assam), Janakpur (Madhya Pradesh) and Sawaipura (Rajasthan)—in a three-year CSIR initiative to develop scalable rural models across varied climatic regions.

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Chennai CSIR Innovation: Smoother, Jerk-Free Bridge Travel

- **Scientists at CSIR-Structural Engineering Research Centre have developed a new technology to eliminate noise and jerks experienced by motorists on overbridges.**
- **The innovation allows bridges to be built without conventional iron expansion joints, ensuring smoother travel and reducing maintenance costs.**
- **Using advanced cement composites, the specially designed material removes the need for traditional expansion gaps in bridge structures.**
- **This approach also addresses long-term issues like debris accumulation and wear in joints, improving durability and overall driving comfort.**

Hidden Antibiotic Resistance found in urban wastewater

- **Wastewater in big Indian cities contains a large amount of Antimicrobial Resistance, much of it coming from unknown types of microbes.**
- **Scientists from CSIR-Centre for Cellular and Molecular Biology and CSIR-National Environmental Engineering Research Institute studied 447 wastewater samples from different cities over two years to understand this better.**
- **They found that while the types of microbes change from city to city, the antibiotic resistance genes are similar everywhere, showing that the problem is spreading widely. Many microbes found were new and not studied before.**
- **The wastewater had many genes resistant to common antibiotics like Tetracycline and Beta-lactam antibiotics, and these genes can easily spread between bacteria.**