SCIENCE AND SOCIETY NEWSLETTER

Innovations and Contributions by CSIR labs

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CSIR-NAL Ready for Pilot Trainer Aircraft Production

- CSIR-National Aerospace Laboratories (NAL) in Bengaluru has tied up with a private firm, Pioneer Clean AMPS Pvt. Ltd., to boost the production of its pilot trainer aircraft, Hansa-3 Next Generation (NG).
- This is the first time the technology for an aircraft would be fully designed and developed in India.
- Hansa-3 NG is a two-seater aircraft and the latest, more durable version of the Hansa aircraft being made since 1998.
- There's a huge demand for such trainer aircraft from flying clubs for training commercial pilots.
- While imported trainer aircraft cost Rs. 6 crore, Hansa-3 NG would cost just Rs. 3 crore.
- The private company is expected to set up manufacturing units and handle marketing, servicing and after-sales.

CSIR-NAL Revolutionizes Solar Water Heating with Eco-friendly Coating

- CSIR-National Aerospace Laboratories (NAL) has developed a special coating for solar water heaters, reducing dependency on imported coatings.
- This sprayable coating is eco-friendly, scalable, cost-effective and safer than conventional coatings using harmful chemicals, as it uses water as a solvent.
- The coating increases sunlight-to-heat conversion efficiency up to 70%.

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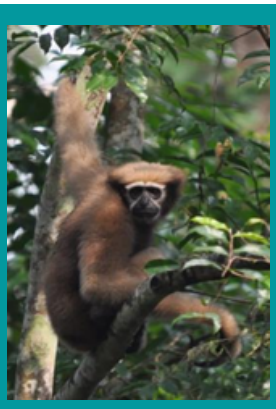

Image Source: ccmb.res.in

CSIR-CCMB Genome Study Sheds Light on Primate Evolution and Survival

- **A team from the CSIR-Centre for Cellular and Molecular Biology (CCMB) in Hyderabad has come up with a new study which discusses how genetic changes shaped major traits of primates including monkeys, apes and lemurs.**
- **The researchers focused on traits such as brain and body size, diet, mobility, vision, and survival strategies in extreme environments.**
- **The scientists delved into adaptations in monkeys that live in high-altitude areas and limestone caves, the evolution of colour vision in some species, and the evolution of tailless apes and agile gibbons.**
- **The study titled 'Genomic Basis of Non-Human Primate Diversity and Adaptation' in Nature Reviews Biodiversity combines decades of data and uses high-resolution genome sequencing to explore how primates adapted to various ecological niches.**

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Image Source: clri.org

A Radically New Variety of Leather for a Warmer World Developed by CSIR-CLRI

- Scientists from CSIR–Central Leather Research Institute (CLRI) of Chennai have created 'cool leather' suitable for warmer climates.
- Leather is generally preferred in colder climates and it is difficult to imagine people wearing leather in tropics or deserts.
- Along with researchers from Egypt, researchers at CLRI found a way to coat leather with tiny heat-storing elements, making it thermally adaptive.
- Their new composite has excellent heat absorption capacity.
- "This material merges the ancient art of leather production with next-generation material science," Venkatesan Natesan, a researcher from CSIR-CLRI, told Nature.

CSIR-CRRI Develops Tech to Repair Potholes in 20 Minutes

- CSIR-Central Road Research Institute (CRRI) of New Delhi has developed a steel slag-based instant pothole repair technology 'ECOFIX'.
- The mix is made using metallurgical waste from the steel industry, making it an environmentally sustainable option.
- The Public Works Department conducted a live trial of the ready-to-use mix on Delhi Secretariat Road.
- They managed to repair both waterlogged and dry potholes without dewatering.

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Image Source: cmeri.res.in

CSIR-CMERI Unveils E-Tractor and E-Tiller Technology at Ludhiana

- **CSIR-Central Mechanical Engineering Research Institute (CMERI) of West Bengal has developed cutting-edge electric farming solutions which can transform Indian agriculture.**
- **Designed for small and marginal farmers, the developed technologies feature low vibration, easy maintenance, women-friendly ergonomics, and zero emissions, delivering long-term economic and environmental benefits.**

Newly Identified Property of Metallo-nanozymes Could Transform Bioenergy and Therapeutic Applications

- **Scientists from CSIR–Central Leather Research Institute (CLRI) of Chennai have found that metallo-nanozymes or artificial biocatalysts are capable of controlling electron transfer.**
- **Nanozymes are nanomaterials with enzyme-like properties, having applications in biosensing, bioimaging and tumor diagnosis.**
- **Electron transfer is a crucial process for regulating cellular energy.**
- **Current-generation nanozymes suffer from uncontrolled electron transfer which leads to unwanted side reactions.**
- **In contrast, electron flow can be precisely controlled in next-gen nanozymes.**
- **This newly-identified property of metallo-nanozymes has huge implications for biological systems.**

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Odisha's Olive Ridleys Unalike Global Populations Genetically

- **A new study from CSIR–Centre for Cellular and Molecular Biology (CCMB) in Hyderabad has found that not only are the famed Olive Ridley turtles of Odisha genetically distinct from their global counterparts, but also differ significantly from those in Sri Lanka.**
- **Research and monitoring was initiated in the late 2000s for the Olive Ridley turtles of Odisha.**
- **The study suggests that a certain population in the Indian Ocean region survived while populations in other ocean basins got completely rooted out following climatic changes before and after the closure of the Isthmus of Panama.**
- **Indian Olive Ridley turtles are remnants of the population that survived.**

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CSIR-NEERI Study Rings Alarm Bells for Godavari River

- A new study by CSIR-National Environmental Engineering Research Institute (NEERI), Nagpur and IIT Hyderabad has revealed that the river Godavari, which is the lifeline of Telangana and Andhra Pradesh, is reeling under severe pollution.
- Untreated urban sewage from Telangana and discharge from industries along the river in Maharashtra are contaminating the 'Dakshin Ganga', as Godavari is often called.
- Unauthorised construction, deforestation and encroachments along its 1460 km span from Nashik in Maharashtra to West Godavari district in AP has added to the pollution.
- Not just this, these activities have even resulted in disruption of the river's natural flow, and increased flooding incidents.

CSIR-CSMCRI's Experimental Salt Works Inaugurated

- CSIR-Central Salt & Marine Chemicals Research Institute (CSMCRI) in Bhavnagar has developed a world-class experimental salt works on 180 acres to demonstrate lab-scale technology at field scale.
- The salt station will help improve salt production using innovative technologies.
- The researchers aim to use the station to teach salt producers efficient rainwater and resource management, precision-controlled brine flow and how to optimize solar energy use while reducing carbon footprint.

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CSIR-SERC Develops Two New Innovative Building Blocks

- CSIR–Structural Engineering Research Centre (SERC) of Chennai has developed two technologies.
- The first novel product features eco-friendly geometrically-shaped blocks made using industrial waste, that make the building earthquake-resistant.
- The scientists combined calcium carbide sludge and fly ash, both industrial waste products, with just 10% cement to make these blocks.
- The second innovation involves thermally efficient blocks made by sandwiching thermocol between ferro-cement layers.
- They have constructed a building inside their Taramani complex to demonstrate both the technologies.
- The patent for these technologies is under process.

High Level of Dissolved Lead in Indian Ocean: CSIR-NIO Study

- A study by CSIR–National Institute of Oceanography (NIO) of Goa has found that the concentration of dissolved lead in the Indian Ocean is much higher than in the Atlantic and Pacific oceans.
- The researchers conducted the study based on seawater samples collected during cruises in 2020 and 2021.
- Lead is toxic, with even small quantities of the metal being dangerous for vulnerable populations such as children and pregnant women.
- This makes understanding lead dynamics in the Indian Ocean region crucial.

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CSIR-CCMB Kick-starts GenomeIndia Project to Give Impetus to Precision Medicine in India

- **The GenomeIndia Project – India's reference dataset for genetics and genomics – could help improve how disease is diagnosed, predict one's response to a drug and provide impetus to precision medicine efforts in India, according to a research article.**
- **Launched in 2020 by the Department of Biotechnology, GenomeIndia aims to build a database that captures the genetic diversity of India's population.**
- **In the first phase, genomes of 10,000 individuals were sequenced by a team of researchers from over 20 Indian institutes, including the CSIR–Centre for Cellular and Molecular Biology (CCMB) of Hyderabad and the All India Institute of Medical Sciences.**
- **83 population groups – 30 tribal and 53 non-tribal – representing different linguistic groups and geographical regions were meticulously selected for the study.**

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Image Source: clri.org

CSIR-CLRI Set to Give Maharashtra's Iconic Kolhapuri Chappal a Stylish Makeover

- Chennai-based CSIR–Central Leather Research Institute (CLRI) has signed an MoU with Kolhapur's Kalapuri Foundation which supports 200 Kolhapuri chappal-making families.
- Artisans involved in the 700-year-old handicraft still use traditional techniques.
- The chappals have their own drawbacks such as absence of anti-slip soles and colour bleeding. Their stiff leather also makes them uncomfortable to wear for a long time.
- Additionally, the production of these chappals is seasonal as leather catches fungus during monsoon.
- Kalapuri has joined hands with CLRI to find practical solutions for these problems. They hope to upskill artisans, reduce their time and effort, introduce new designs and improve comfort of the wearers.
- Recently, Prada, the Italian luxury fashion house, was in the news for all the wrong reasons for copying the Kolhapuri chappal design without proper attribution.

CSIR-CCMB Team Finds Lipids Also Guide Evolution

- Proteins are long chains of amino acids that cells make using instructions from the DNA.
- Lipids were seen until now as just a packing material for proteins.
- But new research from CSIR-Centre for Cellular and Molecular Biology (CCMB) in Hyderabad has found that lipids - the fat in cells - too, may play a role in evolution.