SCIENCE AND SOCIETY NEWSLETTER

Innovations and Contributions by CSIR labs

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Samudra Pradakshina: First-Ever Tri-Service All-Women Expedition with NIO

- In a historic first, an all-women crew from the Army, Navy, and Air Force has set out on a global sea expedition named Samudra Pradakshina.
- The voyage will cover 21,600 nautical miles, crossing all longitudes and the Equator, in line with the strict norms of the World Sailing Speed Record Council.
- Sailing onboard the indigenously built yacht IASV Triveni, the team will face some of the toughest oceanic challenges, including the treacherous Cape Horn passage.
- Alongside seamanship, the crew will collaborate with the National Institute of Oceanography (NIO) to carry out scientific studies on marine biodiversity, microplastics, and the health of oceans.

CSIR-CCMB and IISER Kolkata Develop Metal-Based Compounds to Treat Breast Cancer

- In a major breakthrough, researchers from CSIR–Centre for Cellular and Molecular Biology (CCMB), Hyderabad, and IISER Kolkata have developed metal-based compounds with the potential to treat aggressive forms of breast cancer.
- Unlike traditional treatments such as chemotherapy, radiation, or surgery—which often harm healthy cells—these compounds are designed to selectively target and destroy triple-negative breast cancer cells, one of the most difficult-to-treat cancers.
- The compounds work by entering cancer cells, disabling their natural defence proteins, and triggering self-destruction through ferroptosis and autophagic cell death.
- This approach offers a promising alternative for patients resistant to conventional therapies, while reducing harmful side effects.

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Eustoma Cultivation Opens New Chapter in Odisha's Floriculture

- For the first time, the exotic North American flower Eustoma has bloomed in Sanatanpali village, Sambalpur, thanks to the efforts of 25-year-old farmer Itish Pradhan.
- With support from CSIR–National Botanical Research Institute (NBRI), Lucknow, the local administration, and the Green Sanatanpali Farmer Producer Organisation, Itish successfully cultivated the flower inside a poly house.
- A bunch of Eustoma can fetch up to ₹1,500 in export markets, offering farmers a high-value crop option beyond traditional paddy cultivation.
- The successful trial has yielded promising results.
- This initiative not only marks a new chapter in Odisha's horticulture journey but also opens fresh opportunities for farmers seeking sustainable income through floriculture.

CSIR-CIMAP Researchers Show AI Can Detect Adulteration in Medicinal Plants

- The research team led by C.H. Ratnasekhar at CSIR–CIMAP (Central Institute of Medicinal and Aromatic Plants) has developed an artificial intelligence–based solution to detect adulteration in medicinal plants.
- By integrating high-resolution mass spectrometry with advanced machine learning techniques, the team has created a precise and reliable method to verify the authenticity and purity of herbal raw materials.
- The technology can identify the geographical origin, plant variety, and specific plant parts with an accuracy of over 98%.
- This innovation not only ensures the authenticity of botanicals like turmeric, ashwagandha, and basil, but also strengthens consumer trust and protects the livelihoods of Indian farmers.

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GPS Renewables Partners with CSIR-NCL to Develop Sustainable Aviation Fuel (SAF)

- **GPS Renewables, a global leader in renewable oil and gas solutions has joined hands with CSIR–National Chemical Laboratory (CSIR-NCL) to develop the world's first commercial-scale production of Sustainable Aviation Fuel (SAF) from ethanol. The same technology can also produce SAF from methanol.**
- **Under the partnership, GPS Renewables will invest in advancing CSIR-NCL's patented catalyst technology that enables one-step oligomerization of ethylene and other olefins—transforming smaller molecules into larger ones that replicate Aviation Turbine Fuel. This innovation marks a major step toward scalable, climate-positive biofuel production.**

Human Activity Disrupts Gut Health of India's Tigers: CCMB Study

- **The Laboratory for the Conservation of Endangered Species (LaCONES) and CSIR–Centre for Cellular and Molecular Biology (CCMB), Hyderabad have found that human activities such as tourism, livestock grazing and habitat disturbance are altering the gut microbiome of wild tigers.**
- **Samples collected over two years from five major tiger reserves revealed significant differences in gut health between tigers living in disturbed and undisturbed areas.**
- **The findings suggest that increased human pressure, even in buffer zones of protected reserves could silently erode tiger health and threaten their long-term survival.**
- **Scientists urge stronger regulation of tourism, grazing, and related activities to safeguard the resilience and well-being of India's national animal.**

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CSIR-IHBT Brings Color and Cash through Carnation Farming to Himachali Farmers

- The CSIR-Institute of Himalayan Bioresource Technology (CSIR-IHBT), Palampur, Himachal Pradesh, has empowered over 130 farmers across the state by distributing 1.66 lakh (166,000) carnation cuttings under the CSIR Floriculture Mission.
- Covering 1.5 hectares in Solan, Mandi, Bilaspur, Shimla and Hamirpur districts the initiative aims to enhance farmers' income and promote sustainable livelihoods. Along with high-quality, disease-free plants, CSIR-IHBT experts from Palampur are providing hands-on training in pest management, nutrient use and modern cultivation techniques—helping farmers turn flowers into a steady source of income and opportunity.

CCMB Scientists Uncover How Cells Change Shape

- Scientists at the CSIR–Centre for Cellular and Molecular Biology (CCMB), Hyderabad have discovered how cells remodel their internal skeletons to form protrusions—tiny extensions that help fight pathogens and aid in wound healing, immune response and cancer progression.
- The team led by Dr. Saikat Chowdhury, found that a protein called SPIN90 works with the Arp2/3 complex to regulate the formation of new actin meshworks, enabling cells to push their membranes and change shape. Using cryo-electron microscopy, researchers observed SPIN90's action at near-atomic resolution, revealing how cells dynamically reshape themselves during vital biological processes.
- "This process helps us understand how cells remodel themselves in both health and disease," said Justus Francis, the study's first author.

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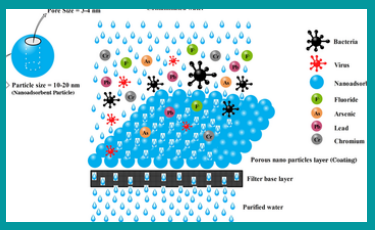

Image Source: ampri.res.in

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Scientists invent a home water purifier that saves both electricity and water

- Bhopal scientists have developed a new water filter that not only purifies water without electricity but also prevents wastage, unlike conventional purifiers that often discard up to three times the amount of filtered water.
- The filter also has a lifespan three times longer than ordinary filters, making it particularly suitable for rural areas.
- Dr. Sundeep Visunghai, Principal Scientist at the Advanced Materials and Processes Research Institute (AMPRI), Bhopal explained that water containing excess fluoride or mercury beyond prescribed standards can cause various diseases. While urban areas have multiple options for safe drinking water, rural regions often face confusion and limited access. This innovation could offer a practical and sustainable solution.

CSIR-NIIST Hosts Conclave on AI & ML for Transformative Innovation

- The CSIR-National Institute for Interdisciplinary Science and Technology (CSIR-NIIST), under the Ministry of Science and Technology, recently organized a Golden Jubilee National Conclave on “AI & ML for Transformative Innovation: Bridging R&D Frontiers and Industry.”
- The event brought together eminent scientists, technologists, academicians, and industry leaders to explore the transformative potential of Artificial Intelligence (AI) and Machine Learning (ML).
- The conclave was inaugurated by Dr. A. Rajarajan, Director, Vikram Sarabhai Space Centre (VSSC), who highlighted the revolutionary role of AI and ML in shaping the future of science and technology.
- He emphasized that modern computing capabilities are crucial, as conventional logic alone is no longer sufficient, and focused human efforts can lead to super-intelligence.