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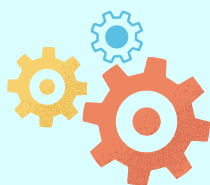
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IIT Bhubaneswar Develops Handheld Device for Arsenic Detection



ArsenSafe enables rapid, accurate arsenic detection without laboratory infrastructure, making water quality assessment more accessible and efficient.

The Indian Institute of Technology (IIT) Bhubaneswar has developed an innovative handheld device for arsenic detection, marking a significant step toward improving water quality monitoring and safeguarding public health. Researchers from the Sensors and Spectroscopy Research Group at the School of Electrical and Computer Sciences (SECS), led by Dr. Sayan Dey, have achieved notable advancements in arsenic detection technologies, according to a press release issued by the institute on June 11, 2026.

Addressing a Major Public Health Challenge

Arsenic contamination in drinking water remains a serious concern across several regions of India. The research team focused on creating affordable, highly sensitive, and field-deployable solutions to detect arsenic quickly and accurately, particularly in resource-constrained settings.

As part of this effort, the team developed ArsenSafe, a compact, portable, and handheld arsenic detection device through Nano Semic Private Limited, a startup incubated at the Research and Entrepreneurship Park of IIT Bhubaneswar.

Fast, Cost-Effective, and On-Site Testing

ArsenSafe is designed to accurately detect arsenic in water without requiring laboratory facilities or chemical reagents. Its portable design enables rapid, cost-effective, and on-site testing, significantly simplifying water quality assessment.

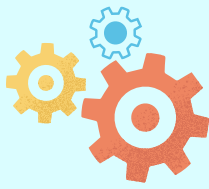
The device can be deployed by a wide range of stakeholders, including government agencies, public health departments, environmental monitoring organizations, water treatment providers, industries, non-governmental organizations (NGOs), and individual consumers.

Advanced Technology with Real-World Applications

The current prototype has achieved a high Technology Readiness Level (TRL) and has been successfully tested on water samples collected from the IIT Bhubaneswar campus and surrounding areas.

According to the institute, ArsenSafe represents a significant advancement in improving public health and sanitation by integrating cutting-edge nanotechnology with machine learning to deliver reliable and efficient arsenic detection.

Source: <https://www.thehindu.com/sci-tech/scienceliit-bhubaneswar-develops-hand-held-device-to-detect-arsenic/article71089117.ece>, <https://www.thehindu.com>



IIT Madras Unveils 3D Atlas of the Human Brainstem

The atlas offers researchers an unprecedented cell-level view of one of the brain's most complex regions.



The Indian Institute of Technology Madras (IIT Madras) has unveiled a detailed three-dimensional atlas of the human brainstem at cellular resolution, providing researchers with an unprecedented tool to study one of the most intricate regions of the human brain.

Developed by the Sudha Gopalakrishnan Brain Centre (SGBC), the atlas—named ANCHOR (Atlas of Neurochemical Characterization of the Human Brainstem with 3D Reconstruction)—integrates MRI imaging, histological analysis, and neurochemical mapping to create comprehensive brainstem maps across prenatal, childhood, and adult stages of life.

ANCHOR features more than 200 reconstructed brainstem nuclei and fibre tracts derived from hundreds of serial tissue sections. Researchers overlaid eight complementary immunostains across more than 500 sections, enabling the identification and characterization of distinct neurochemical cell types.

To support global research and clinical applications, the atlas has been made publicly accessible through a dedicated online portal for scientists and healthcare professionals worldwide.

The atlas was officially launched during the third BRICS Neuroscience Symposium 2026 at IIT Madras. Speaking at the event, Principal Scientific Adviser to the Government of India, Ajay Kumar Sood, noted that the detailed maps could help identify cell populations affected by brainstem lesions and support future clinical interventions.

According to IIT Madras, ANCHOR bridges macro-scale volumetric imaging with cellular-level detail, allowing users to seamlessly navigate from large anatomical structures to microscopic features.

Looking ahead, SGBC plans to expand the initiative by developing cell-resolution maps spanning the entire human lifespan and various neurological disorders, creating a valuable resource for neuroscience research and medical innovation.

Source: <https://www.thehindu.com/news/cities/chennai/iit-madras-releases-3d-atlas-of-human-brainstem/article71093219.ece>
<https://www.thehindu.com>



Libex: A Climate-Resilient Coffee Hybrid for the Future



A newly identified coffee hybrid, *Coffea* × libex (Libex), could play a key role in the future of coffee cultivation as climate change threatens traditional coffee-growing regions. Developed from a cross between Liberica and Excelsa, Libex has shown the potential to thrive in warmer temperatures and under more variable rainfall conditions than the world's two dominant coffee species, Arabica and Robusta.

Arabica and Robusta account for more than 99.99% of global coffee production, with around 17,000 tonnes of Arabica and 10,000 tonnes of Robusta consumed daily before roasting. However, both species are increasingly vulnerable to rising temperatures and erratic weather patterns, creating an urgent need for climate-resilient alternatives.

Researchers from the Royal Botanic Gardens, Kew (UK) confirmed the existence of Libex through genomic analysis, with their findings published in *Scientific Reports*. The study examined 113 coffee plant samples from Africa, Asia, and Central America, providing the first genetic evidence that Liberica and Excelsa had successfully hybridised in cultivation. The researchers also noted that improved Libex varieties could be rapidly propagated through cloning, micropropagation, and grafting techniques.

India has also contributed to the discovery. Samples collected from Malleshwara Estate in Karnataka's Hassan district, where trees were planted between 1980 and 1982, were identified as an Excelsa-Liberica hybrid. These samples were provided by the South India Coffee Company (SICC), whose research team collaborated with the international study.

According to SICC co-author Akshay Dashrath, early tastings describe Libex as a balanced coffee with tropical fruit flavours inherited from Liberica, combined with the chocolate and dried fruit notes characteristic of Excelsa. Besides its appealing flavour, Libex offers several practical advantages for farmers. Compared to Liberica, it produces higher yields, has a better fruit-to-bean conversion ratio, and features thinner pulp and parchment, making post-harvest processing more efficient and improving bean quality.

Traditionally grown only as boundary trees in Indian coffee estates, Excelsa is now gaining recognition for its contribution to climate-resilient coffee breeding. Researchers believe Libex could be cultivated in regions where Arabica and Robusta struggle to survive, offering a promising solution for sustaining global coffee production in a changing climate.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/say-hello-to-libex-a-bold-new-coffee-hybrid-built-to-beat-the-heat/article71128784.ece>, <https://www.thehindu.com/>



Environment



Bird enthusiasts Chirantanu Saikia and Abhilash Gayan have launched Pokkhi, Assam's first digital bird repository, offering a comprehensive guide to the State's rich avian diversity. The platform currently features 372 resident and migratory bird species recorded in Assam, along with their English and Assamese names, brief descriptions, and IUCN conservation status.

Developed in collaboration with the Asian Bird Monitoring Network, Wild Heart Foundation, and The Vulture Network, Pokkhi aims to make bird information more accessible while preserving Assamese bird nomenclature. The founders also plan to document bird names in all indigenous languages spoken across Assam, creating a valuable linguistic and ecological archive.

Among the 372 species listed, 321 are classified as Least Concern, including the Alexandrine Parakeet, Ashy Bulbul, Bar-headed Goose, Chestnut Munia, Dollarbird, Eurasian Wigeon, and Garganey. The repository also records 24 Near Threatened species, 13 Vulnerable species, six Endangered species, and eight Critically Endangered birds, such as the Bengal Florican and Yellow-breasted Bunting.

Saikia, a wildlife photographer and birder from Jamugurihat in Sonitpur district, said the platform was created to address the limited availability of reliable Assamese bird names while encouraging greater awareness and appreciation of Assam's birdlife.

Gayan, a birder and wildlife photographer from Sivasagar district, said the idea emerged after the duo struggled to find authentic local names for several bird species during field expeditions. To encourage community participation, the freely accessible website allows users to contribute indigenous names for each listed bird.

Designed for birdwatchers, photographers, students, educators, researchers, and nature enthusiasts, Pokkhi also features a practical bird identification guide. The guide explains how birdwatchers identify species through field marks and familiarises users with anatomical terms such as supercilium (the stripe above the eye), lore (the area between the eye and bill), tarsus (the lower leg segment), and vent (the area beneath the tail), alongside commonly known features like the crest, bill, claws, and tail.

Another highlight of the platform is its "Bird of the Day" section, which currently showcases the Green-billed Malkoha. Each featured species includes details on its seasonality, size, distinctive field marks, and plumage characteristics, making Pokkhi both an educational resource and a valuable tool for promoting bird conservation and citizen science in Assam.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/assam-duo-launches-digital-bird-repository-with-avian-identification-guide/article71169233.ece>, <https://www.thehindu.com/>



India adds 709 new species to its faunal database in 2025, 353 taxa to its flora



India added 709 new faunal species and 353 plant taxa to its biodiversity records in 2025, further strengthening its position as one of the world's most biodiverse nations. The findings were released by the Zoological Survey of India (ZSI) and the Botanical Survey of India (BSI) on June 30 in Kolkata by Union Environment, Forest and Climate Change Minister Bhupender Yadav.

Of the 709 additions to the faunal database, 483 species are new to science, while 226 species have been recorded in India for the first time. With these discoveries, India's total recorded faunal diversity has reached 1,05,953 species, reaffirming its status as a global megadiverse country.

Among the states, Kerala recorded the highest number of new animal discoveries with 98 species, followed by West Bengal (76), Karnataka (67), and Arunachal Pradesh (65). In terms of taxonomic groups, Hymenoptera (106 species) accounted for the largest share of discoveries, followed by Lepidoptera (65), Diptera (64), Arachnida (64), Coleoptera (55), and Pisces (50), highlighting the rich diversity of India's invertebrate fauna.

Notable faunal discoveries include *Myotis himalaicus*, a newly identified Himalayan bat; *Ptyctolaemus mamdaphaensis* and *Ptyctolaemus siangensis*, two new species of green fan-throated lizards; and *Lycodon irwini*, commonly known as Irwin's wolf snake.

India also added 353 plant taxa to its floral database, including 221 taxa new to science and 132 new distributional records, expanding the known range of several plant groups. The additions include 14 infraspecific taxa, enriching the country's floristic inventory.

State-wise, Arunachal Pradesh led plant discoveries with 49 taxa, followed by Uttarakhand (39) and Kerala (37). The Plant Discoveries 2025 report documents 154 angiosperms, three pteridophytes, 13 bryophytes, 62 lichens, 93 fungi, 22 algae, and six microbes. Around 43% of the newly described taxa are vascular plants, while the remaining discoveries comprise diverse non-vascular organisms, reflecting increasing scientific attention to these ecologically significant groups.

Among the notable plant discoveries are *Polystichum siangense*, a new fern species from Arunachal Pradesh's Siang district; *Miliusa beddomei*, a wild member of the custard apple family discovered in the Western Ghats; and *Hericium indicum*, a newly identified wild edible tooth fungus. The report also highlights the discovery of several wild relatives of economically and ecologically important plant groups, including *Begonia*, *Impatiens* (balsams), legumes, and orchids.

These discoveries underscore India's rich biological heritage and the continued efforts of researchers to document the country's biodiversity, providing valuable knowledge for conservation, ecological research, and sustainable management of natural resources.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/india-adds-709-new-species-to-its-faunal-database-in-2025-353-taxa-to-its-floral/article71166805.ece>, <https://www.thehindu.com/>



New Herbicide-Tolerant Mustard Hybrids Require Sustainable Farming Strategies



Indian farmers are expected to begin large-scale cultivation of imidazolinone-resistant (IMI-resistant) mustard hybrids during the 2026–27 rabi season. Developed to combat *Orobanche*, a destructive parasitic weed that significantly reduces mustard yields, these hybrids could help strengthen India's domestic edible oil production.

India continues to face a major edible oil deficit, importing nearly 16 million tonnes in 2024–25 at a cost of about ₹1.6 lakh crore. Mustard, one of the country's most important oilseed crops, is particularly vulnerable to *Orobanche*, a root parasite that attaches to plants and drains water and nutrients, causing substantial yield losses.

The new hybrids offer an effective solution. Unlike genetically modified crops, they were developed through mutation breeding, which preserves naturally occurring genetic changes. The technology is based on a modified acetolactate synthase (ALS) enzyme that allows mustard plants to survive IMI herbicides. Farmers can therefore spray herbicides across fields, killing weeds while leaving the crop unharmed. This approach is especially useful against *Orobanche*, which is difficult to control through manual weeding.

The technology has been welcomed by farmers because it reduces dependence on labour during critical weeding periods and offers better protection for oilseed crops. However, experts caution that its long-term success depends on responsible use.

In a recent commentary published in *Current Science*, geneticist Deepak Pental of the University of Delhi highlighted the risk of overreliance on a single herbicide. Continuous use of the same chemical can create strong selection pressure, allowing resistant weed populations to emerge. Over time, this could reduce herbicide effectiveness and undermine the benefits of the technology.

Pental argues that IMI-resistant mustard should not be viewed as a simple replacement for manual weeding. Instead, it should be integrated into a broader weed-management strategy. Recommended practices include crop rotation, the use of herbicides with different modes of action, and continued manual removal of surviving weeds. Such an integrated approach can slow the development of resistance and extend the usefulness of the technology.

As India introduces IMI-resistant mustard on a wider scale, the challenge will be to ensure that it becomes part of a long-term, scientifically informed farming system rather than a short-term fix. Sustainable weed management will be essential to preserving the benefits of this promising innovation.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/new-herbicide-tolerant-mustard-hybrids-need-diverse-farming-plans/article71075951.ece>



AGRICULTURE



Turning India's Farm Waste into 'Black Gold' with Biochar

India's agriculture faces a major challenge: millions of tonnes of crop residues that could enrich soils are instead burned, causing severe air pollution and releasing greenhouse gases. Every year, Punjab and Haryana alone burn over 20 million tonnes of paddy straw due to limited time between harvests and a lack of practical alternatives. At the same time, many agricultural soils across India suffer from low organic carbon, poor water retention, and declining fertility, reducing crop productivity despite improved seeds and irrigation.

Biochar offers a sustainable solution to both problems. Produced by heating agricultural waste in low-oxygen conditions, biochar is a stable, carbon-rich material that stores carbon in soils for long periods while improving soil structure. Its porous nature enhances water retention, nutrient availability, and microbial activity, making soils more productive and resilient.

Research has shown that biochar can increase crop yields by 10–30% and improve soil water-holding capacity by 10–25%, particularly in nutrient-deficient soils. Field trials in Maharashtra demonstrated that biochar made from maize stalks increased soil organic carbon and fertility, while studies in Kerala found that biochar produced from coconut residues significantly improved soil quality across different cropping systems. Long-term studies further indicate that biochar sustains soil health and maintains higher crop yields over time.

Beyond agriculture, biochar supports India's climate resilience goals. Healthier soils retain more moisture, helping crops withstand droughts and erratic rainfall while reducing dependence on fertilizers. This is especially valuable for small and marginal farmers who are highly vulnerable to climate change.

Despite its potential, biochar remains largely confined to research projects. Integrating it into natural farming, soil health, and carbon farming initiatives could deliver significant environmental and economic benefits. Agricultural residues should be viewed not as waste but as valuable resources capable of generating income, creating rural employment, and improving ecosystem services.

Carbon markets provide an additional opportunity. Since biochar permanently stores carbon and avoids emissions from residue burning, it qualifies for internationally recognized carbon credits. Each tonne of certified biochar can generate approximately 2–2.8 tonnes of carbon dioxide-equivalent credits, providing an additional revenue stream for farmers and cooperatives. Technologies such as the KISAN kiln developed by IIT-Kharagpur and successful biochar programs in Kenya, Thailand, and Brazil demonstrate that decentralized production combined with strong certification systems can scale effectively.

With abundant agricultural residues and biodegradable urban waste, India has the opportunity to transform biomass into "black gold." Building an integrated ecosystem of innovation, investment, market access, and farmer support can improve soil health, strengthen climate resilience, and contribute meaningfully to sustainable agricultural development.

Source: <https://www.thehindu.com/sci-tech/energy-and-environment/biochar-offers-way-turn-india-farm-smoke-black-gold/article71128481.ece>
<https://www.thehindu.com/>



Blood Test May Predict Lung Cancer Years Before Diagnosis

Lung cancer remains one of the world's deadliest cancers, causing nearly 1.8 million deaths and 2.5 million new cases annually, according to the World Health Organization. While smoking remains the leading cause, air pollution and occupational exposure also contribute significantly. Early detection and prevention are crucial for reducing the disease burden.

A multinational team of researchers led by Charles Swanton of the Francis Crick Institute, London, has made a promising breakthrough. Published in *Cell* on May 4, their study identified a group of 14 proteins in blood plasma—known as the “14-protein signature”—that can predict the risk of developing lung cancer several years before diagnosis.

Blood plasma contains thousands of proteins released by organs and tissues throughout the body. Studying these proteins, a field known as proteomics, provides valuable insights into health and disease. Because blood samples can reveal biological changes before symptoms appear, plasma analysis functions like a non-invasive “liquid biopsy.”

To identify the protein signature, researchers used data from the U.K. Biobank, a large health database tracking around 500,000 volunteers. Using plasma proteomics profiles from approximately 48,000 participants, along with information such as age, sex, smoking history, and cancer diagnoses, the team trained a machine-learning model to identify proteins linked to lung cancer risk.

The model was then tested on data from about 12,000 individuals who were not included in the training phase. Among them were 75 people who later developed lung cancer, with diagnosis occurring a median of 5.1 years after their blood samples were collected. The model successfully identified more than 75% of these future cases. The 14-protein signature was further validated across eight additional datasets, including one involving lifelong non-smokers.

Researchers also found that the signature became stronger when inflammatory pathways associated with smoking and air pollution were activated. This supports the theory that smoking may cause genetic mutations, while inflammation triggered by environmental factors helps drive those damaged cells toward cancer. The signature was also more evident in people who later developed chronic obstructive pulmonary disease (COPD) or pulmonary fibrosis.

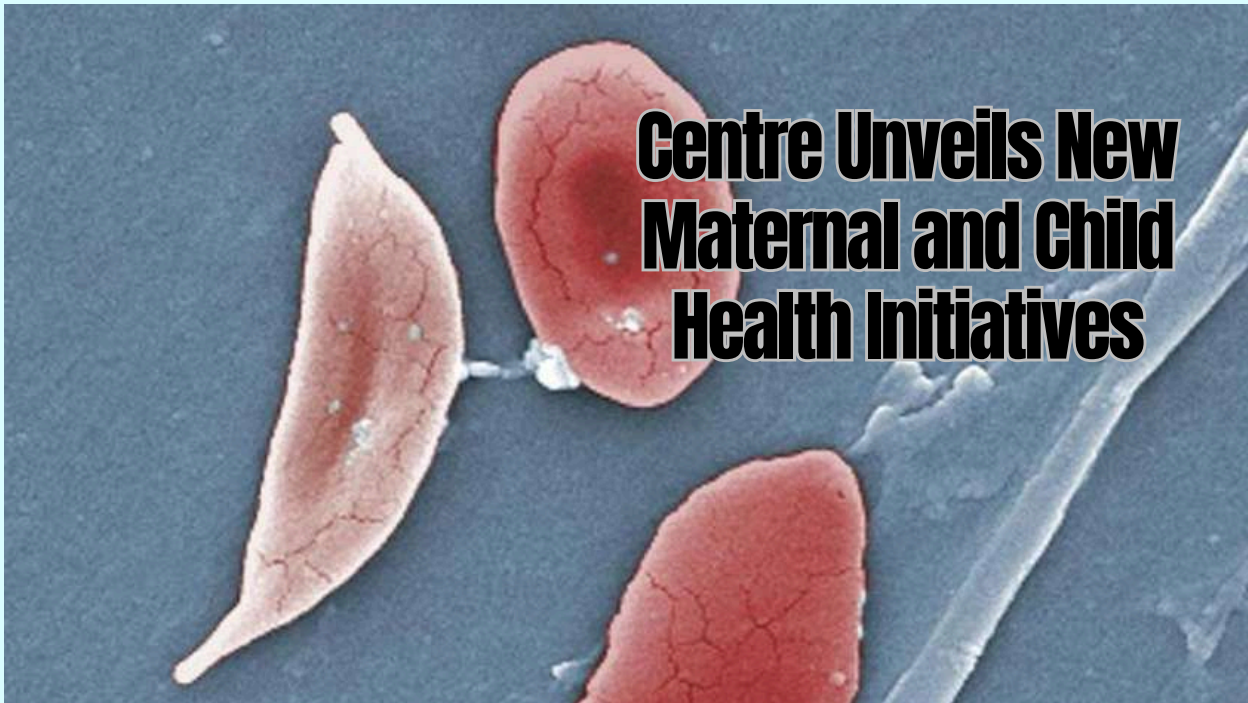
The study also highlighted a potential preventive treatment. Researchers re-examined data from the CANTOS clinical trial, which tested canakinumab, an anti-inflammatory drug originally developed to reduce cardiovascular risk. Among 2,300 participants who showed the 14-protein signature and received canakinumab, lung cancer risk was reduced by about 50%.

Despite these encouraging findings, significant challenges remain. The protein signature has so far been validated mainly in populations from the U.K., U.S., and East Asia, requiring broader testing across more diverse groups. A reliable and affordable diagnostic test capable of measuring all 14 proteins must also be developed.

Canakinumab itself presents additional obstacles. The drug is expensive, costing around \$73,000 annually in the United States, and has been associated with serious side effects. Regulatory reviews have questioned whether its risks outweigh its benefits, making safer and more affordable alternatives necessary. Although further research is required, this discovery marks an important step toward identifying individuals at high risk of lung cancer years before symptoms appear and potentially preventing the disease before it develops.



HEALTH



REVISED ANAEMIA MUKT BHARAT ABHIYAAN, NATIONAL AMBULANCE GUIDELINES, AND SUMAN ROADMAP 2030 AMONG KEY MEASURES ANNOUNCED

The Centre on Monday (June 29, 2026) unveiled a series of initiatives to strengthen maternal and child healthcare, improve emergency medical services, and intensify anaemia control during the 16th Conference of the Central Council of Health and Family Welfare (CCHFW). The announcements were accompanied by a review of progress in key health indicators and a renewed call for closer Centre-State collaboration to achieve universal health coverage.

Chairing the conference, Union Health and Family Welfare Minister J.P. Nadda said the vision of a Viksit Bharat by 2047 rests on a healthy population, describing healthcare as a cornerstone of national development.

A key announcement was the revised Anaemia Mukta Bharat Abhiyaan, which aims to strengthen the country's anaemia control strategy through saturation-based screening, digital beneficiary tracking, case-based management, dietary diversification, and behaviour change interventions across all target groups.

The Ministry also released the Operational Guidelines on National Ambulance Services, 2026, establishing uniform national standards for emergency medical transport. The guidelines seek to standardise ambulance infrastructure, staffing, equipment, response protocols, and digital integration across States and Union Territories to ensure timely and equitable emergency care.

Another major initiative was the launch of the SUMAN Roadmap 2030, a strategic framework to improve maternal and newborn healthcare by enhancing the quality of services, promoting respectful maternity care, and reducing preventable maternal and neonatal deaths.

The conference also witnessed the launch of the Samagra Shishu Bal Swasthya Karyakram, which integrates Home-Based Newborn Care (HBNC) and Home-Based Care for Young Children (HBYC) into a single programme. The initiative aims to provide a continuum of care from birth to five years through regular home visits, early detection of illnesses, nutrition counselling, and timely referrals.

Source: <https://www.thehindu.com/news/national/centre-unveils-new-maternal-and-child-health-initiatives/article71161625.ece>
<https://www.thehindu.com/>



HEALTH

GOVERNMENT TO LAUNCH AFFORDABLE DIGITAL HEALTH MANAGEMENT SYSTEM FOR SMALL CLINICS

The Union Health Ministry is set to launch eSushrut@Clinic, an affordable and user-friendly Hospital Management Information System (HMIS) designed specifically for small outpatient clinics across India. Developed by the Centre for Development of Advanced Computing (C-DAC), the cloud-based platform aims to help clinics transition from manual processes to digital healthcare management.

Small clinics often struggle with paper-based records and lack access to affordable digital solutions, while existing HMIS platforms are frequently too expensive and complex. To address this gap, eSushrut@Clinic offers a lightweight system that simplifies essential administrative tasks such as patient registration, appointment management, billing, and record keeping, reducing paperwork, improving efficiency, and minimizing errors.

The initiative responds to growing demand from healthcare providers and State governments for a government-backed, cost-effective digital solution. The Ministry plans to make the platform available to government primary health centres, sub-centres, and private outpatient clinics across the country.

Currently, more than 800 healthcare facilities are using eSushrut@Clinic, generating over 680,000 digital health records. C-DAC is also implementing its comprehensive eSushrut software in over 15 AIIMS institutions and several State government hospitals.

Designed for ease of use, the platform requires minimal technical expertise and can be accessed from any internet-enabled device without complex installation. Its cloud-based architecture makes digital healthcare accessible even for resource-constrained clinics.

To support nationwide adoption, the National Health Authority (NHA) will sign a Memorandum of Understanding (MoU) with C-DAC. Under the agreement, C-DAC will maintain and upgrade the software, while the NHA will provide financial and implementation support as part of the Ayushman Bharat Digital Mission (ABDM).



The standard subscription cost is ₹499 per month for up to five users. With NHA support, clinics will receive a ₹200 monthly subsidy, reducing the effective cost to ₹299 per month. The software will also be offered free for the first three months, with additional users charged ₹50 per user per month.

Alongside eSushrut@Clinic, the Ministry will launch Aarogya Setu 2.0, a redesigned version of the application originally introduced during the COVID-19 pandemic. The upgraded app will serve as a comprehensive Personal Health Record (PHR) platform and a single digital gateway for accessing healthcare services under ABDM.

Aarogya Setu 2.0 will allow users to securely store medical records, including laboratory reports and diagnostic documents, and create personalized health dashboards. It will also support health monitoring through integrated tracking of vital parameters such as heart rate, glucose levels, physical activity, and calories burned, along with personalized reminders, medication schedules, and wearable-device integration.

Additional features include a PM-JAY Wallet displaying healthcare coverage and benefits, real-time blood availability through e-RaktKosh, ambulance booking, and a searchable directory of empanelled hospitals offering cashless treatment. Users can filter hospitals by State, district, specialty, PIN code, or facility name, making it easier to access authorized healthcare services.

Together, eSushrut@Clinic and Aarogya Setu 2.0 represent significant steps toward expanding affordable digital healthcare, improving service delivery, and accelerating the adoption of India's digital health ecosystem.

Source: <https://www.thehindu.com/sci-tech/health/govt-to-launch-affordable-digital-health-management-system-for-small-clinics-across-india/article71154465.ece>, <https://www.thehindu.com/>



OTHERS

Why do recessive traits from older generations suddenly reappear in one individual?



Genes usually occur in pairs, with one copy inherited from each parent. Some gene variants, known as dominant alleles, are expressed even when only one copy is present. Others, called recessive alleles, are expressed only when a person inherits two copies—one from each parent.

A person who carries one dominant allele and one recessive allele is known as a carrier. Carriers do not display the recessive trait because the dominant allele masks it. As a result, a recessive trait can remain hidden within a family for many generations, passed silently from parent to child without ever being expressed.

The trait can reappear when two carriers have a child together. If both parents pass on their recessive allele, the child inherits two recessive copies and the trait is expressed. This is why a characteristic that seemed to have disappeared from a family can suddenly re-emerge after several generations.

Chance also plays a crucial role. During the formation of eggs and sperm, genes are shuffled and distributed randomly, creating countless possible genetic combinations. This genetic reshuffling explains why even full siblings can inherit different traits from the same parents. It also determines whether a child of two carriers inherits two recessive alleles, one recessive allele, or none at all.

Source: <https://www.thehindu.com/sci-tech/science/why-do-recessive-traits-from-older-generations-suddenly-resurface-in-one-individual/article71113693.ece>, <https://www.thehindu.com/>



OTHERS



How Ants Cope with Disease Outbreaks

Ants are known for their teamwork, discipline, and collective behavior. Like humans, many ant species live in large social groups, which provide benefits such as protection and efficient division of labour. However, close living also increases the risk of disease spreading throughout the colony.

Humans control disease outbreaks by reducing social contact through isolation and quarantine. Ants have evolved similar strategies. Some species create a form of “social immunity” by spreading antimicrobial secretions from a specialized gland onto themselves, larvae, and nestmates. This helps protect the entire colony from infections.

Ants can also take more extreme measures. Researchers at the University of Lausanne observed black ants amputating the injured leg of a nestmate by repeatedly biting it at the joint. This behavior prevents infections from spreading and protects the colony from harmful microbes.

A 2025 study published in *Science* examined how black garden ants respond to an epidemic. These ants live in complex underground nests with separate chambers for the queen, larvae, food storage, and workers. Scientists tracked a colony of about 200 workers and one queen using tiny QR codes and monitored nest structures with micro-CT scans. They then introduced 20 worker ants exposed to a pathogenic fungus.

The colony quickly adapted. Infected ants spent more time outside the nest, effectively isolating themselves. At the same time, workers altered the nest’s architecture by digging longer tunnels, reducing connections between chambers, and spacing entrances farther apart. These changes limited interactions among different groups within the colony.

As a result, the queen and nurse ants, which are essential for colony survival, had much less contact with potentially infected foragers and remained healthy. The combination of self-isolation and nest restructuring reduced the chances of disease transmission.

These responses closely resemble human public-health measures such as quarantine, social distancing, and hygiene practices. Although ants have tiny brains, they display sophisticated collective behaviors that help control disease outbreaks. Their ability to modify both behavior and nest structure demonstrates how social organisms can protect themselves through cooperation and organization.

The study highlights that effective disease management is not unique to humans. Ants have evolved highly successful strategies to contain infections, ensuring the health and survival of their colonies. Their remarkable social discipline offers a fascinating example of how collective action can reduce the spread of disease in densely populated communities.

Source: <https://www.thehindu.com/sci-tech/science/how-ants-cope-with-disease-outbreaks/article71088090.ece>
<https://www.thehindu.com/>