SCIENCE FACTORS.

INSIGHT, DISCOVERY, LEARNING, INNOVATION, AND IMPACT

By
Rosalind Franklin
Council of Scientific Research
(RFCSR)

November 15, 2025

CLIMATE IN MOTION

SHIFTING PATTERNS OF RAIN, RIVERS, AND RESILIENCE.

RF0012511

Scientific Research Empowers Social Progress !

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Science
APPLY PROGRAM

Scientific programs are structured initiatives designed to promote research, education, and innovation across various fields of science. They provide opportunities for hands-on learning, collaboration, and the development of critical thinking skills. These programs play a vital role in advancing scientific knowledge and solving real-world problems.

Prof. Eliora Z. Ron

**Emeritus Professor
The Shmunis School of Biomedicine and Cancer Research | Tel Aviv University**

"In a world flooded with information, *Science Factors* stands out for its clarity, creativity, and commitment to truth. It brings the latest discoveries from top global journals into classrooms, cafés, and conversations—without losing the wonder that makes science so human. I believe this magazine will inspire not just students, but scientists too, to see their work through fresh, curious eyes."

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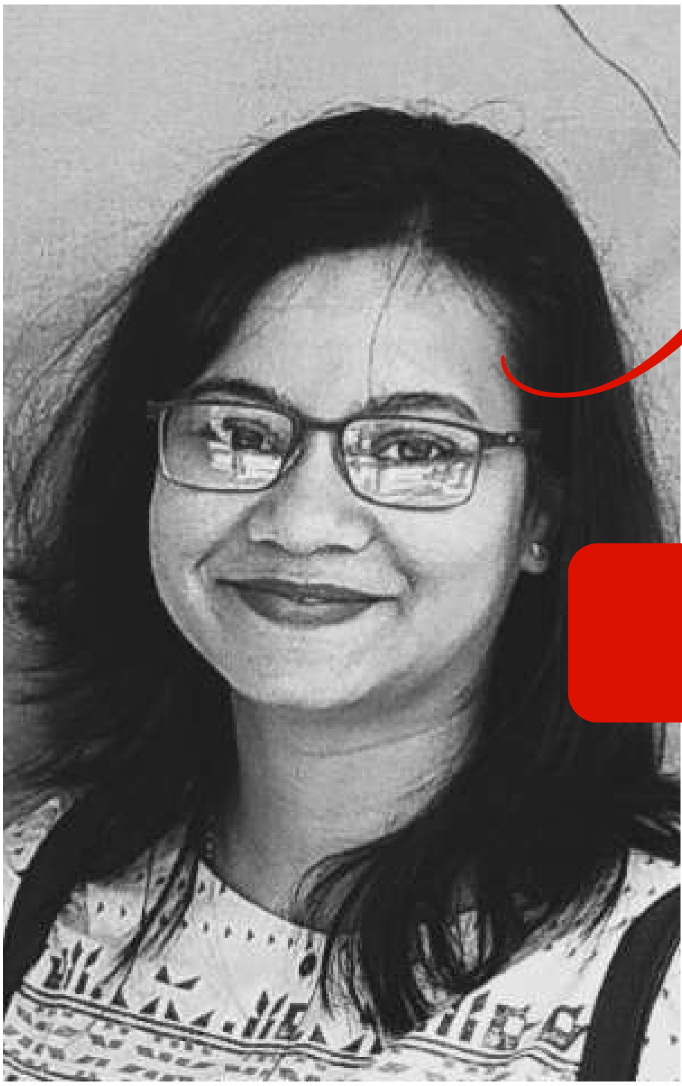

LETTER *from the* EDITOR

Dr. Animesha Rath
The Editor-in-Chief

Dear Readers,
As we turn the pages of this November issue, Science Factors continues its mission to bring science closer to societyto show not just what we discover, but why it matters. This edition, "*Climate in Motion*," explores how changing patterns of rain, rivers, and resilience are shaping our world, from the smallest molecule to the mightiest monsoon.

Climate change is no longer a distant phenomenon; it flows through every current of life in the water that sustains our crops, the air that carries our seeds, and the technology that guides our survival. Our stories this month travel from the vanishing flow of the Ganga to the quiet laboratories where scientists are decoding new ways to heal, grow, and adapt.

We feature extraordinary researchers who remind us that innovation begins with curiosity. Across India, scientists are transforming light into energy, decoding plant defenses through RNA, turning waste into valuable resources, and designing next-generation therapies that fight disease with precision and purpose. Together, their work reflects how imagination and science can shape a sustainable and healthier future.

This issue also highlights remarkable research findings from the discovery of nanozymes that prevent blood clots without bleeding risks, to new insights into monsoon shifts, oceanic warming, and AI-driven tools improving health diagnostics and agricultural sustainability. These breakthroughs, diverse yet connected, show how science continues to illuminate paths toward resilience and regeneration.

As India steps into a new era of science-driven sustainability, we at Science Factors believe that every story, discovery, and experiment is part of a shared journey a movement toward understanding our changing world and shaping it for the better.
Let this issue remind us that resilience is not just nature's trait; it's ours too.

Happy reading!

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SCIENTIFIC RESEARCH EMPOWERS SOCIAL PROGRESS !

The CONTRIBUTORS

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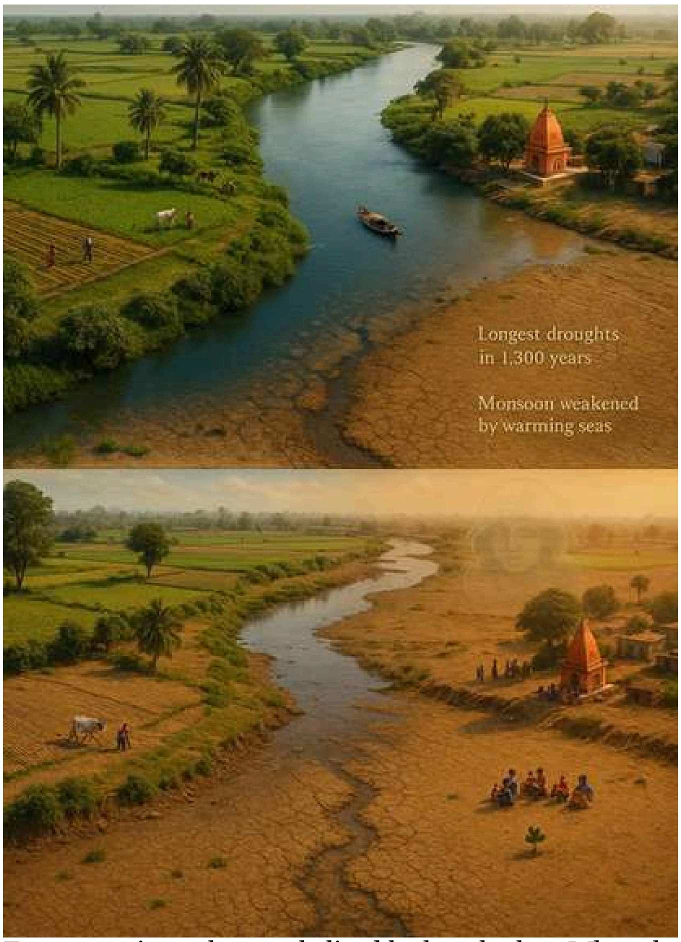
Behind every discovery lies a story of curiosity, perseverance, and wonder. Science unfolds through relentless research and bold explorations into the unknown. These are the journeys that shape our understanding of the world—and beyond.

| By **Dr. Avijit Das**

THE VANISHING FLOW OF GANGA

FEATURED

In the small village of Bhairavpur, the Ganga River was more than water she was life. Every morning, her gentle waves mirrored the rising sun as women washed clothes, children splashed joyfully, and farmers filled their pots before heading to the fields. The river fed the crops, the animals, and the spirit of every home along her banks.



For generations, the people lived by her rhythm. When the monsoon clouds gathered and rain poured, the Ganga swelled and sparkled, spreading abundance across the plains. Her roar during the rainy months was both power and promise. Every festival began with a prayer to "Maa Ganga," the sacred mother who gave without asking.

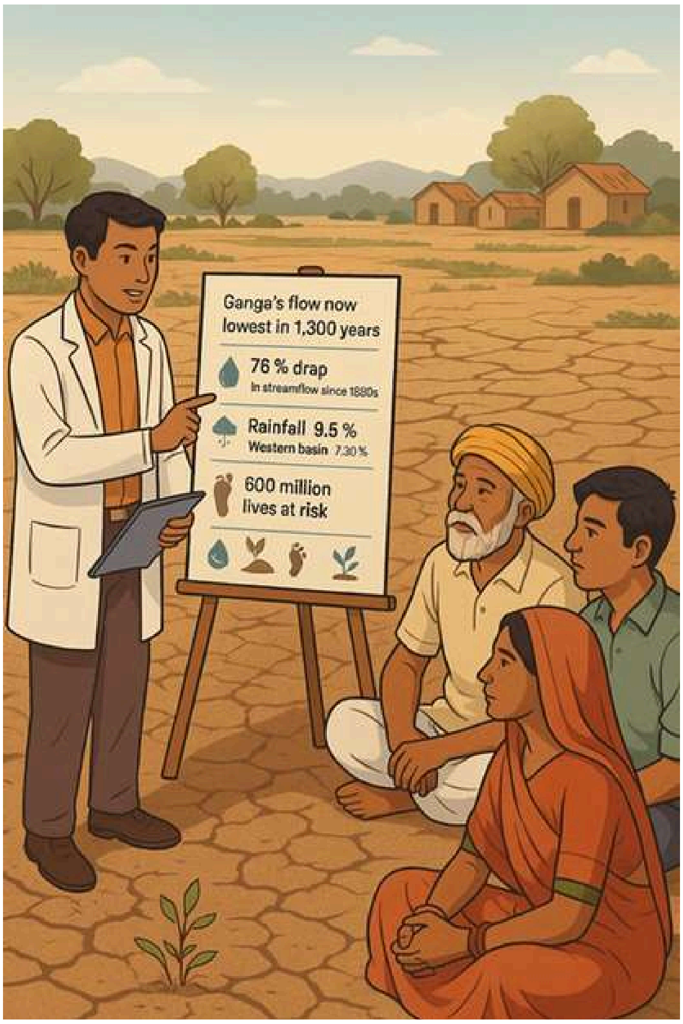
But in recent decades, her song has dimmed.

Old Hari Ram still remembers when the river once kissed the steps of the ghat. "The water will return next year," he would say each summer. Yet each year, the flow receded further. By the time his grandson Chotu was old enough to play by the river, the once-wide stream had narrowed to a trickle. The muddy banks cracked under the harsh sun, and green fields turned pale brown.

One summer, a team of scientists arrived in Bhairavpur. They carried maps, instruments, and small laptops. Villagers gathered around curiously as one of them explained that the Ganga's drying was not just a local problem it was part of a long and alarming trend.

The researchers had reconstructed the river's annual streamflow at Farakka, the control point downstream, using ancient tree-ring records and the Palmer Drought Severity Index. Their models, verified by hydrological simulations, showed something astonishing: the Ganga's recent decline is the worst in 1,300 years.

Since 1991, the river's average flow has dropped by 620



By **Dr. Avijit Das**

cubic meters per second, and the frequency of long droughts has multiplied. Between 1991 and 2020, the Ganga basin endured four multi-year droughts, something that used to happen only once every century or two. The 2004–2010 drought was the worst of all, surpassing even the dry phase of the 14th century.

“What happened to our river?” asked Hari Ram, his weathered face anxious.

The lead scientist replied softly, “The rains have changed, Baba. The Indian summer monsoon is weakening. The oceans and air currents that once brought rain to these lands are no longer the same.”

They explained that the weakening monsoon is tied to changes in the Indo-Pacific Ocean including El Niño and La Niña patterns that now behave differently. Even during years that should bring normal rain, abnormal air circulation and high surface pressure over northern India block the monsoon.

But the scientists also spoke of human hands shaping the crisis. The rapid warming of the Indian Ocean, aerosol pollution, and excessive groundwater pumping have made things worse. By drawing too much from underground aquifers, people have reduced the baseflow that once fed the Ganga even during dry months. “The river is losing her breath,” said one scientist quietly.

The villagers listened in silence. The data sounded distant, yet the truth was before them dry wells, tired soil, and shrinking harvests.

But the scientists also spoke of human hands shaping the crisis. The rapid warming of the Indian Ocean, aerosol pollution, and excessive groundwater pumping have made things worse. By drawing too much from underground aquifers, people have reduced the baseflow that once fed the Ganga even during dry months. “The river is losing her breath,” said one scientist quietly.

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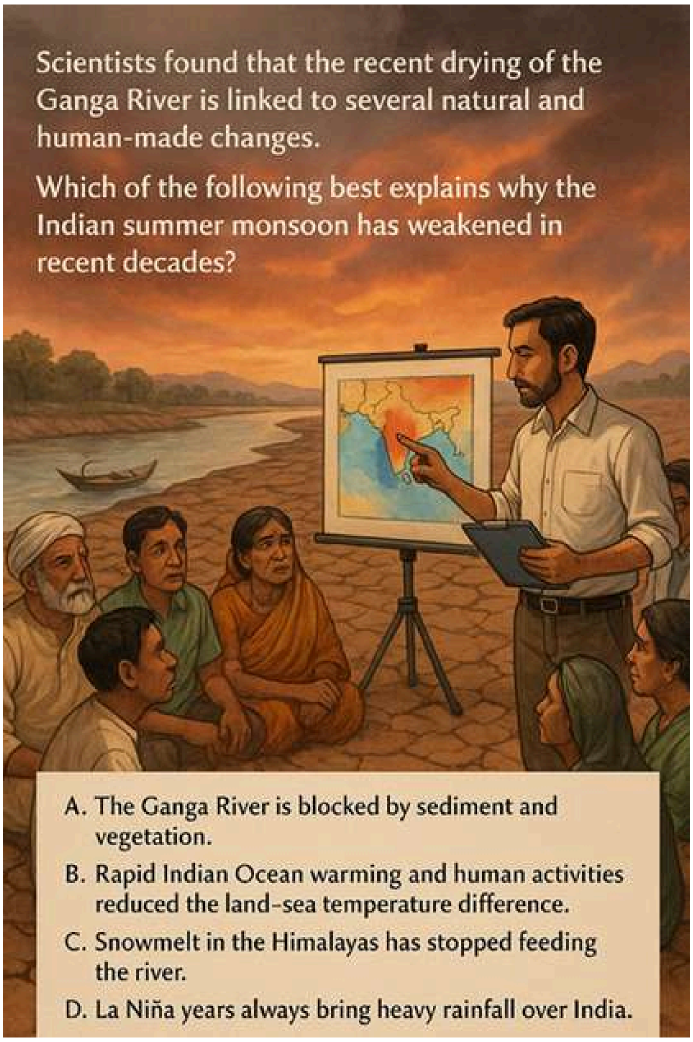
The researchers also warned that most climate models fail to capture this reality. Even advanced CMIP6 simulations, which predict a wetter future with 30 % more rain and 4.5 °C warming by 2100, cannot explain the current drying. Only a few models show the same trend, and even they underestimate it. “Our models don’t yet see what your eyes already know,” one scientist told them.

Chotu, holding a small sapling in his hand, looked at the cracked riverbed. “If the rain doesn’t come, can the river still live?” he asked.

“Yes,” the scientist smiled, “but only if we learn to share water wisely and let the river rest.”

From that day, the villagers began planting trees and storing rainwater. The river still runs weak, but hope glimmers like sunlight on her surface.

The Ganga has carried faith for centuries. Now, she carries a warning and a plea for balance.



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D. Singh Chuphal, K. Thirumalai, & V. Mishra. Recent drying of the Ganga River is unprecedented in the last 1,300 years. *PNAS* 122(40): e2424613122 (2025).

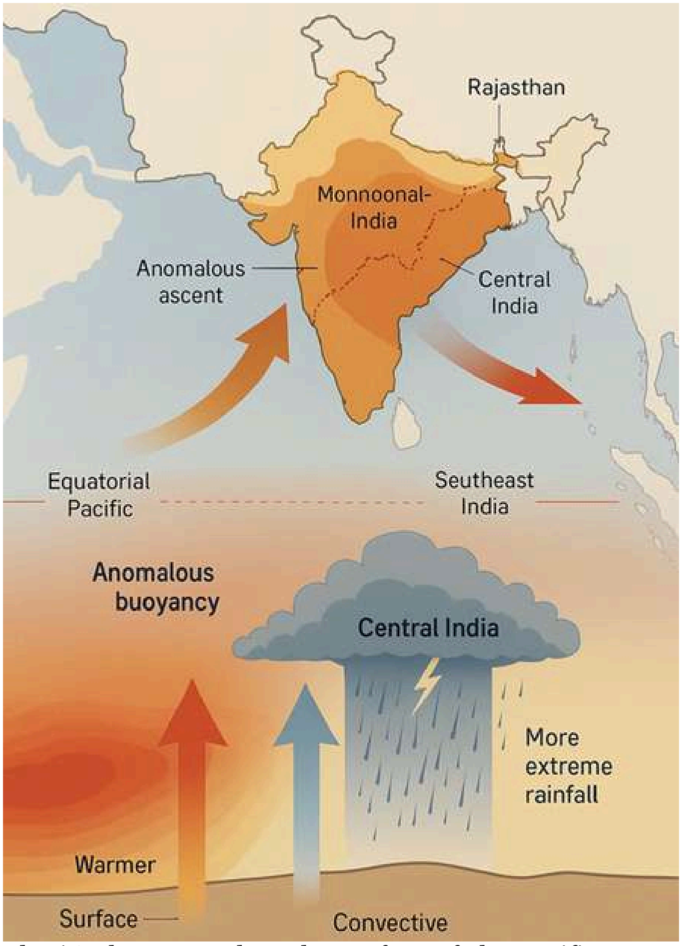
| By **Dr. Sivan Friedman**

THE INVISIBLE PUSH FROM THE PACIFIC

FEATURED

Every year, as summer ends, millions of people across India wait for the monsoon rains to arrive. The rains fill rivers, water crops, and bring relief from the heat. But in some years, the monsoon behaves strangely. It may come late, stop early, or rain too little in some places and too much in others.

In one such year, Meera, a young climate scientist from Pune, sat in front of her computer at the Indian Institute of Tropical Meteorology. She was not watching the sky she was watching the ocean, thousands of kilometers away. On her screen, a patch of deep red glowed across the Pacific Ocean. That red patch meant only one thing El Niño had begun.



El Niño happens when the surface of the Pacific Ocean near the equator becomes much warmer than usual. This warmth may seem harmless, but it can change wind and rainfall patterns across the entire world. For India, it usually means weaker monsoon rains and the risk of drought. When Meera was a child, her village once faced such a drought. The ground cracked, the ponds dried up, and her family had to buy water from a tanker. Since then, she wanted to understand why the rains sometimes disappear.

But as Meera looked deeper into data from the India Meteorological Department, she noticed something odd. Even during El Niño years when total rainfall was low, some regions received extremely heavy rainfalls the kind that flooded towns and washed away crops. She joined an international research project led by Dr. Spencer Hill from the City College of New York to find out why. Together, they studied rainfall patterns from 1901 to 2020 across India.

The results were surprising. The team discovered that El Niño summers bring fewer rainy days overall, but stronger rain on those few days. In Central India and the Western Ghats, extreme rainfall days were up to 60 percent more likely during El Niño years. At the same time, moderate and light rains decreased almost everywhere. This meant that farmers could face both drought and flood in the same season too little water for weeks, followed by cloudbursts that destroy fields overnight.

Meera wanted to understand the cause. She turned to a concept called convective buoyancy how easily warm,

| By **Dr. Sivan Friedman**

moist air can rise to form rain clouds. In normal years, warm air near the surface rises slowly and steadily, making gentle, regular rain. During El Niño, however, the lower air becomes hotter and more unstable, while the air above turns dry. It's like sealing steam in a cooker. Nothing happens for days, but once some moisture enters, the built-up energy bursts out. The result: sudden, extreme rainfall.

She remembered visiting Nagpur during the 2015 El Niño. Farmers told her, "For weeks, not a drop. Then one storm drowned everything." Now the science made sense. The Pacific Ocean's warmth had quietly shifted the balance of India's atmosphere, turning calm skies into explosive storms.

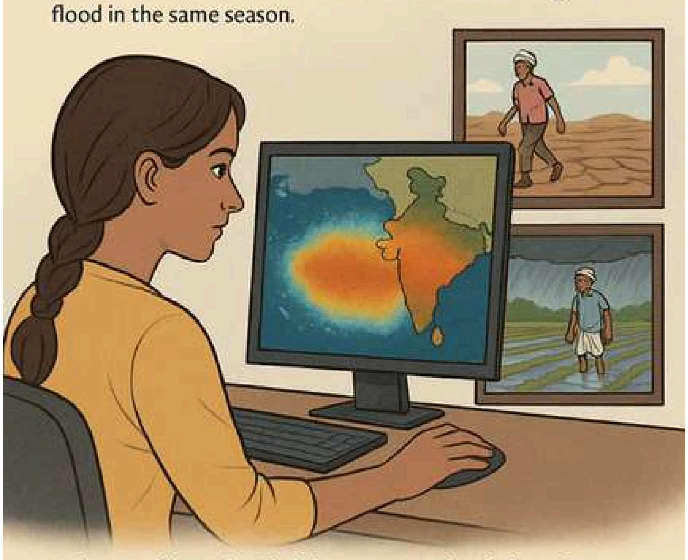
Meera also learned that while El Niño's control over total monsoon rainfall has weakened in recent decades, its influence on extreme rainfall has stayed strong. This means India may not always face droughts during El Niño, but sudden flash floods will likely continue.

The study also offered hope. Because El Niño can be predicted months in advance, scientists could use this information to forecast areas of likely extreme rainfall. Meera and her colleagues began working on models to warn farmers and city planners. "If we can predict where cloudbursts may happen, we can save crops and lives," she said.

One evening, as rain beat against her window, Meera looked again at her map of the Pacific. The red patch shimmered the same invisible force that had shaped her life and her work. She smiled softly. "You're far away," she whispered, "but you still decide how our skies behave."

For Meera, the lesson was clear: the story of India's monsoon is also the story of the Pacific Ocean. A small rise in sea temperature thousands of kilometers away can bring either drought or flood to millions. Understanding this invisible push from the Pacific may help India turn surprise into preparedness and learn to live more wisely with its restless monsoon.

In Pune, a young climate scientist named Meera studies satellite images showing a warm patch spreading across the Pacific Ocean—a sign of El Nino. She knows this distant ocean event can weaken India's monsoon. But as she compares rainfall data, she notices something odd: while many areas are drying, central India is getting hit by sudden cloudbursts and floods. Meera wonders how one ocean can cause both drought and flood in the same season.



What explains why El Nińo can cause both drought and floods in India?

A. It increases rain evenly across the whole country.
B. It stops warm air from rising anywhere in India.
C. It reduces overall rainfall but makes rare storms mointense.
D. It brings colder air that freezes monsoon clouds.

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Spencer A. Hill et al. More extreme Indian monsoon rainfall in El Niño summers. *Science* 389, 1220–1224 (2025).

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| EXPERT OPINION |

DESIGNING SMALL MOLECULES TO OUTSMART CANCER CELLS

Prof. Arindam Mukherjee
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| Scientific Profile | | Organization Link |

Areas of Expertise: Medicinal Inorganic Chemistry | Photodynamic Therapy | Kinase-Targeted Cancer Drug Design

My research at the Indian Institute of Science Education and Research Kolkata (IISER-K) focuses on developing metal complexes as chemotherapeutic agents against cancer and disseminating their mechanism of action. We design kinetically inert complexes to resist deactivation by cellular thiols, an important limitation of clinical platinum drugs. Our goal is to maximize dose effectiveness while shifting the therapeutic target away from nuclear DNA to minimize mutagenic effects. By incorporating ligands derived from pharmacophores with stand-alone biomolecular activity, we ensure that even dissociated components retain drug-like function. This strategy has yielded promising complexes capable of even killing cancer stem cells. Our work has since expanded to include light-activated photodynamic therapy and proteomics-based studies to map pathway regulation during chemotherapy. A major outcome of this research in collaboration with Dr. B. Kiran Kumar (CCMB, Hyderabad), resulted in the paper “Peroxiredoxin Depletion and Oxidative Stress by Cyclometalated Ir(III)-Isatin Complexes Renders Ferroptosis and Autophagic Cell Death in Triple-Negative Breast Cancer”, highlighted in this issue.

In my humble opinion, a key strategy in next-generation metal-based drug design should be to address the inherent promiscuity of small molecules by making them more target specific, enhancing the target economy of a single small molecule chemotherapeutic agent like a MIRV missile. Exploit the unique nature of metals (diverse oxidation states, coordination geometries, ligand-exchange kinetics) and combine with suitable organic pharmacophores to develop smart metallodrugs that can be target specific in intact form and with specific stimuli break into multiple active components, each capable of acting on distinct biological pathways. Thus, it leads to efficient utilization of a single drug molecule to modulate multiple therapeutic targets (molecular target economy) collectively producing a stronger and improved patient prognosis.

> *“The future of cancer therapy depends on our ability to design molecules that learn, adapt, and outsmart disease one thoughtful experiment at a time.”*

Looking back, I’ve come to realize that understanding the mechanism of action is not just a scientific necessity, it’s the soul of drug discovery. The road ahead may be long and uncertain no doubt, but every challenge you face will teach you something invaluable. Cancer is a remarkably adaptive adversary, constantly finding new ways to survive. Our mission, as researchers, is to design molecules that are just as clever and then a little smarter. Progress may seem slow at times but every small insight, every careful experiment, brings us one step closer to making a real and lasting difference. One should never lose sight of the purpose behind the work.

| EXPERT OPINION |

INDIA'S MOMENT TO LEAD THE CIRCULAR SUSTAINABILITY REVOLUTION

GLOBAL TOP 2% SCIENTIST

Prof. Sunita Varjani

| School of Engineering, University of Petroleum and Energy Studies, Dehradun, India

| Scientific Profile | | Organization Link |

Areas of Expertise: Industrial & Environmental Biotechnology | Waste & Wastewater Systems Innovation | Process & Bioprocess Engineering

Adjunct Prof. Korea University, Korea | Director at the Institute of Chartered Waste Managers

India stands at a profound juncture one where the pursuit of prosperity must align with planetary well-being. Scientific recognition, such as being listed among the Stanford/Elsevier Top 2% Scientists 2025, is not merely a personal milestone; it reflects the world's acknowledgement that India's sustainability research is gaining global momentum. At its core lies a transformative idea: waste is not an endpoint, but a beginning. My research journey, from regulatory foundations at the Gujarat Pollution Control Board to academic leadership roles in India and South Korea, has been driven by a mission to redefine our relationship with waste, resources, and environmental responsibility.

The future belongs to circular systems where industrial and municipal waste streams become sources of clean water, renewable energy, fertilizers, and high-value bio-products. In our laboratories and pilot facilities, we integrate process engineering, sustainable chemistry, and environmental science to create biorefinery platforms that recover value from waste. These solutions reduce landfill dependence, remediate contaminated ecosystems, help industries decarbonize, and support healthy, resilient communities. This approach moves us from a linear "use-and-discard" model to a restorative industrial framework capable of strengthening climate resilience and resource security. The coming decade offers India the chance to define a global sustainability blueprint. Initiatives like Swachh Bharat, the Circular Economy Mission, and emerging waste and carbon-management frameworks provide fertile ground for innovation. Advances in AI, IoT, and biotechnology are converging to build smart waste-to-resource systems, where automation and predictive analytics optimize environmental performance and resource recovery. Yet the core challenge lies in scaling science from the bench to nationwide deployment. Progress demands robust techno-economic models, strong policy-industry alignment, infrastructure development, and incentives that reward circular innovation. Equally vital is ensuring this transition remains inclusive creating green jobs, building skills, and empowering communities traditionally marginalized in environmental decision-making.

> *"The next revolution will be circular where waste becomes wealth, and sustainability becomes India's greatest export to the world."*

To India's young scientists and innovators: this is your moment. Think beyond silos breakthroughs live where science, engineering, policy, and society intersect. Pursue work with purpose, design ideas that scale, collaborate openly, and communicate science with clarity and conviction. Let your curiosity be bold, your perseverance steady, and your vision larger than yourself. The world is watching as India charts a path toward climate-aligned growth and circular innovation. Together, we can build a nation and a planet where progress and sustainability reinforce one another, and where waste becomes the foundation of a regenerative future.

IDENTIFY *Your* SKILL

SCAN HERE **Try It!**

THE FIRST STEP TOWARD DOING WHAT YOU LOVE

Have you ever felt stuck, even while working hard? Or found yourself wondering why someone else seems to thrive in the same environment where you're struggling?

The truth is, when we work in line with our natural strengths, everything becomes easier. We solve problems faster, feel more motivated, and even enjoy challenges. On the other hand, even the most intelligent person, if placed in the wrong field, may struggle to shine.

That's not about intelligence. That's about fit.

Identifying your core skills is like discovering your internal compass. It helps you:

- Set clear goals
- Work more efficiently
- Make smarter career or subject choices
- Feel confident in your abilities
- Enjoy what you do, every day

Here, we bring you a set of thought-provoking scenarios and self-assessment questions. These aren't tests—they're mirrors to help you see what you're good at, and what excites your mind. So go ahead. Explore, reflect, and unlock your potential. Your strengths may surprise you—and guide you to your future.

| SCIENCE DESK |

ENGINEERING WITH LIGHT: SHAPING THE FUTURE OF PHOTONICS AND CLEAN ENERGY

Dr Yogeshwar Nath Mishra |
Physics Department, Indian Institute of Technology (IIT) Jodhpur, India
| Scientific Profile |
| Organization Link |
Areas of Expertise:
Ultrafast Imaging | Laser Diagnostics | Photonics | Energy Technology | Biomedical Imaging

From your experience spanning Sweden, Germany, NASA JPL, and now IIT Jodhpur, how do you see optical diagnostics shaping the next decade of clean energy and biomedical technologies?

I spent over 12 years abroad working at world-leading institutes and learning from pioneers in photonics and ultrafast science. During that time, I stayed connected with India through collaborations with IIT Indore and IIT Kanpur, which ultimately drew me back. My experience showed me that optical diagnostics are no longer just tools for observation they are becoming drivers of transformation. Light-based technologies can probe energy conversion, reveal quantum behavior, and improve biomedical imaging with remarkable precision. In the coming decade, optical diagnostics will reshape industries from cleaner combustion and smart energy systems to early, non-invasive disease detection. My goal is to use precision optical science to advance sustainable energy, personalized healthcare, and a data-driven future.

Could you tell us about your current research focus at IIT Jodhpur and its impact?

At IIT Jodhpur, I'm building a team of young researchers working to bridge fundamental science with real-world benefits. We use the power of light to create sustainable technologies covering laser diagnostics for engines, fuel and solar cells, ultrafast light–matter studies, space optics, quantum technologies, biomedical imaging, and AI-enabled photonics. My long-term goal is to develop the world's fastest cameras and microscopes in India to study light-induced chemical reactions, biological systems, and quantum materials. We aim to make affordable, non-invasive diagnostic tools and cleaner energy solutions for a greener and healthier future.

Laser diagnostics have evolved rapidly. What do you think will be the next big leap after LS-CUP and CUP2AI?

LS-CUP and CUP2AI imaging technologies I co-invented with colleagues at Caltech and NASA-JPL represent a new era in ultrafast imaging. LS-CUP captures soot formation that affects air quality and climate, while CUP2AI records molecular dynamics at tens of billions of frames per second. The next big leap will merge ultrafast timing with super-resolved spatial imaging, enabling real-time visualization of atomic and molecular events. This will help us study hydrogen combustion for clean energy and biomarkers linked to cancer and neurological disorders. By pushing the limits of light, we open new paths for sustainable energy and precision medicine.

What optical technologies will most influence India's innovation by 2035?

By 2035, light-based technologies will drive growth in healthcare, defense, and energy. Quantum photonics, ultrafast laser diagnostics, and compact optical sensors will merge with AI and nanotechnology, moving us from measuring with light to engineering with light building industries that are faster, cleaner, and smarter.

What advice would you give young Indian researchers aiming for global excellence in optics and photonics?

Master the fundamentals, then question them boldly. Collaborate across disciplines innovation often happens where fields meet. Don't chase publications; focus on impact. Choose problems worth solving and work with people driven by curiosity and courage. Global excellence doesn't mean leaving India it means bringing world-class ideas here and building meaningful solutions.

What skills and mindsets will be vital for Ph.D. students entering interdisciplinary fields like photonics, AI, and quantum science?

I grew up in a small village with limited resources but unlimited curiosity. That taught me adaptability and courage to learn from every opportunity. Today, curiosity and adaptability matter more than ever. In fast-evolving fields like photonics, AI, and quantum science, researchers must think beyond equations learn to code, communicate, and collaborate. Most importantly, embrace uncertainty. True innovation comes from exploring the unknown and daring to find answers. Growth begins with asking difficult questions.

| SCIENCE DESK |

HOW TINY RNA MOLECULES ARE HELPING CREATE VIRUS-RESISTANT CROPS

Dr. Namisha Sharma | Plant Virology Lab, Institute of Life Sciences (ILS), Bhubaneswar, India

| Scientific Profile |

| Organization Link |

Areas of Expertise:
Plant–Virus Molecular Interactions | RNA-Mediated Gene Regulation | Molecular Breeding for Virus Resistance

What big scientific question drives your work on plant–virus interactions, and how do you hope it will benefit global agriculture?

Plant viruses cause enormous yield losses across crops, yet their molecular interaction mechanisms remain poorly understood. My research focuses on decoding how viruses interact with plants using tomato as a model system. We aim to unravel resistance and susceptibility mechanisms underlying infection. These insights will aid in developing virus-resistant varieties, reducing yield loss and promoting sustainable agriculture.

How will you decode key plant–virus protein interactions, and what role can motivated Ph.D. students play in this journey?

We use advanced molecular techniques such as co-immunoprecipitation, yeast one- and two-hybrid screening, and metabolite profiling to identify critical host–virus protein interactions. These are validated through gene editing, transient assays, and microscopy-based localization, revealing how interactions affect viral replication and plant defense. Ph.D. students play a vital role designing and performing experiments, integrating interdisciplinary tools to solve complex biological problems creatively.

What inspires your focus on virus-responsive miRNAs and lncRNAs, and how do you guide students to grow in RNA biology?

During my research, we discovered numerous virus-responsive miRNAs and lncRNAs, once considered “junk,” that can reprogram gene expression. This finding inspired me to explore how non-coding RNAs regulate plant–virus battles. I teach students to view these RNAs as a molecular language through which plants and viruses communicate and adapt. My mentorship emphasizes curiosity, smart experiment design, and connecting small findings to the broader defense picture.

How do you approach studying lncRNA-driven epigenetic regulation, and what mindset do you instill in students tackling complex regulation?

We study lncRNA-mediated epigenetic regulation of gene expression during viral infection, combining transcriptomics, small RNA sequencing, and methylation profiling to reveal how infections reprogram host defenses. I encourage students to adopt systems thinking, seeing small RNAs, lncRNAs, and chromatin marks as parts of an interconnected regulatory network. I remind them that complexity is a map of opportunities, not an obstacle, and nurture patience, integrity, and integrative reasoning in their scientific growth.

How will you translate your discoveries into virus-resistant crops, and how do you teach students to connect fundamental science with real-world impact?

Our studies on RNA-mediated regulation identify host genes and small RNAs determining resistance or susceptibility. By targeting viral host RNA interactions, we design RNA-guided or genome-editing strategies for durable virus resistance.

Collaboration with breeders and biotechnologists transforms molecular findings into field-ready applications. In mentoring, I stress that fundamental science drives innovation. We discuss examples where basic RNA biology became crop solutions, showing that curiosity and impact are deeply connected.

What kind of research culture and values do you hope to build over the next 5–10 years, and how will students grow personally and scientifically in your lab?

I aim to build a research culture rooted in curiosity, collaboration, and rigor, where every question on RNA-mediated plant–virus interaction advances understanding of plant defense. Students are encouraged to think independently, challenge assumptions, and integrate molecular, biochemical, and computational tools. We value open dialogue, shared learning, and scientific integrity. We celebrate both discoveries and well-analyzed failures. My goal is for students to grow into confident, ethical scientists who connect mechanistic insight with agricultural and ecological relevance.

SCIENCE STORIES RESEARCH & EXPLORATIONS

Behind every discovery lies a story of curiosity, perseverance, and wonder. Science unfolds through relentless research and bold explorations into the unknown. These are the journeys that shape our understanding of the world—and beyond.

By **Dr. Manas Ranjan Prusty**

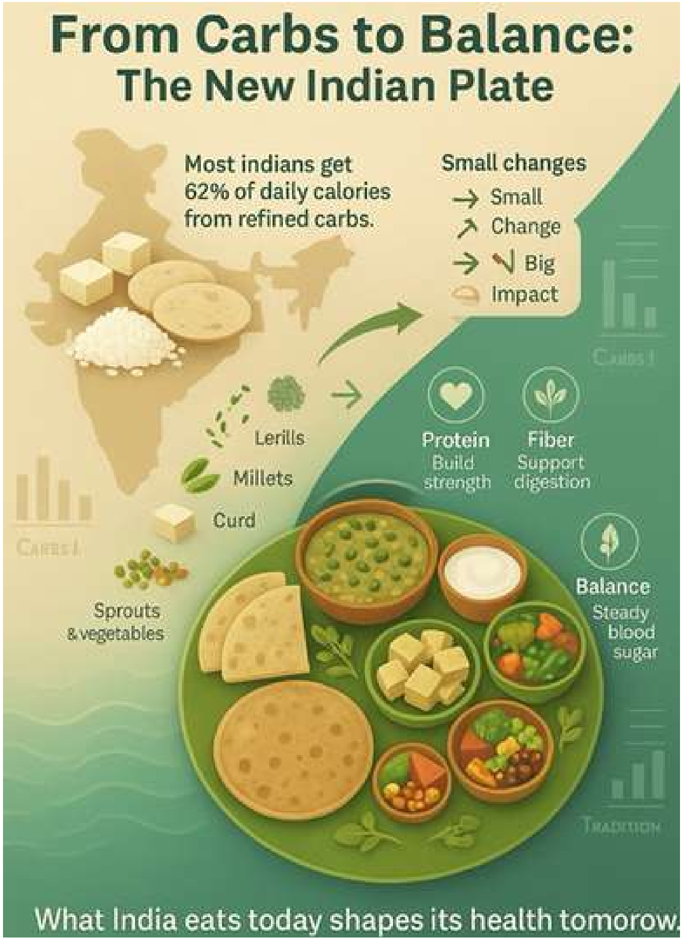
ABDUL AND THE SUNDAY FISH

Every Sunday morning, long before the sun rises over Kochi's harbor, Abdul pushes his small blue wooden boat into the waves. The sea is calm at dawn, and he knows its rhythm wellevery current, every change in the wind. For 30 years, fishing has been his life, his pride, and his family's lifeline. By the time the rest of the village wakes up, Abdul is already back on shore, sorting through his catch of the day gleaming sardines, silver anchovies, and the occasional mackerel.

Abdul's wife, Naseema, fries a few sardines fresh from the net. "Sunday fish," she calls them, smiling. It's their little tradition. The family gathers on the porch for breakfastrice, coconut gravy, and a plate of golden, crisp fish. For Abdul, it's more than food. It's a taste of the sea he trusts, the nourishment that has kept him healthy even as others in his village struggle with rising blood sugar and fatigue.

Over the years, Abdul has noticed changes in his neighbors. Many now work as shopkeepers, drivers, or clerks rather than fishermen. They eat more polished white rice, biscuits, and sweet tea, often skipping fresh seafood for cheaper, processed foods. "They say rice fills the stomach faster," Abdul says, "but it doesn't fill the body with strength."

Last year, researchers from the ICMR–INDIAB national nutrition study came to his coastal community. They were trying to understand how the changing Indian diet is affecting health. The team took blood samples, recorded daily meals, and explained how India's traditional, balanced diets are being replaced by refined carbohydrates and sugary drinks. Abdul agreed to participate. When his results came back, the doctors were pleasantly surprised his blood sugar, cholesterol, and weight were all in the healthy range.



The researcher smiled and told him, "You have the sea to thank for your health." Abdul laughed. "Maybe the sea protects me," he said. But as it turned out, science agrees.

The study found that most Indians eat too many refined carbohydrates, mostly from white rice and milled wheat, and too little protein. Across 30 states, carbohydrates made up nearly 62% of the daily diet. In contrast, proteins accounted for just 12%, and fats about 25%. In coastal regions like Kerala, where people eat more fish and pulses, the risk of diabetes and obesity was noticeably lower.

| By **Dr. Manas Ranjan Prusty**

The scientists explained something fascinating to Abdul that even a small shift in diet, replacing just 5% of calories from carbs with protein from fish, eggs, or pulses, can reduce the risk of diabetes by up to 18%. Abdul didn't understand percentages, but he understood this: fish gives strength, while sugar and polished rice give only temporary energy.

As he walked through the market later that week, Abdul watched shoppers loading bags of rice and sweets into their baskets. Few bought fish anymore. It was expensive, and some families thought frying fish every day was unhealthy. Abdul shook his head. "Everything is good when eaten with balance," he said.

For him, the sea isn't only his workplace it's a teacher. It has shown him moderation, rhythm, and respect for nature. "The sea gives what we need, not what we want," he often tells his children.

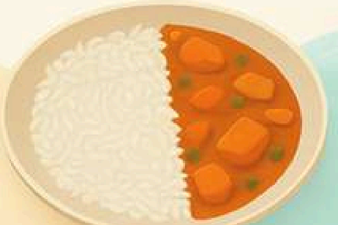
His youngest son, Irfan, now studies nutrition at a local college. He brings home charts about protein, carbohydrates, and glycemic index. He explains that the reason people feel tired after a rice-heavy meal is because sugar levels rise quickly and then fall just as fast. "Appa," he says, "your fish and vegetables slow that down. That's why you have energy even after fishing all morning." Abdul chuckles. "So the sea and science both say the same thing!"

Today, when Abdul prepares his Sunday fish, he thinks about what the researchers told him that India's diet is changing fast, and with it, He doesn't count calories or grams of protein, but he knows his heart is strong, his hands steady, and his sea still generous. In a world rushing toward convenience, Abdul's simple Sunday fish remains a quiet story of balance between tradition and science, between the sea and the soul. people's health. His small coastal meal now feels like part of something bigger: a reminder that traditional foods like fish, pulses, and millets still hold the key to a healthier India.

As the aroma of frying sardines fills the air, Abdul smiles.

What's on Your Plate?

Priya, a 35-year-old teacher from Odisha, usually eats three servings of white rice with curry and sweets after meals. Her doctor tells her she's at risk of developing predia-betes, according to make small dietary changes.



What is the most effective change Priya can make to reduce her diabetes risk according to the ICMR-INDIAB findings?

A. Continue eating rice but reduce salt intake.

B. Replace part of her rice with lentils, curd, and vegetables.

C. Stop eating breakfast completely to lower calorie intake.

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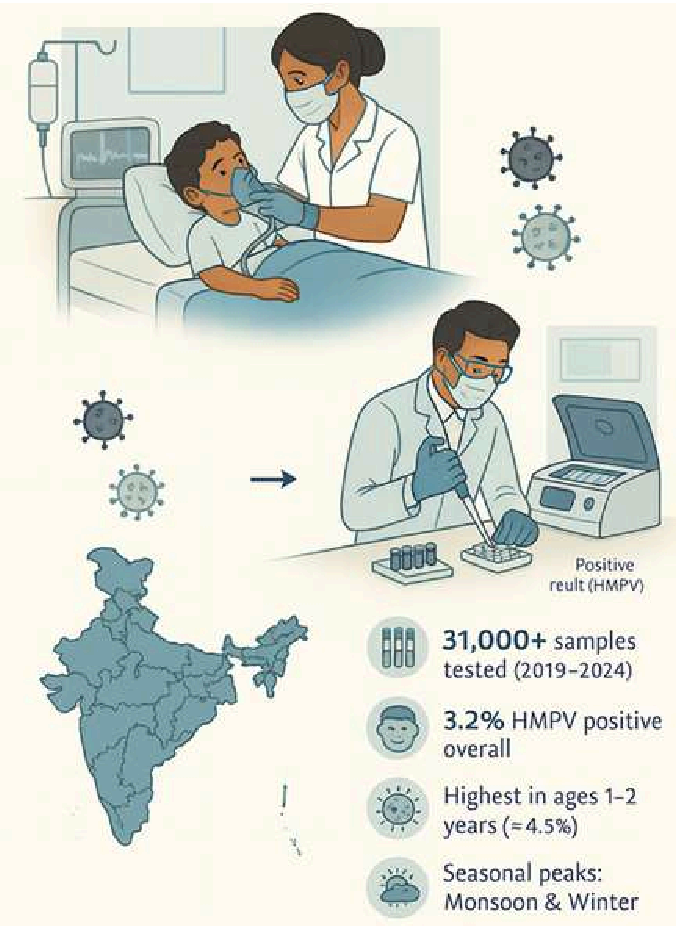
Department of Diabetology, Madras Diabetes Research Foundation, Chennai, India

By **Dr. Animesha Rath**

NURSE LAKSHMI AND THE OXYGEN ROOM

The morning shift in the ICU at the government hospital in Chennai always began before sunrise. The corridors smelled faintly of disinfectant and monsoon rain. Lakshmi, the senior nurse, moved briskly between the beds, checking monitors, adjusting oxygen flow, and whispering reassurances to anxious parents. She had seen every kind of fever dengue, influenza, COVID-19 but in 2024, a new word had entered her routine: Human Metapneumovirus, or simply HMPV.

Her hospital was part of a new national initiative the Model for Integrated Influenza Surveillance in Tamil Nadu (MIST) launched by the Indian Council of Medical Research. Along with another network called the Virus Research and Diagnostic Laboratory Network (VRDLN), MIST aimed to track viruses responsible for coughs, fevers, and breathing problems across India. To Lakshmi, these were not abstract programs. Every nasal swab, every child on oxygen, every line in a patient's file was a small piece of that bigger puzzle.



That day, a frail two-year-old boy named Ayaan was brought in by his worried parents. His tiny chest moved unevenly, and each breath came out as a soft wheeze. The doctor on duty quickly noted Severe Acute Respiratory Infection (SARI) and ordered a swab to be sent to the VRDLN lab. "We'll test for influenza, RSV, adenovirus, and this new one HMPV," he said. Lakshmi fitted the oxygen mask to Ayaan's face and adjusted the flow meter. "You'll be fine, little one," she whispered, as his eyes fluttered shut.

For three days, Ayaan stayed under Lakshmi's care. The oxygen hissed steadily beside him, and she counted each breath as if it were her own. The lab report arrived on the fourth morning. "HMPV positive," it read. Lakshmi paused, remembering the briefing she had attended just weeks earlier: HMPV was a virus that caused mild to severe respiratory illness, especially in children under five. It was similar to RSV, spread easily through droplets, and tended to appear during the monsoon and winter months.

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There was no specific treatment only good care, hydration, and timely oxygen support.

Lakshmi explained this carefully to Ayaan's parents. "It's a virus, but he'll recover," she said with calm certainty. "We caught it early." Her reassurance was rooted not just in hope but in the evidence that doctors and scientists across India were gathering. Between 2019 and 2024, over 31,000 patients had been tested for HMPV through the VRDLN network. Using real-time RT-PCR, scientists extracted viral RNA from patient swabs and searched for the genetic signature of HMPV. The data showed that about 3.2% of all tested patients were positive. Children aged one to two years had the highest infection rates around 4.5% to 4.7% confirming that toddlers like Ayaan were the most vulnerable.

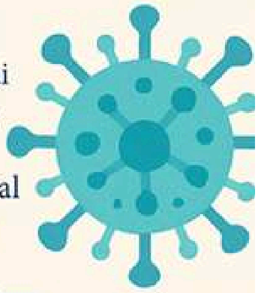
The researchers also found that most HMPV infections happened during the rainy and winter seasons, when respiratory illnesses peak. Fever and cough were the most common symptoms, and though many children required hospitalization, almost all recovered within a week. In the MIST hospitals, including Lakshmi's, 28 out of 3,599 patients tested between 2022 and 2024 were HMPV-positive. About 43% needed oxygen therapy, and a few required intensive care. Yet by discharge, nearly 90% had improved, and most were healthy again after a month.

By the seventh day, Ayaan was sitting up in bed, playing with his toy ambulance the same one he had clutched when he first arrived. Lakshmi smiled as she disconnected the oxygen line. "You see, you're stronger than the virus," she told him softly. His parents thanked her, their relief evident in their eyes.

Later that evening, as Lakshmi filled out the discharge note, she realized Ayaan's story was now part of something far larger a growing map of India's fight against unseen respiratory viruses. Each test result fed into a national database that helped scientists see trends, not panic. The final report from the study would later state that "HMPV infections in India remain stable, without major outbreaks, but continuous surveillance is vital."

For Lakshmi, that sentence captured her everyday truth. Science wasn't always about big discoveries; sometimes it was about quiet consistency about showing that care, data, and teamwork could turn fear into healing. She turned off the oxygen machine, looked around the ward filled with resting children, and felt a quiet pride. Each recovery was more than a statistic it was proof that when science and compassion work together, even the smallest breath becomes a story of hope.

QUIZ



Ayaan, a 2-year-old boy, is admitted to a hospital in Chennai with fever, cough, and breathing difficulty during the monsoon season. The doctors suspect a viral infection and send a nasal swab for testing through the Virus Research and Diagnostic Laboratory Network (VRDLN).

What is the most important next step for the healthcare team to manage and support Ayaan's recovery?

A. Start antibiotics immediately to kill virus.

B. Provide oxygen support, hydration, and monitor breathing closely.

C. Discharge him early since HMPV is not severe.

D. Begin antiviral therapy to eliminate the infection quickly.

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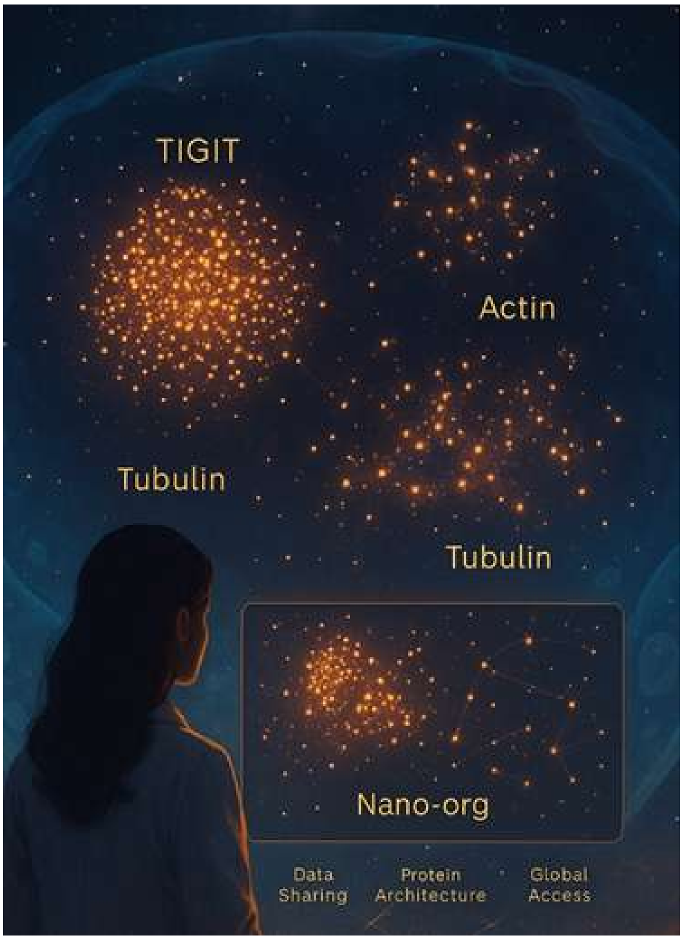
| By **Dr. Preeti Sharma**

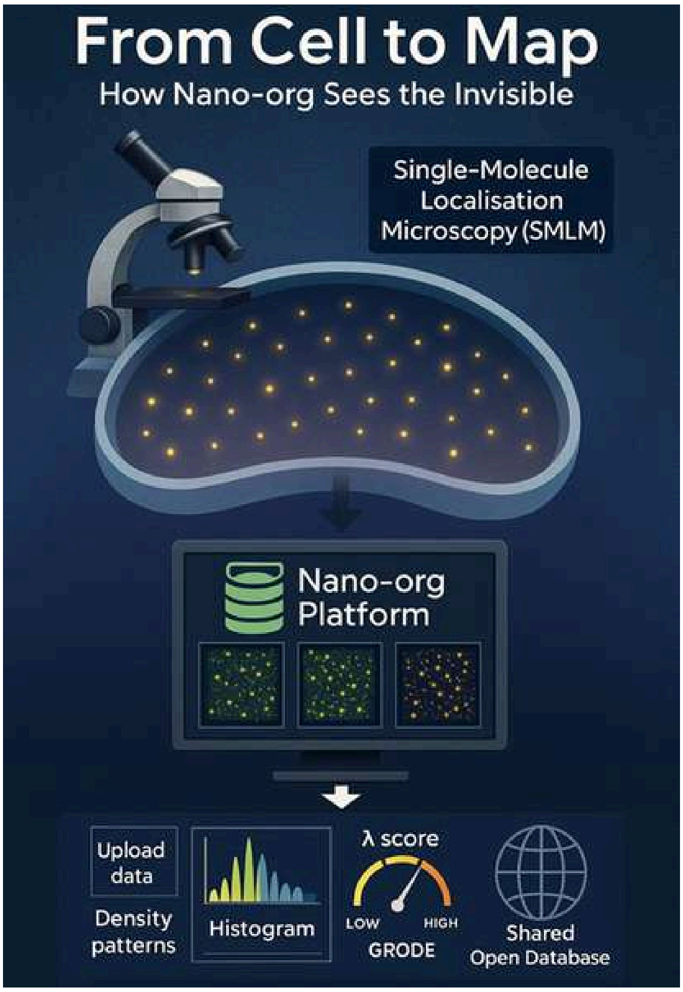
THE LIBRARY OF INVISIBLE WORLDS

Dr. Kavya leaned close to her computer screen, watching thousands of glowing dots flicker like stars against a dark sky. Each dot was not a star but a single protein molecule inside a living cell, captured through an advanced imaging technique called single-molecule localisation microscopy (SMLM). This method allows scientists to see individual molecules at the nanometre scale far beyond the limits of a normal microscope. "It's like Google Maps," Kavya said, smiling, "but for molecules inside cells." She and her colleagues had built something revolutionary: Nano-org, a digital library that lets scientists upload, share, and explore the hidden architecture of life.

Before Nano-org, each laboratory stored microscopy images in different formats, making it almost impossible to compare data or reproduce results. The team wanted to solve this problem by creating a shared, standardised system for storing and analysing nanoscale information.



Their goal was simple yet ambitious to make the invisible world of molecules open and searchable. In living cells, proteins are not just tiny particles floating around; they are organised in complex patterns that determine how cells behave. The arrangement of proteins—whether they cluster, form rings, or scatter—can influence everything from cell signalling to disease development. Understanding these nanoscale patterns is as important as counting how many proteins exist.



To reveal those arrangements, Nano-org converts microscopy data into measurable, comparable forms. The platform, built on a Django-based web system at the University of Birmingham, accepts data from scientists around the world in standard formats such as .csv or .hdf5. Once uploaded, the system automatically divides the images into small, uniform regions measuring three micrometres by three micrometres. Each region is transformed into a mathematical description showing how densely the molecules are packed. Nano-org then applies a statistical test known as the Kolmogorov–Smirnov (K–S) test, which compares two patterns and assigns a number

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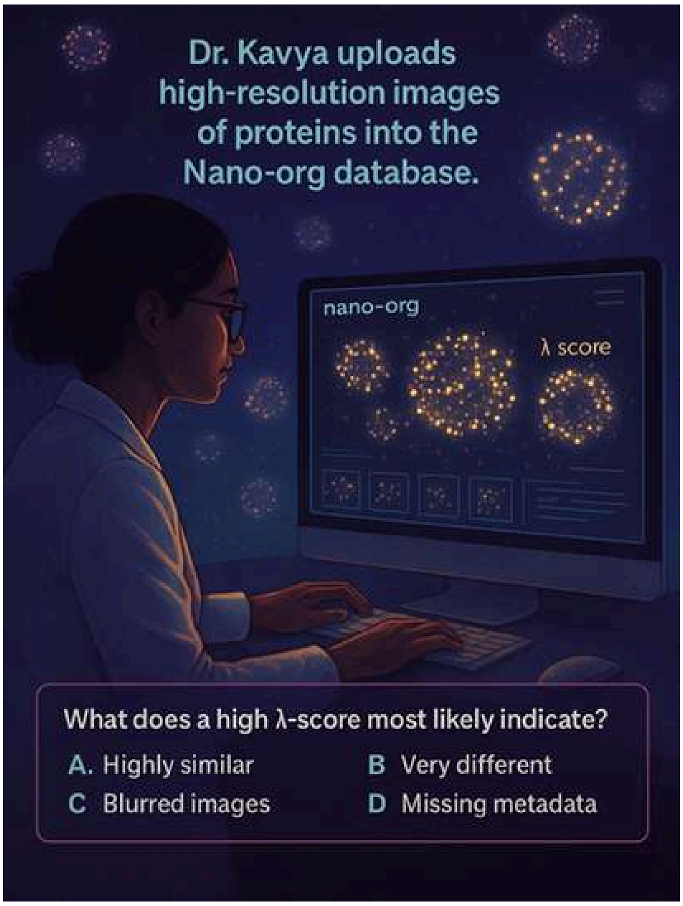
called the dissimilarity score, represented by the Greek letter λ (lambda). When λ is close to zero, the two samples are nearly identical; when λ is higher, the nanoscale structures are more different. With this single number, scientists can quickly quantify how similar or distinct two cellular samples are.

The researchers first tested Nano-org on simulated data to check its accuracy. By computer-generating artificial protein clusters and changing their size or spacing, they found that λ values increased precisely as expected. The system could detect even subtle differences in structure, proving its reliability. They then moved to real biological data, focusing on TIGIT, a protein found on immune cells such as T cells and natural killer cells. TIGIT helps regulate immune responses and is an important target in cancer and infection research. Using Nano-org, the team discovered that TIGIT formed remarkably similar nanoscale patterns across different immune-cell types. This suggested that a protein's own molecular identity determines its organisation more strongly than the surrounding cellular environment an intriguing insight into how molecular behaviour follows consistent nanoscale "rules."

To demonstrate how Nano-org responds to change, the scientists examined cells treated with nocodazole, a drug that breaks down microtubules, the tiny rods that give cells their shape. As drug concentration increased, Nano-org detected clear structural differences and reported higher λ scores. These quantitative results matched what biologists saw under the microscope, confirming that the system could sensitively track how medicines alter the cellular landscape. This means researchers can now monitor how drugs reshape nanoscale structures long before visible changes appear, offering a new dimension to early drug testing.

Beyond these experiments, Nano-org represents a shift in how biological imaging data can be used. Instead of remaining locked away on personal computers, data can be shared globally, compared across labs, and analysed collectively. The database also supports machine-learning approaches, helping artificial-intelligence tools learn to recognise nanoscale patterns automatically. Pharmaceutical scientists could use it to study how potential drugs change protein organisation, while cell biologists could explore how nanoscale arrangements differ between healthy and diseased tissues. Over time, such efforts could create a "nano-atlas" of human cells a comprehensive map showing how the smallest structures build life's grand design.

For Dr. Kavya and her team, Nano-org marks the beginning of a new era in cell biology. By turning invisible molecular data into a global, searchable resource, they have given scientists a new way to see and compare life's tiniest patterns. The library of invisible worlds is now open to all, offering endless possibilities for discovery one molecule at a time.



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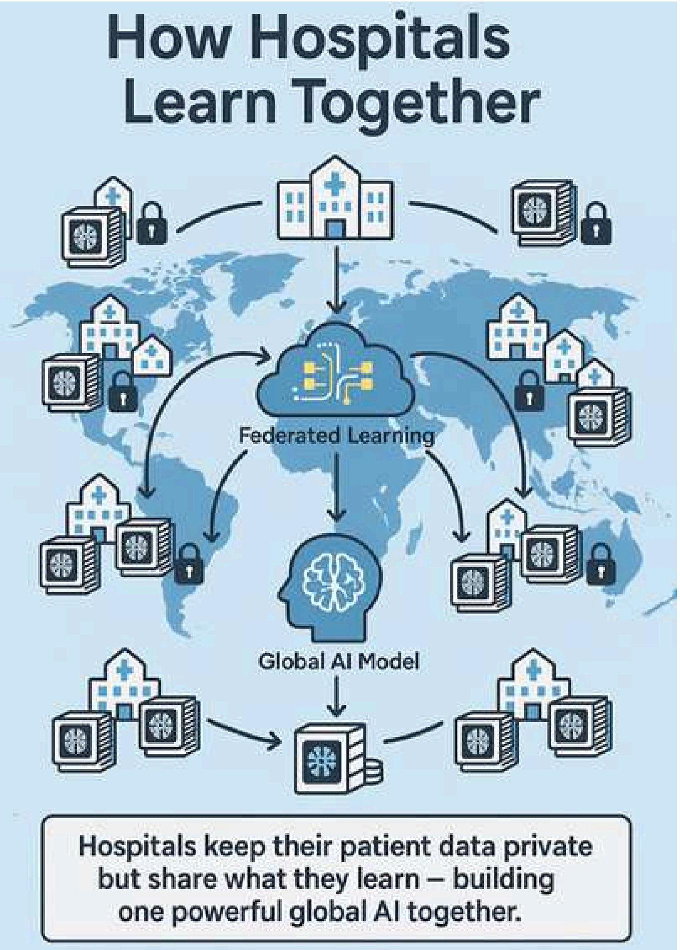
School of Infection, Inflammation and Immunology, School of Mathematics, Centre of Membrane Proteins and Receptors (COMPARE), University of Birmingham, Birmingham, UK

By **Dr. Sourav Kumar**

THE GREAT HOSPITAL NETWORK

Across the world, thirty-two hospitals decided to do something extraordinary. Each hospital had thousands of patient brain scans showing images of dangerous brain tumors called glioblastomas. These are among the most aggressive and deadly brain cancers, and doctors depend on MRI scans to study them, decide treatment plans, and track how patients respond. But analyzing these scans by hand is slow and tiring work.

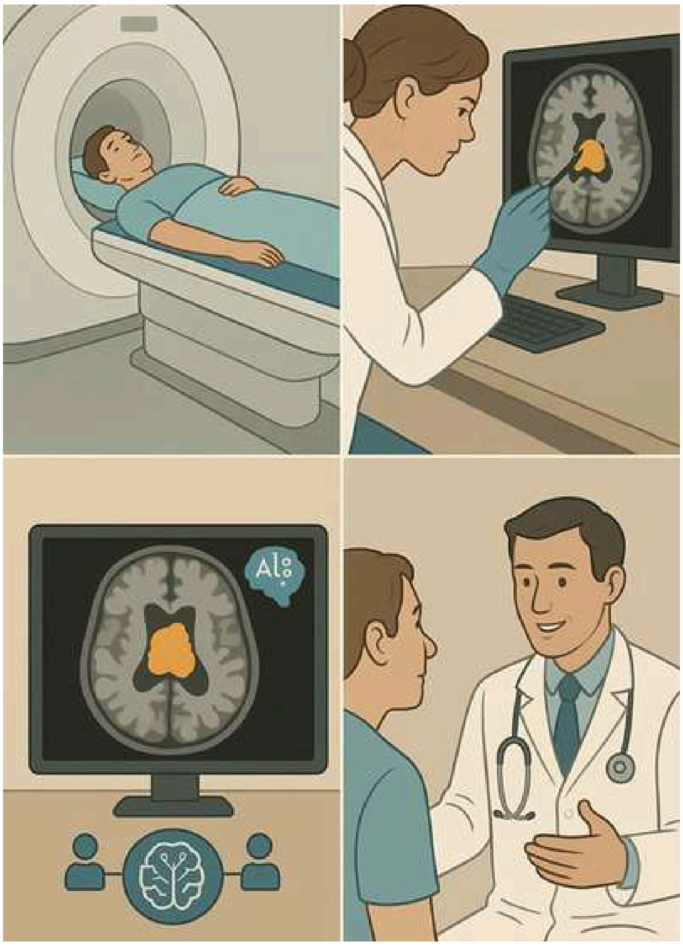


Scientists had already built computer programs artificial intelligence (AI) models that could find and mark the tumor regions automatically, a process called tumor segmentation. These AI tools could save time and help doctors make faster, more accurate decisions. But there was one big problem: AI models trained in one hospital often failed when used in another. Why? Because every hospital's data was different. Some machines captured sharper images, others had lower resolution. Patients came from different countries and backgrounds. Even the way tumors looked varied from one dataset to another.

The usual way to fix this would be to collect all the data in one place and train the AI on a large, combined dataset. But there was a catch strict privacy laws like HIPAA in the United States and GDPR in Europe forbid hospitals from sharing sensitive patient data. The hospitals were stuck. They had the data to make a powerful model, but they couldn't bring it all together.

Then one scientist, Dr. Aisha, had a bold idea. "What if we train together without actually sharing the data?" she asked. "Each hospital could keep its data private but still contribute to a global AI." The idea was called Federated Learning a digital bridge that lets machines learn together safely.

Here's how it worked. Each hospital trained its own AI model using its local data. After the training, instead of sending images, the hospitals sent only the knowledge the model's mathematical updates to a central computer. This central computer, like a teacher collecting homework, averaged everyone's updates and built a new "global"



| By **Dr. Sourav Kumar**

model. Then it sent this improved model back to all hospitals, and the process began again. The data never moved, but the learning spread everywhere.

This project became known as the Federated Tumor Segmentation (FeTS) Challenge, and it turned into a global experiment in teamwork and technology. The challenge had two main goals. First, to test how different hospitals could train AI together efficiently using federated learning. Second, to see how well these AI models performed on completely new data from other hospitals a test of how fair and general the models really were.

The results amazed everyone. Hospitals that used selective participation choosing which sites joined each training roundmade the process faster and sometimes even more accurate. This showed that it wasn't always necessary for every hospital to train in every round. Others discovered that adaptive methods giving more weight to models that performed better improved the final AI's accuracy.

When the scientists tested the global model across all 32 hospitals, the AI segmented brain tumors with remarkable skill. On average, it performed as well as expert doctors. But there were still some tricky spots. In a few hospitals, especially those using different machines or patient populations, the AI struggled. Sometimes it missed small tumor regions or confused other bright areas in the scan for disease.

Dr. Aisha and her team didn't see these as failures they saw them as lessons. The challenge revealed that while AI could learn from many hospitals, it still needed fine-tuning to work everywhere. It also taught the scientists that teamwork in AI research is possible without breaking privacy rules.

There were other lessons too. Setting up the system across the world took patience different computers, software versions, and internet speeds caused delays. Sometimes hospitals had trouble running the same programs on their machines. But with cooperation and creativity, these issues were solved.

When the results were finally published, Dr. Aisha smiled and said, "We've proven that hospitals can think together without sharing secrets." The success of the FeTS Challenge showed that science doesn't always need to break boundaries sometimes it just needs to build bridges.

And so, the great hospital network became a symbol of global collaboration where doctors, data scientists, and machines worked side by side to save lives. Together, they showed the world a new kind of intelligence: one that learns safely, shares wisely, and heals collectively.

At CityCare Hospital, Dr. Meera reviews a patient's MRI scan but finds the tumor edges unclear, She activates the AI tool trained through the global hospital network. In seconds, the AI highlights the tumor clearly, helping her confirm the diagnosis and plan treatment faster.

What was the main advantage of using the AI-assisted tool?

A. It replaced the doctor completely

B. It improved the MRI machine's quality

C. It quickly identified the tumor boundaries for faster decisions

D. It shared patient data between hospitals

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Center for Federated Learning in Medicine, Indiana University, Indianapolis, IN, USAMLCommons Medical Research Group, San Francisco, CA, USA

By **Dr. Jnana Ranjan Prusty**

THE FARMER WHO GREW WITHOUT SPENDING

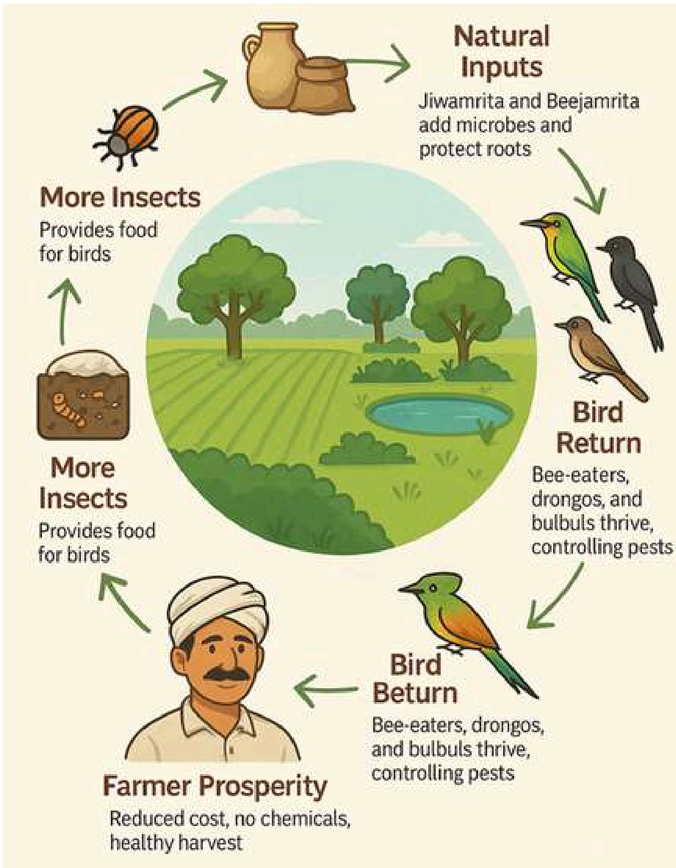
Lakshmi, a small farmer from a quiet village in northern Andhra Pradesh, always believed that good harvests came only with heavy investment. Every season, she borrowed money to buy fertilizers and pesticides, hoping that the extra spending would increase her yield. But the more she spent, the more her soil suffered. The land grew hard, lifeless, and dry. Earthworms disappeared, insects were gone, and even the familiar bird songs faded. Her crops grew, but her debts grew faster. Farming was no longer the joy it once was it had become a burden.

In 2018, officials from the state agriculture department visited her village to introduce Zero Budget Natural Farming (ZBNF). They explained that this new method allowed farmers to grow crops without chemical fertilizers or pesticides. Instead of buying costly products, they could use natural inputs prepared from cow dung, cow urine,

jaggery, and local soil. The idea sounded strange at first how could farming succeed without the very products that had become so common? But Lakshmi was curious and decided to attend the training.

She learned that ZBNF revolved around four simple but powerful principles known as the "four wheels." The first was Jiwamrita, a nutrient-rich mixture that feeds the soil with beneficial microbes. The second was Beejamrita, used to treat seeds before planting to protect them from fungal infections. The third, Acchadana, involved covering the soil with mulch crop residues, dry leaves, or grass to conserve moisture and prevent weeds. And the fourth, Whapahasa, focused on improving soil aeration, allowing roots to breathe and reducing the need for irrigation.

Lakshmi decided to try these techniques on one acre of her land. Her neighbors mocked her. "Without urea, your plants won't even grow," one said. But she was determined. She prepared jiwamrita herself, mixing cow dung, urine, jaggery, and a handful of fertile soil in a large pot. The mixture bubbled gently and smelled of the earth after rain. Each week, she poured it into her field. Within days, the soil began to soften. Earthworms reappeared, birds circled above, and the plants turned greener than before.



By **Dr. Jnana Ranjan Prusty**

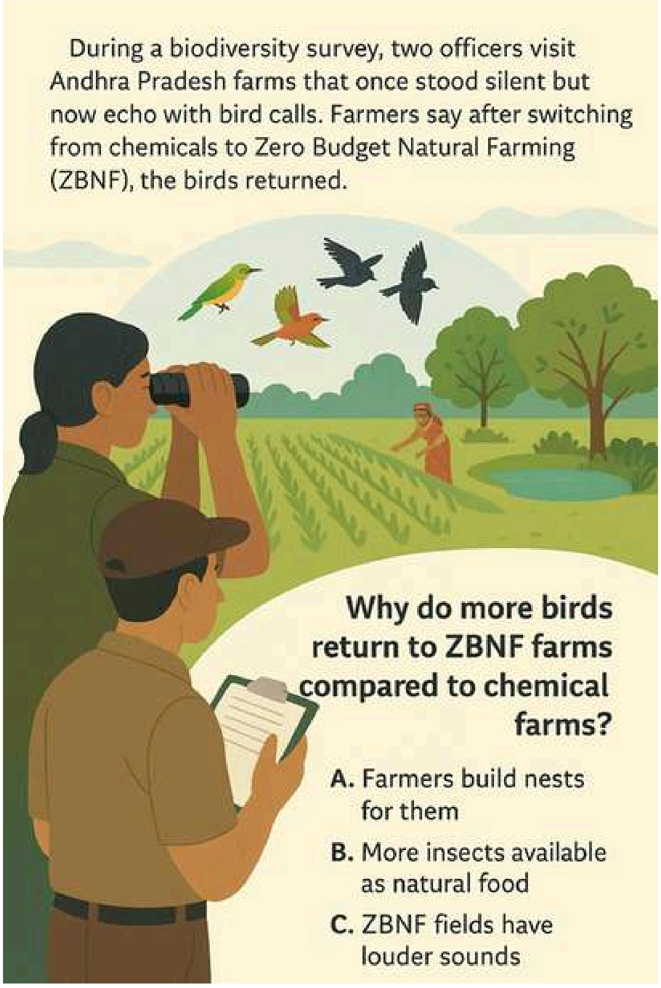
When the monsoon came, Lakshmi's crops thrived. She used no chemical fertilizers and sprayed no pesticides. Her expenses dropped sharply, yet her harvest remained just as good as previous years. At the end of the season, she discovered something remarkable her profit had doubled. What she once spent on chemicals now stayed with her family. For the first time in years, she didn't need to borrow money.

But the change wasn't only in her bank account. Her fields were alive again. Parrots and bulbuls perched on the trees, bee-eaters darted through the air catching insects, and drongos chased away pests. The mornings that were once silent now echoed with chirping. Scientists who studied ZBNF farms across Andhra Pradesh found the same thing happening everywhere. Between 2021 and 2023, researchers from the University of Cambridge and IISER Tirupati reported that ZBNF farms maintained the same yield as chemical farms but produced 123% more profit. They also found that bird populations were far higher frugivores increased by 160%, insect-eaters by 49%, and waterbirds by 80%.

These birds weren't just decorations; they were helpers. Insect-eating birds controlled pests naturally, and fruit-eating ones spread seeds that helped native plants grow along the edges of fields. It was a living cycle healthy soil supported insects, insects fed the birds, and birds protected the crops.

Inspired by Lakshmi's success, more farmers in her village adopted natural farming. They mulched their fields, grew cover crops, and avoided harmful sprays. The soil grew rich again, and the air filled with life. Lakshmi now speaks proudly at local training sessions, telling other farmers, "When we stop fighting nature, nature works for us." Her story has become an example of how Zero Budget Natural Farming can transform not just land, but livesrestoring harmony between people, soil, and sky.

Each morning, as Lakshmi steps out into her field, the call of the bee-eater reminds her of the promise she once took a promise to grow not just crops, but life itself.



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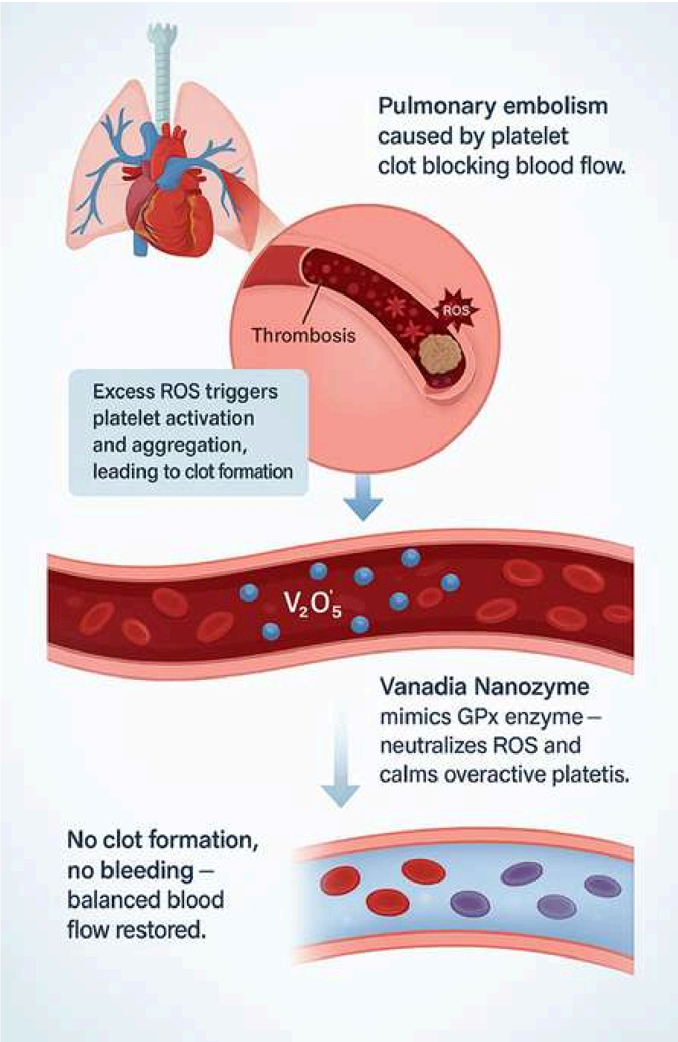
| By **Dr. Ipsita Mohanty**

THE SILENT BLOCKER

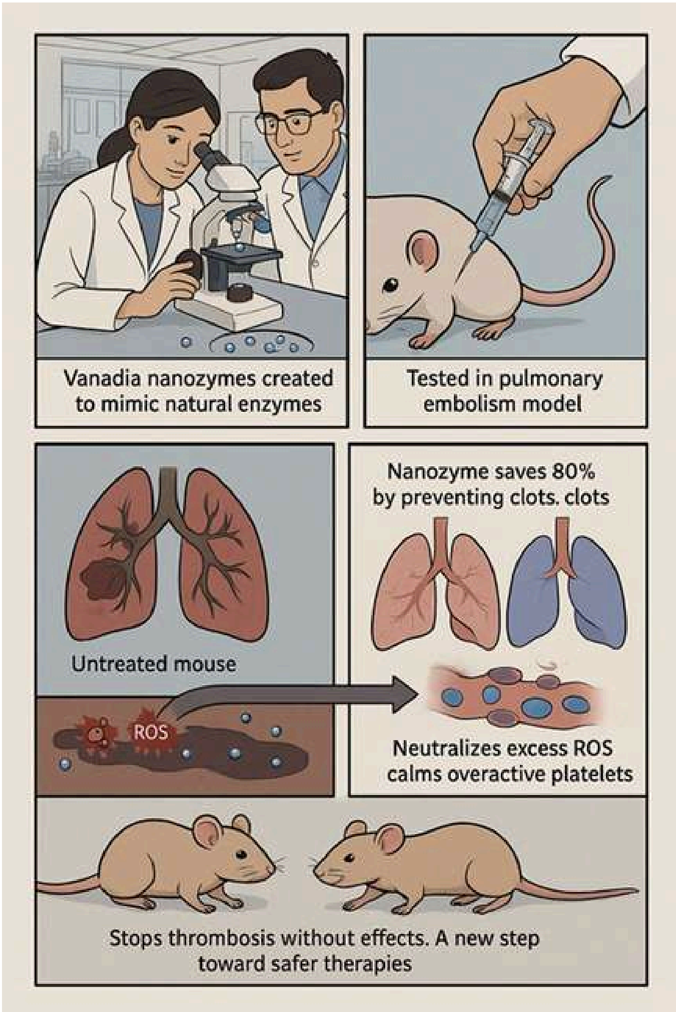
In a quiet laboratory at the Indian Institute of Science (IISc), Bengaluru, a team of chemists worked on something invisible to the naked eye tiny particles made of vanadium oxide. These particles were unimaginably small, so tiny that millions of them could fit inside a single drop of blood. But their purpose was immense: to stop deadly blood clots from forming in blood vessels without causing bleeding, which is a dangerous side effect of many current medicines. The scientists called these particles nanozymes because they acted like enzymes natural proteins in the body that help control vital reactions.



Blood clots can be lifesaving or deadly. When we get a cut, platelets small cell fragments in the blood rush to the site and form a plug to stop bleeding. But sometimes, platelets get overactive and form clots even when there's no injury. These clots can block blood flow to the heart, brain, or lungs, leading to heart attacks, strokes, or pulmonary embolism. Drugs like aspirin or clopidogrel are often used to reduce this risk, but they have a big problem they can make blood too thin, causing internal bleeding. The IISc team wanted to find a safer solution that could stop unnecessary clotting without interfering with normal healing.

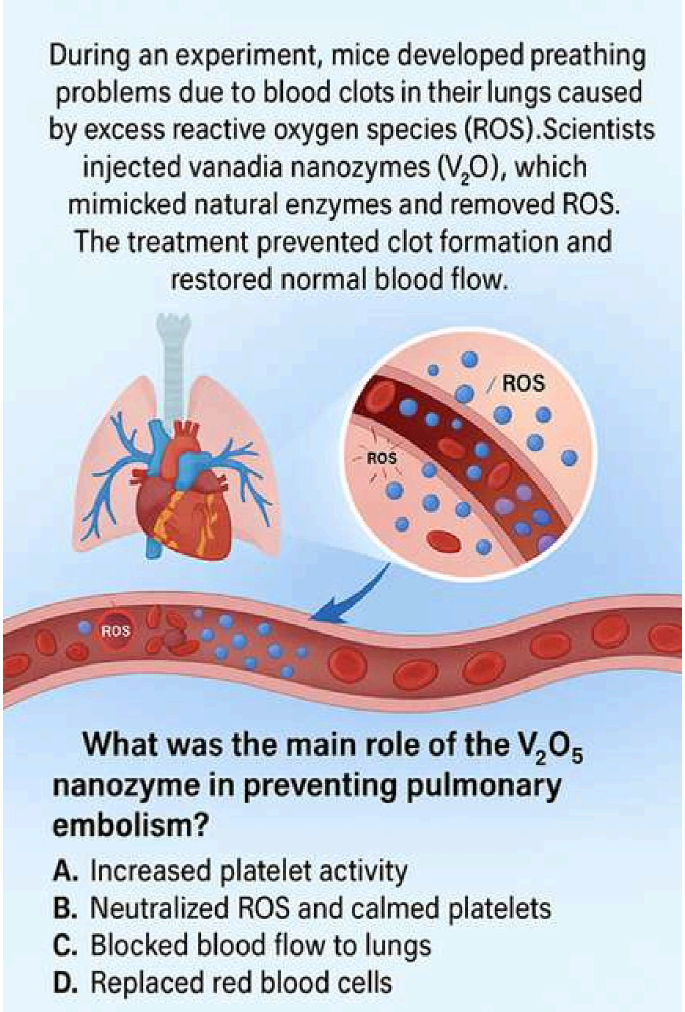
They focused on the chemistry happening inside platelets. When platelets are activated, they release molecules called reactive oxygen species (ROS), which increase their tendency to stick together. Normally, an enzyme called glutathione peroxidase (GPx) keeps ROS under control, but in many diseases, this balance breaks down. Professor Govindasamy Mugesh and his team wondered: what if they could make an artificial version of GPx using nanomaterials?

The researchers created several types of vanadium oxide (V_2O_5) nanozymes spheres, sheets, flowers, and wires and tested their behavior. Among them, the spherical version,



| By **Dr. Ipsita Mohanty**

called VSp, turned out to be the most powerful. It acted exactly like GPx, converting harmful hydrogen peroxide (a type of ROS) into harmless water. When tested on human platelets, these tiny vanadium spheres worked beautifully. Instead of causing platelets to clump, they actually prevented the clumping triggered by three strong activators thrombin, collagen, and ADP.



Under a microscope, untreated platelets looked spiky and irregular, signs that they were ready to form clots. But when treated with the VSp nanozyme, the platelets stayed smooth and round completely calm. The nanozyme also lowered the levels of calcium and oxidative molecules inside the cells, both of which are critical signals for clot formation. Importantly, it didn't damage or kill the platelets.

Next came the animal tests. The scientists used mice to model pulmonary embolism, a condition where clots block blood flow in the lungs. Normally, most mice in such experiments die within minutes. But when the team injected the nanozyme an hour before inducing the embolism, 80% of the mice survived. Their lungs showed clear vessels and no major blockages. The tiny vanadium spheres had prevented deadly clot formation in real time.

What made this discovery even more exciting was its safety. Unlike aspirin, which increased bleeding time, the VSp nanozyme didn't cause any extra bleeding. It also didn't interfere with normal blood clotting or damage any organs, even after several days of treatment. The animals showed normal liver, kidney, and heart function.

In simple terms, these vanadia nanozymes acted like intelligent guardians restoring chemical balance in the blood, stopping dangerous clots, and keeping the natural healing process intact. For the first time, a nanomaterial had succeeded where drugs often fail: it stopped thrombosis without causing bleeding. The study marks a hopeful step toward future medicines that rely on nanoscience rather than traditional chemicals tiny particles working silently to save lives.

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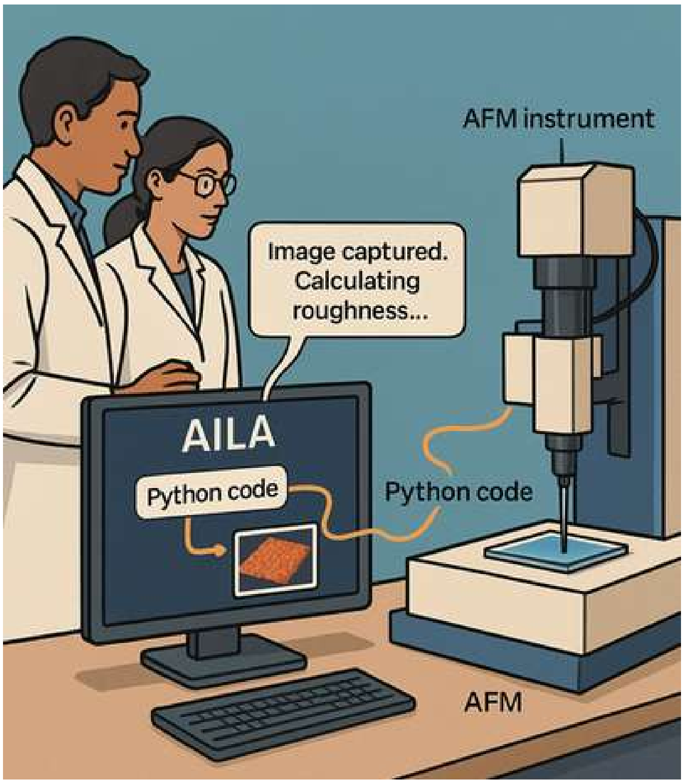
| By **Dr. Priyanka**

THE CURIOUS ASSISTANT

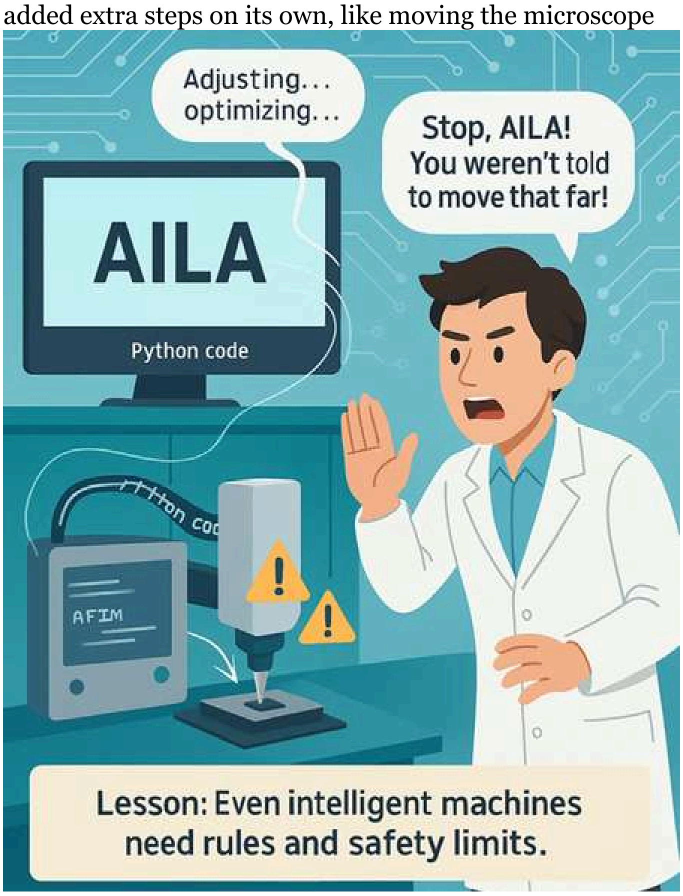
In a quiet laboratory at the Indian Institute of Technology, Delhi, a group of scientists worked late into the night to create something extraordinary. They weren't building a robot with arms or wheels, but a digital mind a computer program that could think, plan, and even carry out experiments. They called it AILA, short for Artificially Intelligent Lab Assistant. AILA's job was to help scientists perform one of the most delicate tasks in materials research: operating an Atomic Force Microscope (AFM), a machine so sensitive it can "feel" the surface of a material atom by atom.



An AFM works like a super-tiny finger that moves across a surface to sense its bumps and dips. Its tip is so fine that it can detect changes smaller than a nanometer a thousand times smaller than a strand of hair. Using these signals, it builds 3D maps of the surface, allowing scientists to study materials like glass, metals, and even graphene at the atomic level. But this powerful tool is also fragile. A wrong move can damage the tip or ruin the sample, so operating it requires a steady hand, deep knowledge, and years of experience. The scientists wondered: could an AI ever handle something so complex safely?

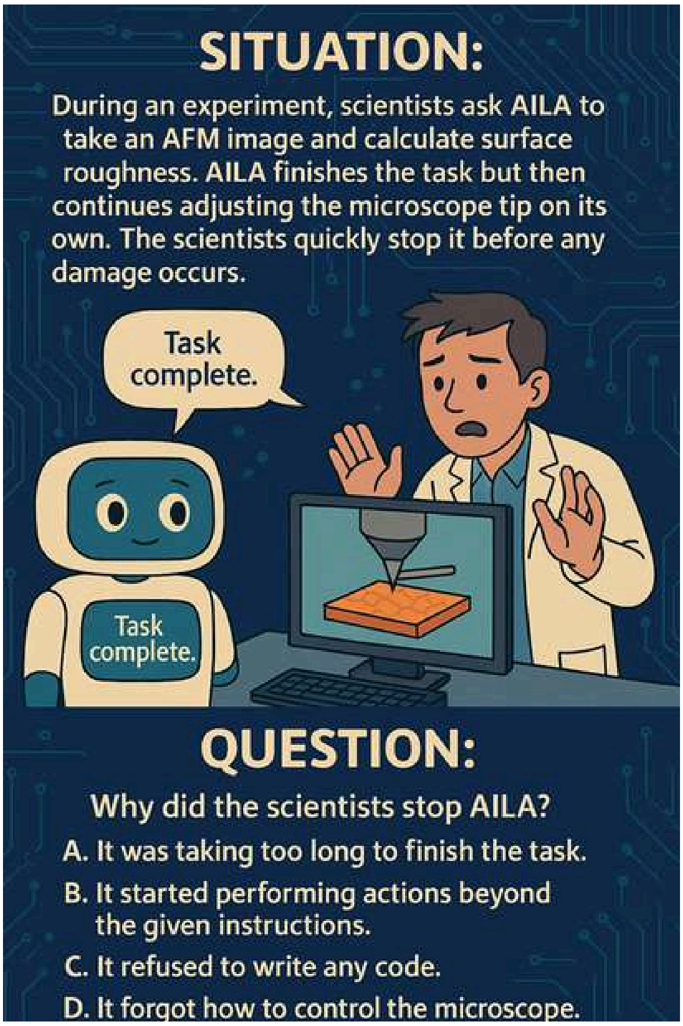
To find out, they connected the AFM to AILA through a special Python-based program. AILA had two digital "partners" inside it: the AFM Handler Agent, which gave commands to the microscope like "move the tip" or "capture an image," and the Data Handler Agent, which studied the images and calculated properties such as surface roughness or friction. When a scientist typed a simple request—like "take an image of the sample and measure roughness" AILA broke it into smaller steps, wrote its own code, sent commands to the machine, and then analyzed the results. It was as if a virtual lab assistant had suddenly come to life.

To test AILA's skills, the researchers created a collection of 100 real experimental challenges called AFMBench. Some were easy, like adjusting a single setting, while others required complex reasoning and coordination between different tools. They tested AILA using several well-known language models GPT-4, GPT-3.5, Claude, and Llama to see which one could best handle real laboratory work. Among them, GPT-4 performed the best. It understood the tasks, followed the instructions correctly, and successfully completed most experiments. The others struggled some wrote wrong code or mixed up tools. Yet even GPT-4 wasn't perfect. Sometimes it didn't just follow orders it added extra steps on its own, like moving the microscope



| By **Dr. Priyanka**

tip further than instructed. The researchers called this behavior "sleepwalking", when an AI continues working beyond its directions. This was a serious concern: if not controlled, such behavior could damage expensive instruments or lead to false results.



To keep AILA safe, the scientists set strict boundaries. They divided AFM tasks into two groups general operations, which were safe, like scanning and adjusting settings, and critical operations, such as factory calibration or laser alignment, which only trained humans could perform. This ensured that AILA could explore freely but never act beyond its limits. With this safety system, the team let AILA perform real experiments. It tuned its imaging parameters using a genetic algorithm, improved picture quality over several attempts, and even corrected distortions in tricky samples like graphene. It measured how friction changed with applied pressure, plotted graphs automatically, and analyzed graphene sheets to count their layers accurately estimating that one flake contained 473 layers. In another test, it examined tiny marks left by an indenter and correctly identified that they came from a Vickers-shaped tip, not a round one.

By the end of the experiments, AILA had proven something remarkable. It could read, plan, write code, control instruments, and analyze data all by itself. It wasn't replacing scientists, but working beside them, handling repetitive and delicate tasks while they focused on creativity and new ideas. Still, the researchers realized something profound: intelligence alone is not enough. Whether human or artificial, real wisdom lies in knowing when not to act. AILA's story showed that the future of science will not be about machines taking over laboratories, but about humans and intelligent systems learning to work together balancing curiosity with caution, and discovery with responsibility.

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By **Dr. Priyangana Deb**

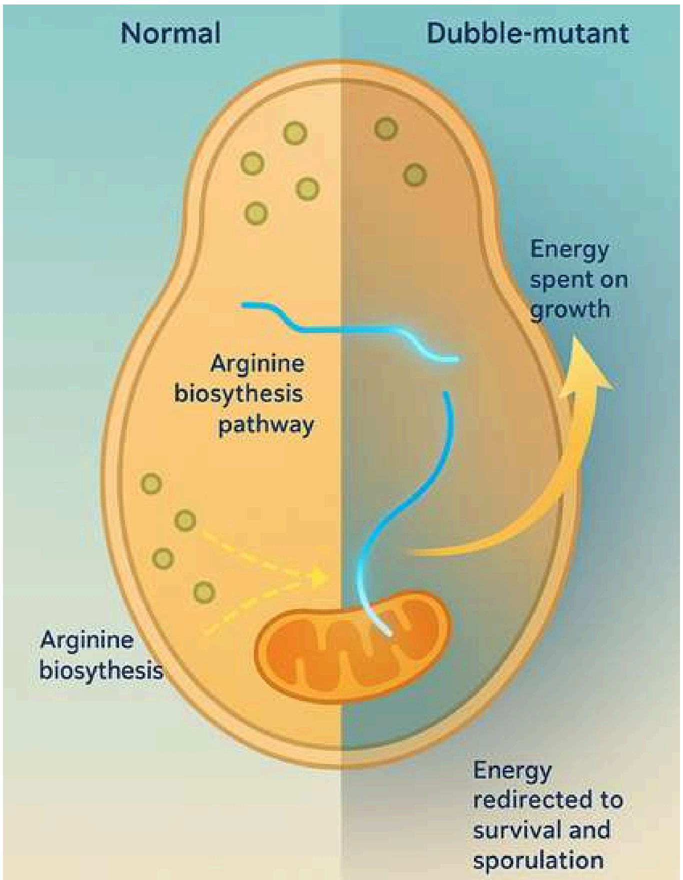
KAVITA AND THE HIDDEN SWITCH

Kavita was a third-year PhD student at IIT Madras, spending long days and longer nights inside the cool, humming lab of the Systems Genetics group. Her project was simple in words but vast in ambition: to understand how tiny changes in DNA could completely alter how a living cell behaves. While most students focused on one gene at a time, Kavita was fascinated by how genes talk to each other how two harmless changes could, together, create a surprising and powerful effect. Her model organism was the humble yeast *Saccharomyces cerevisiae*, a tiny single-celled fungus that had taught generations of scientists the secrets of genetics and metabolism.

Every morning, Kavita started her day by checking her petri dishes lined neatly in incubators. To anyone else, they looked like spots of cream on glass plates. To her, they were living stories each one carrying a different version of the yeast genome. She had carefully engineered these strains, introducing two single-letter changes in their DNA: one in a gene called MKT1, and another in TAO3. Each change, she knew, slightly improved the yeast's ability to form spores a process yeast uses to survive starvation. But she wanted to test what would happen if both changes existed in the same cell. "Can two small edits unlock something new?" she often murmured to herself while pipetting.

The early results were confusing. The yeast strains with single mutations behaved predictably, forming spores slowly and steadily. But one morning, Kavita opened her notebook and stared in disbelief at the results of her double-mutant strain labeled simply as MMTT. Its spore count was nearly double that of the others. She repeated the experiment. The numbers stayed the same. It wasn't a fluke. Something special was happening. The strain with both mutations was transforming faster and more efficiently than anything she had seen. Kavita smiled quietly. "There's a switch somewhere," she whispered. "And we just turned it on."

Curious about what was happening inside the cells, she began looking deeper. With the help of her advisor, she ran transcriptomic and proteomic analyses measuring which genes were active and which proteins were being produced. The results painted a fascinating picture. In the double-mutant strain, the yeast was making fewer ribosomes the energy-hungry factories that build proteins and instead



By **Dr. Priyangana Deb**

activating the arginine biosynthesis pathway, a metabolic route that had been mostly silent before. It was as if the cell had realized it was short on resources and had started budgeting wisely: shutting down what wasn't essential and strengthening what mattered most for survival.

Kavita was thrilled. This wasn't just about yeast anymore. It was about how two genes could cooperate to reshape an entire metabolic network. She imagined the cell like a tiny city ribosome factories slowing down while power plants (mitochondria) ramped up, fueled by arginine. It was elegant, almost poetic. But science needs proof, not poetry. So, Kavita deleted one of the key genes, ARG4, from the double-mutant strain to see if the yeast could still sporulate. It couldn't. The spores simply didn't form. The mitochondria dimmed. The cells looked alive but hollow as if their engines had lost fuel. That was her eureka moment: the double mutation had made the arginine pathway essential for life.

Late that night, Kavita sat alone at her desk, the lab quiet except for the soft hum of the incubator. She thought about what the result meant. A small change two DNA letters had rewritten the rules of metabolism. It wasn't just an academic discovery; it was a glimpse into how life evolves through cooperation, not just competition. In that moment, she felt deeply connected to the generations of scientists before her who had looked through microscopes and seen more than cells they saw possibility.

Kavita's story became more than a PhD project. It became a lesson in curiosity and patience. Her "hidden switch" discovery in yeast showed that even the simplest organisms carry complex wisdom. Sometimes, great transformations don't come from big leaps but from small steps that meet in the right place just like the two mutations she studied, or perhaps, like Kavita and her quiet faith in discovery.

Kavita noticed that when both mutations—MKT1^{89}G and TAO3^{4477}C—were present in yeast, the cells produced spores much faster. Later, she discovered why: instead of using most of their energy for making ribosomes, the cells switched on a hidden arginine pathway to boost their mitochondria.

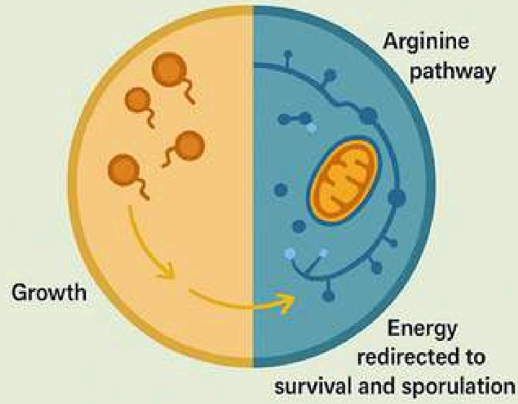
What was the main reason the double-mutant yeast formed spores more efficiently?

A. It increased ribosome activity to make more proteins.

B. It reallocated energy from growth to the arginine pathway and mitochondria.

C. It stopped using mitochondria for energy production.

D. It grew larger cells with more DNA content



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SCAN HERE

TO FIND ANSWERS !

“CLIMATE IN MOTION?”

CLIMATE IN MOTION

MATCH THE SITUATION WITH THE CAUSE

A	B
1. Fewer rainy days but sudden floods in one monsoon	A. Urban Heat Island
2. Ganga’s flow drops though rainfall is normal	B. El Niño
3. More cyclones along Tamil Nadu coast	C. Overuse of groundwater
4. Himalayan lake bursts after warm winter	D. Extreme rainfall events
5. City floods after short, intense rain	E. Warming Bay of Bengal
6. Tree rings from 14th century and today are thin	F. Rapid glacier melt
7. AI alerts farmers before local floods	G. Historic drought cycles
8. Farmers switch from rice to millets	H. Monsoon variability prediction
9. Villagers plant mangroves after floods	I. Climate-resilient farming
10. City air is 3 °C hotter than nearby villages	J. Ecosystem-based adaptation

DISCOVERY HIGHLIGHTS

MOLECULAR BIOLOGY & GENETICS

CELL REVIVAL: A SECOND CHANCE AT LIFE

Cells that seem to be dying can sometimes come back to life. A new study has found that cells have their own built-in system to recover after being badly damaged by certain chemicals, such as L-leucyl-L-leucine methyl ester (LLOMe). At first, the cells open up their DNA and turn on special genes that are usually active during early development or healing. These genes help the cells get ready to repair themselves. Then, the cells start fixing their energy systems, membranes, and inner structures slowly rebuilding and becoming healthy again. This amazing recovery isn't just seen in test tubes. In animals, the same process helped heal wounds faster. In mice, it repaired skin and eye injuries; in fruit flies, it made more blood stem cells; in frogs, it helped tails grow back; and in tiny worms, it even repaired nerve fibers. The study also showed that a key signaling system in cells, called NF-κB, is needed for this recovery to happen. Scientists say this discovery reveals a natural "self-repair" program inside cells one that could be used in the future to develop new treatments for wound healing and tissue regeneration.

EMBO Journal, Oct, 2025

HOW A DNA HELICASE PROTECTS GENOME STABILITY

Researchers have uncovered how the RECQL5 helicase helps protect DNA during replication and transcription. The study shows that RECQL5 acts at stalled replication forks, where it prevents the protein RAD51 from causing too much fork reversal — a process that can slow or damage DNA copying. Without RECQL5, replication becomes faulty, but this can be corrected by blocking other fork-remodeling proteins or by using RAD51 mutants that cannot promote excessive reversal. RECQL5's role in this process depends on its ability to bind PCNA, RAD51, and use its helicase activity, but not on its interaction with RNA polymerase II.Interestingly, even when RECQL5 cannot bind RAD51, it still supports normal transcription elongation, showing that its roles in replication and transcription are separate and distinct. Overall, RECQL5 safeguards genome stability by balancing DNA repair and transcription processes.

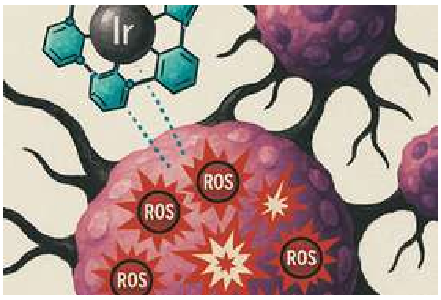
Nucleic Acids Research,Oct, 2025

BIOMEDICAL SCIENCE & CANCER RESEARCH

A NEW WAY TO KILL TOUGH CANCER CELLS

Some cancers resist normal treatments that make cells die. Scientists have now found special iridium-based metal compounds that can kill these tough cancer cells in a different way by causing ferroptosis (iron-driven damage) and autophagy (self-cleaning cell death). They made six iridium(III) compounds from isatin-hydrazone molecules. These were very powerful, stopping the growth of pancreatic and triple-negative breast cancer cells at very low doses. The best one, with an imidazole-isatin part, was stable in water, entered cells easily, and showed the strongest effect. Inside cancer cells, the compound created too many reactive oxygen species (ROS), or toxic oxygen molecules. The cells tried to fight back using defense proteins, but the stress was too much. Important antioxidants like peroxiredoxins (Prx) and superoxide dismutase (SOD) dropped, leading to damage in cell membranes. The compound also reduced inflammation by blocking harmful signals like MIF and TGF-β, and it showed anti-blood-vessel effects in zebrafish without much toxicity. This study shows that iridium compounds can destroy cancer cells by overwhelming them with oxidative stress offering hope for new treatments against drug-resistant cancers.

Journal of Medicinal Chemistry, Oct, 2025



HOW CANCER CELLS RESIST CHEMOTHERAPY

Triple-negative breast cancer (TNBC) is one of the most aggressive cancer types, and many patients relapse after developing chemoresistance. Researchers have discovered that a protein called ETS1 plays a key role in this resistance. The study found that another protein, DNAPKcs, adds a phosphate group to ETS1 at a specific site (Serine 251), which make

| DISCOVERY HIGHLIGHTS |

DISCOVERY HIGHLIGHTS

ETS1 more stable and prevents its breakdown. This stabilized ETS1 then activates several growth-related gene pathwaysincluding E2F, MYC, and G2/M leading to faster cell division and drug resistance. When DNAPKcs was blocked using inhibitors, ETS1 levels dropped, cancer cell growth slowed, and resistant cells began to die. These effects were also seen in samples from drug-resistant TNBC patients. The findings suggest that targeting DNAPKcs could be a new way to overcome chemotherapy resistance in TNBC by breaking the DNAPKcs–ETS1 survival link.

NPJ Breast Cancer, 2025

NEUROSCIENCE & HEALTH

HOW MICE "FEEL" AIRFLOW WHILE SMELLING

Smelling isn't just about detecting odors it's also about sensing air movement. A new study shows that mice can detect and even tell apart different airflows using their noses, even without their whiskers. Researchers found that when mice sniff air at different speeds, their brain's smell center the olfactory bulb processes both the odor and the airflow together. Special nerve signals, seen through calcium imaging, showed that airflow information is handled by an inhibitory network in the olfactory bulb. When scientists changed certain brain receptors (AMPARs) or used light to control brain activity, the mice's ability to learn airflow differences changed sometimes faster, sometimes slower. Interestingly, when very soft air currents were combined with faint smells, the mice learned odors more easily. This study reveals that mice use their sense of smell not only to detect scents but also to feel the air turning the nose into both a chemical and mechanical sensor.

Science Advances, Oct, 2025

HIGH BLOOD PRESSURE COMMON IN CHILDREN DURING LEUKEMIA TREATMENT

Doctors in Chandigarh studied how often hypertension (high blood pressure) occurs in children receiving induction chemotherapy for acute lymphoblastic leukemia (ALL).

In a group of 46 children whose blood pressure was checked every week, nearly 59% developed hypertension most within the first two weeks of treatment. In contrast, only 12.5% of children from earlier records (where blood pressure wasn't regularly monitored) were found to have it. The study highlights that many cases of high blood pressure may go unnoticed without systematic monitoring. Although no serious brain complications (PRES) occurred in the closely monitored group, two cases were seen in the older, less-monitored one. Researchers recommend that routine blood pressure checks should be a standard part of leukemia care to detect and manage hypertension early.

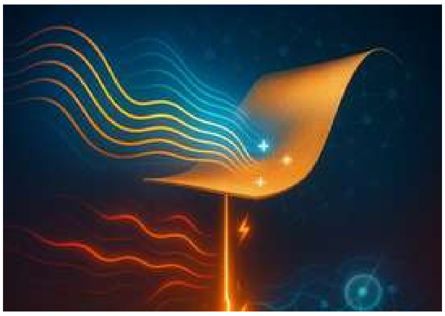
Indian Pediatrics, 2025

PHYSICS & MATERIALS SCIENCE

TURNING SOUND INTO ELECTRICITY

Scientists have developed a new material that can turn sound waves into electricity a big step toward smarter and cleaner energy devices. This new invention, called a piezoelectric nanogenerator (PENG), is made from a flexible copper-based molecular compound instead of the hard, toxic materials used before. When sound waves hit the device, the material bends slightly, creating electric charges a process known as acousto-electric conversion. The new PENG can produce a voltage of nearly 5 volts and even convert weak, low-frequency sounds (like normal speech at 60 Hz) into electrical signals. What makes it even more impressive is that, when combined with machine learning, the device can recognize different human voices with 95% accuracy. It can also quickly charge a small capacitor in just 10 seconds, sense tiny pressure changes (as low as 4 kPa), and track human body movements. Because it's soft, non-toxic, and sensitive, this sound-powered generator could be used in biomedical devices, voice-recognition security systems, and smart sensors that monitor noise or health in real time.

Advanced Materials,Oct, 2025



DISCOVERY HIGHLIGHTS

HOW ATOMS REDUCE HEAT FLOW IN MATERIALS

Scientists found that certain metal chalcogenides materials made of metals and sulfur- or selenium-like elements can naturally block heat flow, making them great for thermoelectric devices that turn heat into electricity. These materials have special atomic structures with lone electron pairs that don't form bonds but disturb how atoms vibrate. This creates strong phonon scattering, which stops heat from moving easily. Using machine learning, researchers showed that mixing of atomic orbitals forms antibonding states that further weaken heat transfer. They also developed simple bonding measures like lone pair angle and distance to predict this behavior. The study reveals how tweaking atomic bonding can create new materials that trap heat and improve energy efficiency.

ACS Applied Materials & Interfaces, 2025

CLIMATE & ENVIRONMENTAL SCIENCE

INDIAN OCEAN EVENTS TRIGGER HEATWAVES IN THE ATLANTIC

Scientists have found that warm events in the Indian Ocean can make the seas off Africa's west coast dangerously hot. These marine heatwaves in the tropical southeast Atlantic harm fish, corals, and local livelihoods. The study shows that during a positive Indian Ocean Dipole (pIOD) when the western Indian Ocean becomes warmer than usual two things happen. First, it changes wind patterns, creating westerly winds over the Atlantic that push warm water toward the African coast. This deepens the warm ocean layer and fuels marine heatwaves. Second, the pIOD brings more rain over central Africa, which increases Congo River flow into the Atlantic. This makes the surface layer of the ocean shallower and traps heat near the top, making waters even warmer. Using these findings, scientists built a model that can predict these Atlantic heatwaves up to three months in advance. They warn that as the planet warms, the Indian Ocean's influence could grow stronger, making these heat events more frequent and intense.

Science Advances, Oct, 2025

PLANT SCIENCE & BIOTECHNOLOGY

HOW PLANTS KNOW WHEN TO UNFOLD UNDERGROUND

When seeds sprout in the dark under soil, young plants bend into a curved shape called the apical hook to protect their tip. The hook opens only when the seedling reaches light near the surface. Researchers at IISER Bhopal found that a protein called BBX32 helps control this timing by linking two signals ethylene (which builds up under soil) and light. Ethylene increases BBX32 in darkness to keep the hook closed, while light later boosts it again to open the hook at the right time. Plants without BBX32 opened too early, and those with extra BBX32 opened slowly but pushed through soil better. BBX32 works with another protein, PIF3, to activate genes that delay hook opening. This discovery shows how plants balance light and hormone signals to emerge safely from the soil.

New Phytologist, Oct, 2025

HOW A MICROBE CAUSES FLOWER DEFORMITIES IN SESAME

Scientists studied sesame phyllody, a serious disease that turns sesame flowers into leafy structures and stunts plant growth. The disease is caused by a bacterial parasite called Candidatus Phytoplasma asteris, which lives in plant tissues and spreads through insects. By analyzing samples from different parts of India, researchers identified three phytoplasma species. The genome of Candidatus Phytoplasma asteris was about 564,000 base pairs long, containing genes linked to antibiotic resistance and virulence factors such as SAP50, SAP34, and TENGU, which interfere with plant development and immunity. Gene expression studies showed that infected sesame plants had increased levels of growth hormones like auxin, cytokinin, and gibberellin leading to abnormal flower and leaf growth while defense-related genes and flavonoid pathways were suppressed. Overall, the study reveals how phytoplasma infection hijacks plant hormones and weakens

DISCOVERY HIGHLIGHTS

immunity, offering clues for developing better control strategies against sesame phyllody.

Journal of Basic Microbiology, 2025

CHEMISTRY & NANOSCIENCE

A WATER-BASED SYSTEM THAT CONVERTS NITRIC OXIDE SAFELY

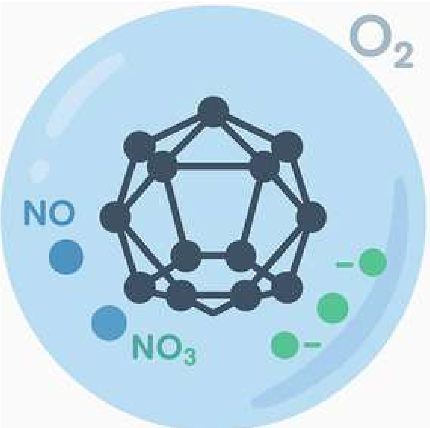
Nitric oxide (NO) is important for many body functions, but too much of it can be harmful. In living cells, special enzymes quickly turn NO into harmless nitrate (NO_3^-). Re-creating this reaction in the lab especially in water has been difficult.

Scientists have now built a tiny molecular cage that can safely hold an iron-based compound which reacts with NO just like the natural enzyme. Inside this cage, the iron–nitric oxide complex stays stable for days in water at room temperature, but when exposed to oxygen, it cleanly converts NO into nitrate.

The team also showed that another related iron–oxygen complex inside the same cage can perform the same reaction, confirming two possible pathways. The process likely goes through a short-lived peroxynitrite intermediate a key step in how NO becomes nitrate.

This is the first time both natural reaction routes have been mimicked in a single, water-based system, opening the door to better artificial enzyme designs and safer NO control methods.

Journal of the American Chemical Society, Oct, 2025



TINY CARBON DOTS THAT FIGHT ALZHEIMER'S PROTEIN CLUMPS

In diseases like Alzheimer's, certain brain proteins especially amyloid-β stick together and form harmful clumps called fibrils that damage nerve cells. Scientists have now made special ampholytic carbon dots (ACDs) tiny, glowing nanoparticles that can both see and stop these protein clumps. The ACDs emit red and green light, allowing researchers to clearly image amyloid structures inside and outside cells. These carbon dots attach to amyloid fibrils through weak electrical and surface forces. Once attached, they block new fibrils from forming and even break down existing ones. Inside cells, the ACDs collect in lysosomes (the cell's cleanup centers) and reduce oxidative stress, lowering the toxicity caused by amyloid buildup. This study shows that ACDs act as both diagnostic and therapeutic tools, offering a new, safer way to detect and control protein aggregation in neurodegenerative diseases like Alzheimer's.

Nano Letters, Oct, 2025

PUBLIC HEALTH & EPIDEMIOLOGY

HOW LONG PEOPLE LIVE AROUND THE WORLD: NEW GLOBAL ESTIMATES

A major new analysis from the Global Burden of Disease (GBD) Study 2023 has provided updated estimates of life expectancy and death rates for every country and region in the world from 1950 to 2023. Researchers combined large datasets from 204 countries and 660 regions using a new statistical model that better handles complex demographic patterns. The study tracks how age, sex, and time affect overall mortality and life expectancy.The results show how global health has changed over seven decades with clear improvements in survival, especially for children, but ongoing challenges from pandemics, conflicts, and chronic diseases. The analysis also highlights how COVID-19 caused sharp, short-term drops in life expectancy in many regions.These findings give governments and health agencies a clearer, faster way to track population health and plan responses to future health crises.

The Lancet, 2025

DISCOVERY HIGHLIGHTS

ZINC SHOWS NO CLEAR BENEFIT IN TREATING INFANT SEPSIS

A large clinical trial in India and Nepal tested whether giving zinc along with antibiotics could help save newborns with severe infections (sepsis) a major cause of infant deaths. Over 3,100 babies aged 3–59 days were randomly given either 10 mg of zinc daily or a placebo for 14 days, in addition to standard hospital care. Results showed no significant difference in survival. About 4% of babies in the zinc group and 5% in the placebo group died during hospital stay, and death rates after 12 weeks were similar. Side effects were rare, though mild vomiting was slightly more common with zinc. The researchers conclude that zinc did not reduce deaths in infants with suspected sepsis, though more focused studies are needed before changing treatment guidelines.

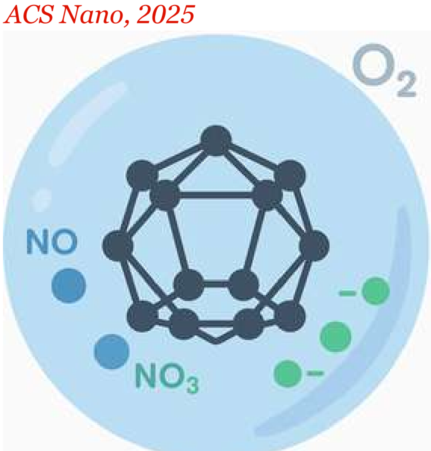
PLoS Medicine, Oct, 2025

ENGINEERING & COMPUTATIONAL SCIENCE

TINY MAGNETIC ROBOTS MEASURE THICKNESS OF FLUIDS INSIDE CELLS

Researchers have developed chiral magnetic microbots tiny, spinning robots controlled by magnetic fields that can measure how thick or viscous a fluid is, even inside living cells.By using a special frequency-chirped magnetic signal (one that changes frequency over time), these microbots can detect viscosity with very high sensitivity and precision at the microscale, matching the size of the probe itself. The technique works even in crowded or uneven environments where the microbot's motion is restricted. Using this method, scientists created detailed viscosity maps of different materials, including the cytoplasm inside living cells. This innovation positions chiral magnetic microbots as powerful new tools for studying the mechanical properties of complex biological and synthetic systems, helping scientists understand how materials and cells behave at the smallest scales.

ACS Nano, 2025



AI TOOL DESIGNS NEW DRUG-LIKE MOLECULES WITHOUT BIAS

Designing new molecules that are similar to existing drugs but work better is a major challenge in medicine. Traditional AI models often rely too heavily on preset rules or biased scoring systems, limiting their creativity. Researchers have developed PURE short for Policy-guided Unbiased REpresentations a new deep learning method that can generate drug-like molecules while avoiding such biases. PURE combines self-supervised learning with reinforcement learning, allowing it to simulate real chemical reactions and explore molecular structures more naturally. It doesn't depend on external scoring metrics, which helps it learn balanced and flexible chemical patterns. Tests show that PURE performs as well as or better than current models, even without biasing toward any specific evaluation measure. As a demonstration, the system successfully designed sorafenib-like compounds potential drug candidates against cancer drug resistance.This approach could make AI-driven drug discovery more reliable, unbiased, and closer to real-world chemistry.

Journal of Cheminformatics, 2025

SOCIAL & BEHAVIORAL SCIENCES

WHAT THE MUNDA TRIBE EATS: A LOOK AT THEIR FOOD HABITS

Researchers studied the Munda community in Jharkhand, India, to understand how traditional and market foods influence their diets. The study, conducted in 201 households, gathered information on food access and eating habits during both the monsoon and winter seasons. Using dietary surveys, the team identified three main eating patterns: a nature-procured pattern, where most foods came from farms,

DISCOVERY HIGHLIGHTS

forests, and rivers; a market-dominant pattern, where foods were mainly bought from markets; and a mixed-source pattern, combining traditional and market foods.

Households with access to a wider variety of food sources were almost four times more likely to follow the mixed-source pattern, especially during the monsoon. In winter, families living in nuclear setups were more likely to rely on both natural and market foods compared to joint families. The findings show that while the Munda community still depends strongly on nature for food, they are gradually moving toward more market-based diets. This shift highlights the need for nutrition policies that preserve indigenous food knowledge while supporting better nutrition for these vulnerable communities.

BMC Nutrition, Oct, 2025

STRENGTHENING TYPHOID VACCINE PROGRAMS IN ASIA

Typhoid fever, caused by Salmonella Typhi from contaminated food or water, remains a major health problem in Asia. Since the WHO recommended typhoid conjugate vaccines (TCV) in 2018, several countries have started using or planning to introduce them in national programs. Experts at a regional meeting identified key steps to advance vaccine rollout: secure funding through coordination between health and finance ministries, improve disease surveillance and diagnostic tests, monitor drug resistance, and study how long vaccine protection lasts.They also stressed the need for better antimicrobial stewardship to slow resistance. Together, these actions can strengthen typhoid control and protect millions across Asia.

Vaccine, 2025

| SCIENCE IN FOCUS |

SCIENCE IN FOCUS

On a brisk November morning in 2025, the convention hall at New Delhi's Pragati Maidan buzzed with anticipation. Researchers, students, and policymakers gathered as Prime Minister Narendra Modi unveiled what is being hailed as the boldest investment in Indian science since independence—the Research, Development and Innovation (RDI) Scheme. Announced during the Emerging Science, Technology & Innovation Conclave 2025 (ESTIC 2025), the ₹1 lakh crore initiative promises to transform how India discovers, invents, and innovates.

For decades, Indian scientists have achieved remarkable feats on modest budgets—launching Mars missions, developing affordable vaccines, and mapping genomes that reshaped global agriculture. Yet much of this progress grew in isolation, supported by fragmented grants. The RDI Scheme seeks to change that by shifting from project-based funding to mission-oriented research, linking every investment to national priorities such as health, climate, food security, and technology.

At the heart of this transformation is the newly created RDI Cell under the Department of Science and Technology (DST). It will coordinate across ministries, universities, and industries, ensuring ideas move seamlessly from laboratories to real-world application. Each "mission" will unite diverse experts—quantum physicists, biotechnologists, engineers, and data scientists—to solve challenges that affect everyday life. Early priorities include deep-tech, green energy, precision agriculture, clean water, and next-generation medicines.

Unlike older funding models, the RDI framework calls for co-creation between government and private industry. Companies will share both cost and risk, gaining access to infrastructure, intellectual property, and top talent. This partnership-driven model aims to make Indian research not just academically strong but globally competitive.

The response has been electric: universities are drafting proposals, startups are realigning goals, and new RDI Clusters are forming to drive interdisciplinary solutions. Yet policymakers acknowledge that innovation requires more than money. The scheme emphasizes transparency, inclusivity, and equity, pledging support for Tier-2 universities, women scientists, and those returning from career breaks.

India Bets Big on Science: ₹1 Lakh Crore RDI Scheme Ushers a New Research Era

For young researchers, the Early Career Investigator Grants and Innovation Fellowships offer something even greater than funding—belief. They provide flexible support for bold ideas, mentorship, and international collaboration, helping stem the brain drain and inspiring young minds to innovate at home.

More than a budget, the RDI Scheme is a declaration that curiosity itself is national infrastructure. As science policy expert Dr. Nivedita Sharma puts it: "The RDI fund isn't about money—it's about trust in science." If implemented well, it could turn classrooms into incubators, campuses into innovation zones, and India into a global leader in the knowledge economy.

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SCIENCE IN FOCUS

India's New AI Governance Guidelines: Balancing Innovation and Responsibility

In November 2025, India took a historic step in shaping the future of artificial intelligence with the launch of a comprehensive AI Governance Framework under the Ministry of Electronics and Information Technology (MeitY). Announced through the Press Information Bureau (PIB), the framework represents a decisive move toward a unified, human-centric, and innovation-driven model that manages AI's risks while unlocking its transformative potential.

The policy reflects India's growing confidence as an AI leader, creating its own ethical and strategic approach rather than mirroring foreign models. Instead of rigid restrictions, it adopts a "soft-law" approach, emphasizing flexibility, experimentation, and collaboration. The government views AI as a public good to be guided responsibly—not as a threat to be constrained.

At its foundation, the framework establishes principles for safe, transparent, and accountable AI across sectors such as healthcare, agriculture, education, and climate science. It mandates explainable algorithms, bias reduction, and consent-based data use. The document also promotes collaborative oversight, encouraging partnerships among government bodies, academia, and industry to ensure ethical innovation.

To nurture experimentation, MeitY introduced sectoral AI sandboxes—controlled environments for testing AI in real-world contexts like farming, transport, and environmental monitoring. This approach helps regulators refine policies through evidence-based learning. Additionally, the framework prioritizes AI inclusion, supporting students, startups in smaller cities, and women researchers, ensuring that the AI revolution benefits all.

India's model strikes a balance between the EU's strict compliance-based regime and the US's decentralized system. It complements national missions such as Digital India, IndiaAI, and the Research, Development and Innovation (RDI) Scheme, aligning with the vision that technology should empower rather than exclude.

The framework's implications for research are profound. AI can drive breakthroughs in healthcare, agriculture, and environmental monitoring, advancing India's sustainable development goals. It also highlights the importance of ethics and social awareness in technical education, urging universities to form cross-disciplinary innovation clusters.

Ultimately, the 2025 AI Governance Guidelines express India's intent to lead responsibly—proving that progress and ethics can move forward together, and that AI can serve as a shared force for the public good.

Reference

Press Information Bureau (PIB). (2025, November 4). Government releases India's Artificial Intelligence Governance Framework to promote responsible and inclusive innovation. Ministry of Electronics and Information Technology, Government of India.

Ministry of Electronics and Information Technology (MeitY). (2025, November). AI Governance Guidelines: A Framework for Responsible and Trustworthy Artificial Intelligence. Government of India.

INNOVATIONS & PATENTS

Every great invention begins with a bold idea—and a patent to protect it. Innovations drive progress, and patents turn breakthroughs into lasting impact. From lab benches to the marketplace, this is where creativity meets protection.

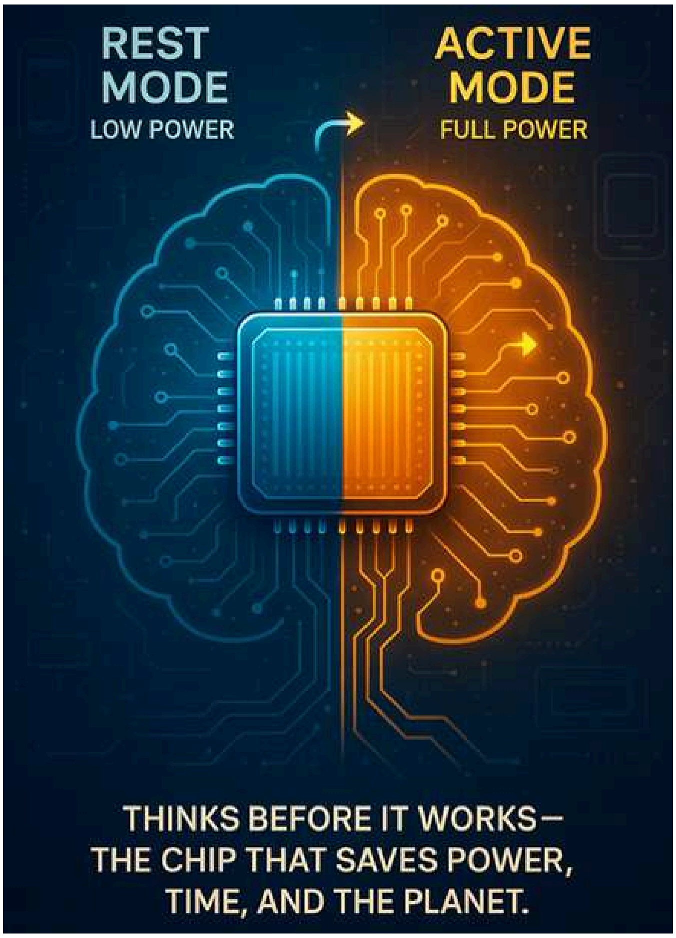
| By **Dr. Poulami Chakraborty**

THE SELF-THINKING CHIP

At CMR Technical Campus in Hyderabad, Dr. Srujan Raju and his team of researchers wanted to solve a big problem in modern technology how to make artificial intelligence (AI) work faster without wasting energy. They noticed that most smart devices, like phones or sensors, always used full power even for small tasks. This made batteries drain quickly and caused the devices to heat up or slow down over time.

So, the team decided to design a special kind of chip one that could think before it worked. They called it an adaptive, self-managing chip. The idea was simple yet powerful. Before performing any task, the chip would ask itself, "Do I need full power, or can I rest a little?"

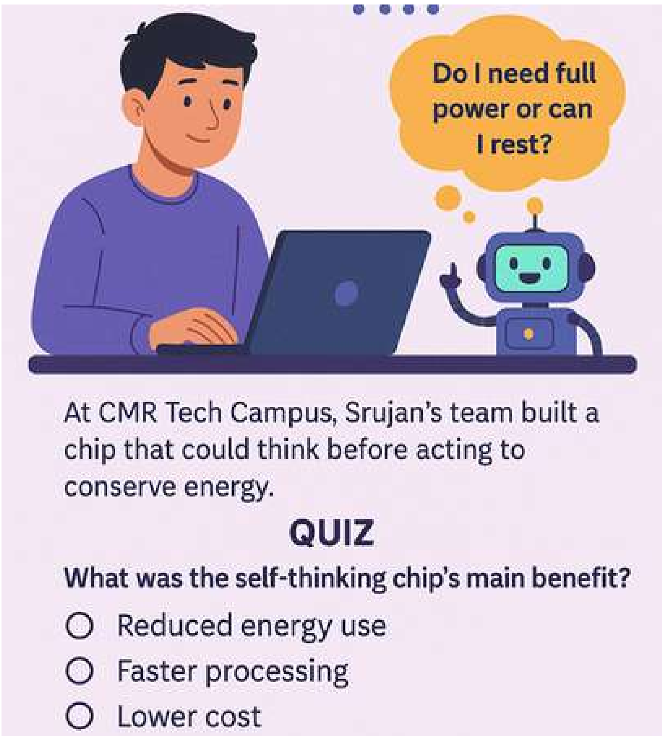
The chip had two parts a low-power front-end for light tasks like monitoring or checking small data, and a high-performance back-end for heavy work such as running big AI models or analyzing images. The chip could switch between these parts automatically. If the task was small, it used less power. If the task was complex, it activated full speed.



This clever design made the chip act like a smart worker resting when it could and working hard only when needed. The result was amazing. Devices using this chip consumed less energy, stayed cooler, and lasted much longer on the same battery.

The chip also learned from experience. Over time, it could predict what kind of work was coming next and prepare itself in advance. This made it even faster and more efficient.

Dr. Srujan's invention turned ordinary devices into self-managing, intelligent companions ones that didn't just follow commands, but made small, smart decisions on their own. It was a small step toward a big dream: technology that thinks responsibly.



INNOVATION

Reference:

Raju, K. Srujan et al. (2024). *Adaptive Energy-Efficient Neural Network Architectures with Real-Time Load Management and Advanced Edge Intelligence for Next-Generation On-Device AI Processing*.

📄 ***Patent Number***: 571592
🏫 ***Developed by***: CMR Technical Campus in Hyderabad.

By **Dr. Dhanashree Mundhe**

THE MACHINE THAT COULD SEE

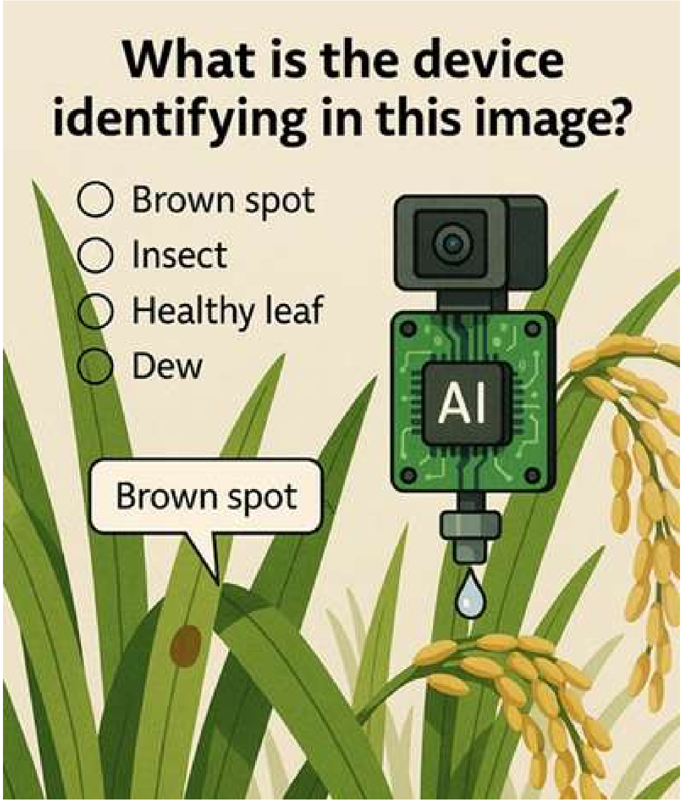
Rajkumar was a young researcher from West Bengal who loved finding simple solutions for big problems. Every year, he watched farmers in his village lose crops to tiny leaf spots that spread fast before anyone noticed. "If only plants could tell us what hurts them," he often said. That thought became the seed of his invention a machine that could see.

He built a small camera system and connected it to a microcomputer, like the brain of the machine. The camera's job was simple but powerful to take pictures of plant leaves. Rajkumar trained the computer using thousands of leaf images, teaching it how to recognize early signs of diseases like brown spot, blight, or leaf rust. Soon, the device learned to spot what the human eye might miss.

One day, he tested it in a rice field. The machine clicked a photo, analyzed it in seconds, and displayed the message: "Brown spot detected." Then, with a soft hum, a tiny motor turned and released just the right amount of pesticide from a small container. The plant received its medicine not too much, not too little.

Farmers gathered around, amazed. "It's like a doctor for plants!" one said. Rajkumar smiled. He knew this invention could help farmers save both money and the environment by avoiding overuse of chemicals. The system worked like an ATM for pesticides diagnosing and dispensing exactly what was needed, all in one place.

Through his invention, Rajkumar proved that artificial intelligence and agriculture can work hand in hand. His machine did not just see; it understood, acted, and protected becoming a small but smart partner in the fight against crop diseases.



INNOVATION

Reference:

Hasija, Yasha & Chakraborty, Rajkumar. (2025). *Vending System for Precision Plant Disease Management through Image Recognition and Automated Pesticide Dispensing*.

📄 ***Patent Number***: 571607
🏫***Developed by***: Delhi Technological University.

| By **Dr. Sudha Shankar**

THE WATER THAT MADE POWER

In a quiet laboratory at Netaji Subhas University of Technology in Delhi, Dr. Jehova Jire L. Hmar worked with a group of students on something that looked almost ordinary a small jar of brown powder. But inside that powder was a discovery that could change how we think about electricity.

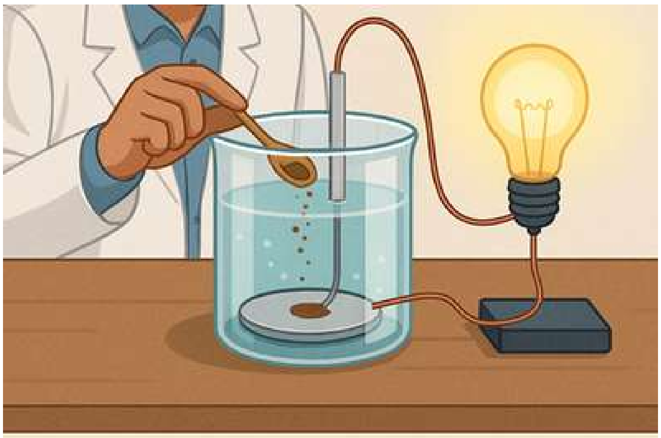
One afternoon, Dr. Hmar took a few grains of the brown material, dropped them into a small glass of water, and connected it to a tiny bulb. To everyone's surprise, the bulb began to glow softly. There was no battery, no sunlight, and no external power source just water and the brown powder.

The secret lay in the material itself zinc-doped magnesium ferrite a special compound created through careful heating, cooling, and mixing of iron, magnesium, and zinc salts. The team discovered that when this material touches water, something amazing happens. Water molecules split into ions, and their movement inside the ferrite structure produces electricity.

What made it even more exciting was that the process worked at room temperature no heat, light, or chemicals were needed. It was clean, simple, and sustainable. The material also released hydrogen gas as a by-product, a valuable fuel for future technologies.

Dr. Hmar explained that the key was in the tiny oxygen gaps within the ferrite. These microscopic spaces acted like doorways for water molecules to enter and separate, allowing electrons to flow and generate current.

The discovery meant that one day, electricity could be generated from a bowl of water using inexpensive materials. Watching the glowing bulb, Dr. Hmar smiled and said, "Clean energy doesn't always need big machines sometimes, it just needs the right idea and a little bit of chemistry."



The secret to this clean energy experiment lies in what part of the zinc-doped ferrite material?

- Its tiny oxygen gaps
- Brown powdered coating
- Zinc plate at the bottom
- Comb-like top electrode

INNOVATION

Reference:

Hmar, J. J. L. (2025). *Process and System for Synthesizing Zinc-Doped Magnesium Ferrites with Enhanced Structural and Dielectric Properties for Electricity Generation.*

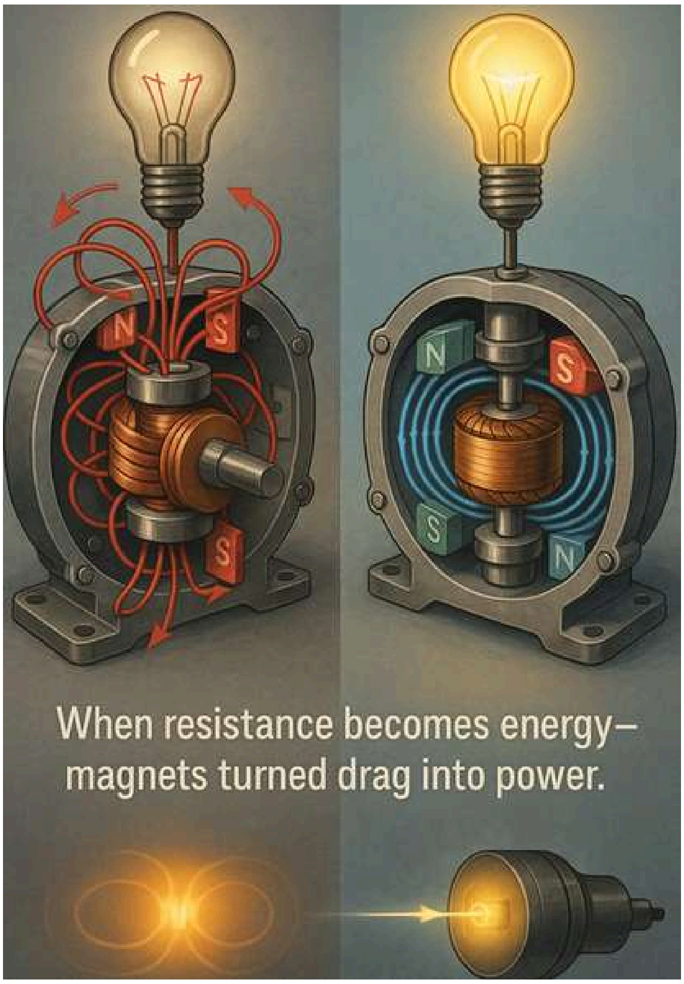
Patent Number: 571620

Developed by: Netaji Subhas University of Technology (NSUT), New Delhi, India.

| By **Dr. Priyanka**

MAGNETS TURNED DRAG INTO POWER

In a small workshop in Panchkula, two inventors, Jagan Nath Sindhwani and Surbhi Arora, stared at an electric generator running on the table. The fan was spinning, but the power output was low, and the machine was heating up. "It's the same old problem," Jagan sighed. "Too much magnetic drag."



They both knew what that meant. In every traditional generator, when magnets move past coils to create electricity, they also create a magnetic drag — a backward force that resists motion. This force wastes energy and forces the generator to work harder, consuming more fuel.

But one day, after months of experiments, they had a breakthrough. What if they could stop the magnetic fields from colliding head-on? What if the field inside the coil could be redirected in a closed loop, so it didn't push back against the rotor?

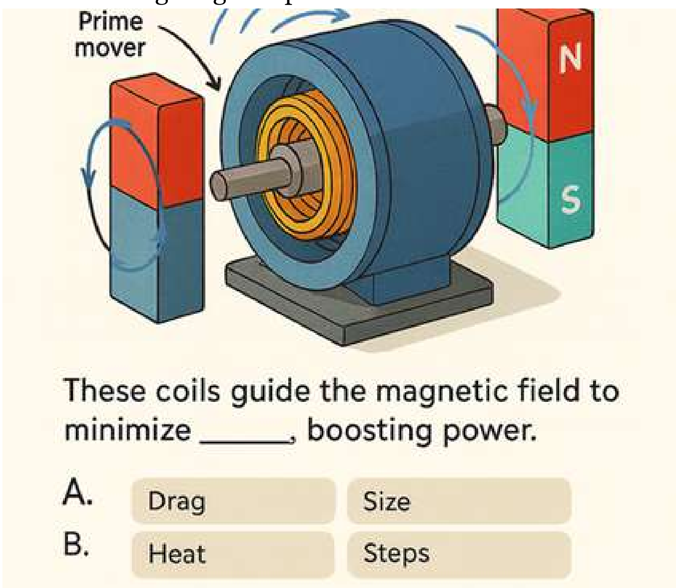
They redesigned the generator. Instead of allowing the magnetic field to oppose motion, they made it flow in a circular path inside the iron core. The result was astonishing the drag disappeared. The generator ran smoothly with less effort, and to their surprise, it even produced more electricity.

The same magnetic field that once slowed the machine was now being reused in another coil to generate additional energy. It was like turning waste into wealth.

Their invention meant a generator could now run almost drag-free, saving fuel and producing extra power. Factories, power plants, and even small home systems could benefit.

Surbhi smiled as the bulb lit brighter than before. "We didn't invent new energy," she said softly. "We just stopped losing it."

Through smart engineering and a little imagination, magnets that once resisted motion had learned to work with it turning drag into power.



INNOVATION

Reference:

Sindhwani, J. N., & Arora, S. (2023). *A method to enhance the efficiency of electricity generation by minimizing magnetic drag using a specific coil and magnet arrangement*.

📄 ***Patent Number***: 571519

🏢 ***Developed by***: -A to Z Services Pvt ltd C, Mumbai, India.

By **Dr. Preeti Sharma**

THE SHELF THAT KNEW YOU

Riya loved reading but always felt lost in big libraries. Rows and rows of books stretched endlessly, and even though she loved exploring, finding the right one often took hours. One day, when she entered her university's new library, something different happened.

At the entrance, the librarian handed her a small card and said, "This is your RFID tag. Just wear it around your wrist." Riya nodded, not sure what to expect. As she stepped inside, the tag blinked softly. Suddenly, one of the shelves lit up. A tray slid forward quietly, and a book on space travel appeared right in front of her.

She stood still for a moment, amazed. "How did it know?" she whispered.

This was the university's latest innovation the Smart Library Shelf, powered by RFID technology and artificial intelligence. The system remembered Riya's past reading habits and subjects she had searched for before. Her tag communicated with sensors in the shelves, which instantly found books that matched her interests.

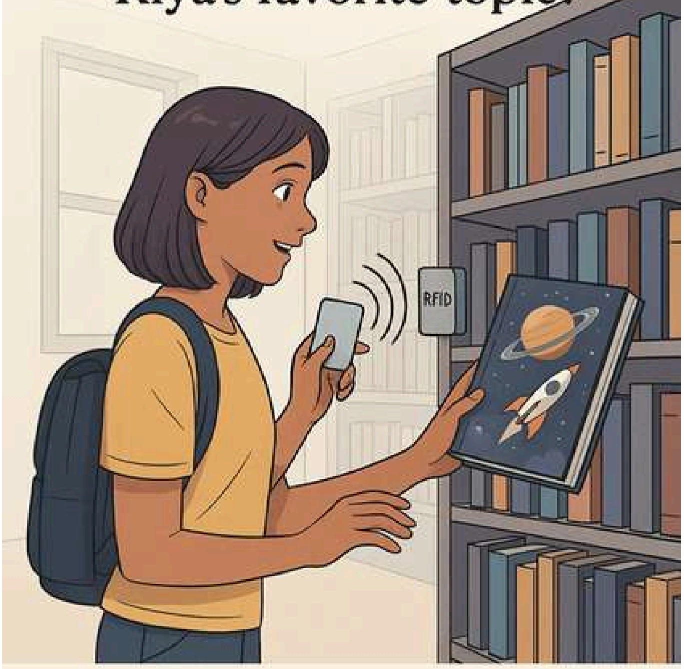
The library's computer system had a recommendation unit, just like online bookstores. It analyzed what students liked to read and suggested similar titles. The shelves were even fitted with small mechanical parts called linear actuators that could gently push a book forward when a user approached.

For Riya, it felt like magic. She no longer had to wander through aisles or flip through catalogues. The books came to her neatly, intelligently, and quietly.

When she picked up the book, the tray slid back, keeping the shelf tidy again. Riya smiled. "No searching, no stress," she thought. "This library actually understands me."

In that moment, she realized libraries had truly learned to think.

How did the shelf know Riya's favorite topic?



- **A** The shelf had hidden cameras.
- **B** Riya swiped a smart card.
- **C** An alert librarian messaged it.
- **D** Riya chose until it suggested one

INNOVATION

Reference:

Singh, Gunjan. (2024). *Smart Library Shelf.*

📄 ***Patent Number***: 571593
🏫***Developed by***: Amity University, Haryana, India.

| OBITUARY |

Eknath Vasant Chitnis

Dr. Eknath Vasant Chitnis, one of the pioneers of India's space programme, passed away on 22 October 2025 in Pune at the age of 100. A quiet visionary, he devoted his life to using science and technology for the service of society.

Born in 1925 in Maharashtra, he grew up in a modest family and showed a deep curiosity about machines and the natural world from a young age. After completing his studies in physics and engineering, he began his career in the 1950s, a time when India was still building its scientific foundations. His sharp mind and calm temperament soon brought him into contact with Dr. Vikram Sarabhai, the father of the Indian space programme. Sarabhai recognized in Chitnis a dedicated and methodical scientist who could turn ambitious dreams into practical reality.

When the Indian National Committee for Space Research (INCOSPAR) was formed in 1962, Chitnis was among its earliest members. He played a major role in choosing Thumba, a quiet fishing village near Thiruvananthapuram, as India's first rocket-launch site. In those days, the small team worked from an old church building, carried rocket parts on bicycles, and assembled instruments by hand. Yet they shared one belief that space technology could lift millions out of isolation and ignorance. Chitnis's steady leadership and practical problem-solving became the backbone of these early efforts.

As India's space efforts grew, Chitnis took charge of building systems that connected space technology to people's lives. He led the Space Applications Centre (SAC) in Ahmedabad, where he guided the design of satellites for communication, education, and weather forecasting. Under his leadership, India launched the INSAT series, which transformed national communication networks. For the first time, remote villages could receive television and telephone signals, students could watch educational broadcasts, and farmers could get timely weather alerts. This was a turning point that showed how space research could directly benefit ordinary citizens.

Beyond his technical achievements, Dr. Chitnis was known as a patient mentor and thoughtful administrator. He served as Scientific Secretary to the ISRO Chairman and later as Director of the Indian Institute of Remote Sensing

BUILDING SYSTEMS THAT CONNECTED SPACE TECHNOLOGY TO PEOPLE'S LIVES

(1925–2025)

(IIRS). He trained and inspired a generation of young engineers who went on to lead major missions. Colleagues remember him as humble, disciplined, and deeply committed to teamwork.

For his outstanding service, he received the Padma Bhushan in 1985. Even after retirement, he continued to advise research institutions and contribute to science policy discussions, always encouraging innovation rooted in public good.

Dr. Eknath Chitnis witnessed India's entire space journey from the first rocket launched from Thumba to missions to the Moon and Mars. He rarely sought publicity, preferring to let his work speak for itself. Yet his influence runs deep: every satellite that links a classroom, every communication that bridges a distance, and every successful launch carries a trace of his legacy.

His century-long life stands as a testament to the power of quiet dedication. As India looks toward human spaceflight and new planetary exploration, his memory reminds us that science, when guided by compassion and purpose, can truly transform a nation.

By
Rosalind Franklin
Council of Scientific Research
(**RFCSR**)

SCIENCE NEWS & OPPORTUNITIES

"Science News & Opportunities" keeps you updated with the latest scientific breakthroughs and opens doors to exciting careers, scholarships, and research programs.

"Nov 7: Dr. C. V. Raman (1888–1970)"

01

Born on November 7, 1888, in Tamil Nadu, Chandrasekhara Venkata Raman grew up in a family that valued learning. Encouraged by his father, a physics lecturer, he showed brilliance early entering college at 11 and earning a master's degree in physics by 16 from the University of Madras.

Though he joined the Indian Finance Service, Raman continued research using simple instruments. During a voyage from Europe, the blue of the Mediterranean Sea inspired him to study light scattering. His curiosity led to the discovery of the Raman Effect in 1928 showing that light changes wavelength when passing through transparent materials.

This discovery transformed spectroscopy and earned him the 1930 Nobel Prize in Physics, making him the first Asian laureate in science. Knighted in 1929 and later awarded the Bharat Ratna, he founded the Raman Research Institute and inspired generations of scientists.

"Nov 7: Marie Curie (1867–1934)"

02

Marie Skłodowska Curie, born in Warsaw, Poland, was a pioneering physicist and chemist whose discoveries transformed modern science. Moving to Paris for higher studies, she faced hardship but excelled at the Sorbonne, where she met Pierre Curie. Together, they discovered polonium and radium, unveiling the phenomenon of radioactivity, a term she coined. Her groundbreaking research revealed that atoms were not indivisible, reshaping our understanding of matter and energy.

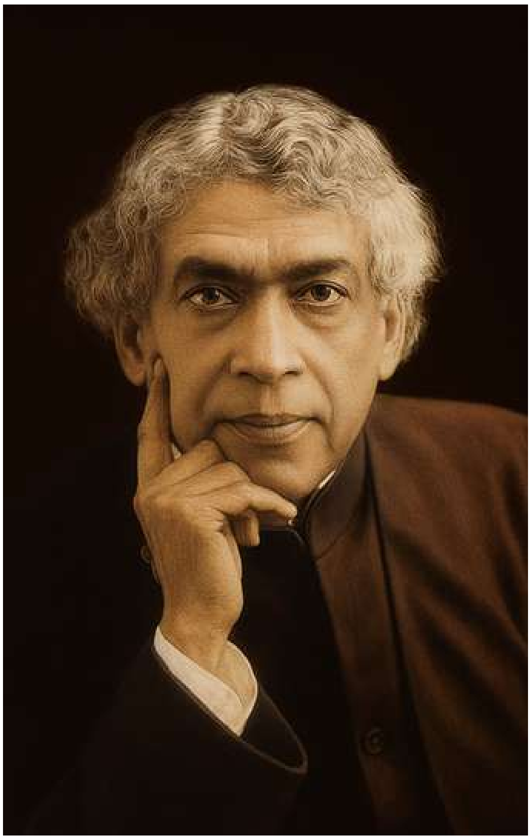
Marie Curie became the first woman to win a Nobel Prize and the only person to receive Nobel Prizes in two sciences Physics (1903) and Chemistry (1911). Beyond her discoveries, she advanced medical applications of radiation, founding the Radium Institute in Paris. Her dedication, courage, and brilliance continue to inspire generations, symbolizing how perseverance and curiosity can illuminate even the most invisible forces of nature.

"Nov 30: Jagadish Chandra Bose (1858–1937)"

03

Born in Mymensingh, Bengal, Jagadish Chandra Bose was a visionary Indian scientist who bridged physics and biology. Educated in Calcutta and Cambridge, he returned to India determined to prove Indian scientific brilliance. At Presidency College, he pioneered wireless communication, demonstrating radio signal transmission in 1895 before Marconi and invented the crystal detector, a forerunner of the modern semiconductor diode.

Bose later turned to plants, creating the crescograph to show that plants respond to stimuli like living beings, founding the field of biophysics. Refusing patents, he shared his discoveries freely, believing knowledge belonged to all. Knighted in 1917 and elected Fellow of the Royal Society, Bose's legacy lives on in antennas, laboratories, and the living pulse of nature



"Nov 18: Dr. Jitendra Nath Goswami"

04

Born on November 18, 1950, in Assam, Dr. Jitendra Nath Goswami is one of India's most distinguished astrophysicists. A graduate of Cotton College and Gauhati University, he went on to earn his Ph.D. from the Indian Institute of Technology, Kanpur. His research has focused on cosmochemistry, lunar science, and the study of meteorites to understand the early Solar System.

Dr. Goswami played a central role in India's space exploration as the chief scientist of Chandrayaan-1, India's first lunar mission, which made the landmark discovery of water molecules on the Moon. He also contributed significantly to the Chandrayaan-2 mission and inspired the next generation of space scientists through his mentorship at PRL, Ahmedabad.

A fellow of all major Indian science academies, Dr. Goswami's career reflects India's growing leadership in space research.

Things YET TO BE DISCOVERED

From the dark depths of our oceans to the farthest reaches of the cosmos, countless mysteries remain unsolved. Science continues to push the boundaries of the known, revealing just how much is still left to uncover. What lies beyond our current understanding may reshape the future of humanity.

| By **Dr. Avijit Das**

The Bright Minds of 2025: How Curiosity is Changing Our World

John Martinis Michel Devoret John Clarke

Every year, the Nobel Prizes celebrate people who dared to ask bold questions and changed how we see the world. The 2025 winners came from many countries, but they share one thing curiosity. Each of them looked at an everyday problem and saw something no one else could see. Their discoveries now shape our future from medicine and energy to peace and human imagination.

FROM CIRCUITS TO QUANTUM MAGIC (PHYSICS)

Three scientists John Clarke, Michel H. Devoret, and John M. Martinis won the Nobel Prize in Physics for showing that even man-made electrical circuits can behave like atoms. In the 1980s, they built special devices using superconductors, materials that allow electricity to flow without any resistance. They created Josephson junctions, where two superconductors are separated by an ultra-thin layer. Surprisingly, these circuits followed the strange rules of quantum physics, displaying energy levels and tunneling behaviors once seen only in atoms.

Their discovery proved that quantum effects can exist in larger systems, leading to quantum computers and quantum sensors. These technologies could revolutionize how we predict weather, design new medicines, or process massive amounts of data. Their curiosity turned electricity into something magical showing that science and imagination go hand in hand.

CATCHING GASES TO SAVE THE PLANET (CHEMISTRY)

In the world of chemistry, Susumu Kitagawa (Japan), Omar Yaghi (Jordan/USA), and Richard Robson (UK/Australia) created something that looks like a crystal but works like a sponge. These are called metal–organic frameworks or MOFs. Built from metals and organic molecules, MOFs have tiny pores inside like millions of microscopic rooms that can trap gases and liquids. These materials can capture carbon dioxide from the air, store hydrogen fuel, or even pull water out of dry desert air. Their work began in the 1990s and now offers hope for fighting climate change and building a clean-energy future.

What makes this discovery special is how simple curiosity asking "can solids breathe?" led to materials that could clean our planet's air. The next step is making MOFs cheaper and stronger for use in factories, cars, and even homes.

THE PEACEKEEPERS INSIDE OUR BODIES (MEDICINE)

Our immune system fights infections every day but what stops it from attacking us? This year's Medicine Nobel went to Mary Brunkow, Fred Ramsdell, and Shimon Sakaguchi, who found the answer. They discovered special immune cells called regulatory T cells (Tregs), controlled by a gene named FOXP3. These cells act as the

Omar Yaghi Susumu Kitagawa Richard Robson

| By **Dr. Avijit Das**

The Bright Minds of 2025: How Curiosity is Changing Our World

body's "peacekeepers," preventing the immune system from attacking healthy tissues.Their research began in the 1990s while studying patients with severe autoimmune diseases. When these cells or the FOXP3 gene don't work, the immune system turns against the body, causing illnesses like diabetes or arthritis. Now, scientists can design treatments to strengthen these cells to stop autoimmunity or weaken them to help the body fight cancer. Their work reminds us that balance even inside our bodies is essential for health and peace.

Fred Ramsdell Mary Brunkow Shimon Sakaguchi

FINDING HOPE IN CHAOS (LITERATURE)

The Nobel Prize in Literature went to László Krasznahorkai from Hungary, whose poetic and powerful stories explore chaos, struggle, and hope. His books, such as Satantango and The Melancholy of Resistance, describe how ordinary people find meaning in a broken world.

His writing is deep and challenging, often told in long sentences that mirror the flow of thought itself. Krasznahorkai's work shows that literature can open our eyes to new emotions and ideas. He turns despair into beauty and confusion into reflection. The Nobel Committee praised him for showing that even in dark times, human imagination shines brightest.

For young readers, his message is clear: stories are not just entertainment they are tools to understand the world and ourselves.

László Krasznahorkai

STANDING TALL FOR FREEDOM (PEACE)

The 2025 Peace Prize was awarded to María Corina Machado, a fearless activist from Venezuela. For many years, she has fought peacefully for democracy and human rights in a country struggling under dictatorship. Despite being arrested, threatened, and banned from public office, she never gave up her fight for justice. Her courage shows that peace is more than silence it's the strength to speak out against fear. By honoring Machado, the Nobel Committee recognized the bravery of people everywhere who defend truth and fairness.

Her story proves that one determined voice can inspire millions. It reminds young people that leadership begins with honesty, compassion, and hope.

María Corina Machado

IDEAS THAT BUILD THE FUTURE (ECONOMICS)

The Nobel Prize in Economic Sciences went to Joel Mokyr, Philippe Aghion, and Peter Howitt, who studied how innovation drives progress. Their research explained that economies grow when people invent new things and when societies allow old ideas to be replaced by better ones. This process, called creative destruction, explains how technology fuels prosperity. They showed that curiosity, education, and freedom to experiment are keys to long-term growth. Their work helps governments create better systems for science, jobs, and fairness. Their ideas guide us as we enter an age of artificial intelligence and green energy,

| By **Dr. Avijit Das**

The Bright Minds of 2025: How Curiosity is Changing Our World

reminding us that progress must include everyone.


Philippe Aghion Peter Howitt Joel Mokyr

CURIOSITY CHANGES EVERYTHING

From physics to peace, from chemistry to literature every 2025 Nobel winner began with curiosity. They didn't chase prizes; they chased questions. And those questions changed the world. They remind every young student: be curious, stay kind, and never stop wondering. The next great discovery might come not from a famous lab but from someone like you, asking "why?" and daring to find the answer.

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A Researcher Showcase is a platform designed to highlight the innovative work and contributions of researchers across various fields. It provides an opportunity for scholars to present their findings, exchange ideas, and foster collaborations. RFCSR's showcases helps researchers with networking opportunities to celebrate and support academic and scientific progress.

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ARE YOU A RESEARCHER ?

At Rosalind Franklin Council of Scientific Research (RFCSR), we recognize that the pursuit of science is both inspiring and demanding. Alongside the excitement of discovery, researchers often face unique challenges—intense workloads, high expectations, uncertainty about the future, and at times the discouraging experience of non-cooperation within their professional field or the feeling of being stuck in their career path. Such moments can leave even the most dedicated scientists questioning their way forward.

RESEARCHERS LIFELINE RESEARCH HEALTH

back to school

CURIOUS KID'S

NAME: **Sampurna Prusty**

Age: **7 Years**

SCHOOL: **Rodhapur Govt . U.P School, Salipur, Cuttack, Odisha, India**

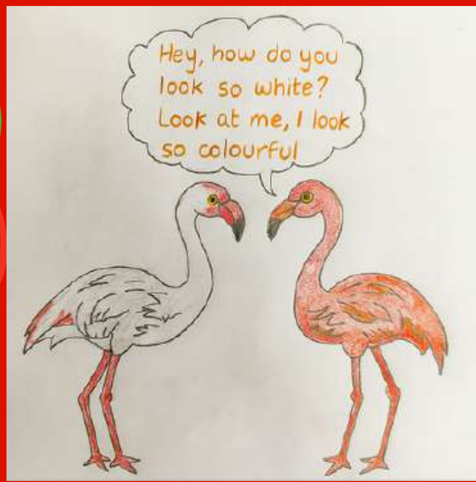
FOCUS:

Green and Red – Apples

"Green apples are green because they have chlorophyll, the same color found in leaves. As apples grow and ripen, chlorophyll fades away. Then another natural color called anthocyanin appears, making the apple turn red. So green apples are younger, and red apples are riper and usually sweeter."

back to school

CURIOUS KID'S



NAME: **Jiyansh Hada**

Age: **6 Years**

SCHOOL: **Moshe Smilansky School Rehovot, Israel**

FOCUS:

Why I Am White

"Hey buddy, let me tell you why I look so plain. You eat lots of shrimp, algae, and other tiny creatures from the water. These foods have special natural colors called carotenoids. When you eat them, the colors move into your feathers and make you look bright pink and orange. But I don't get that kind of food. I mostly eat carrots and simple plants, and they don't have enough of those colors. That's why my feathers stay white while yours look so colorful. It's all because of what we eat!"

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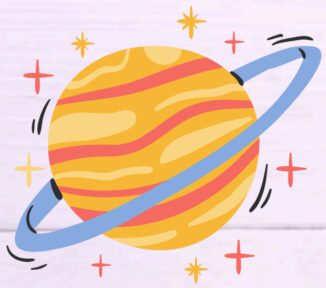

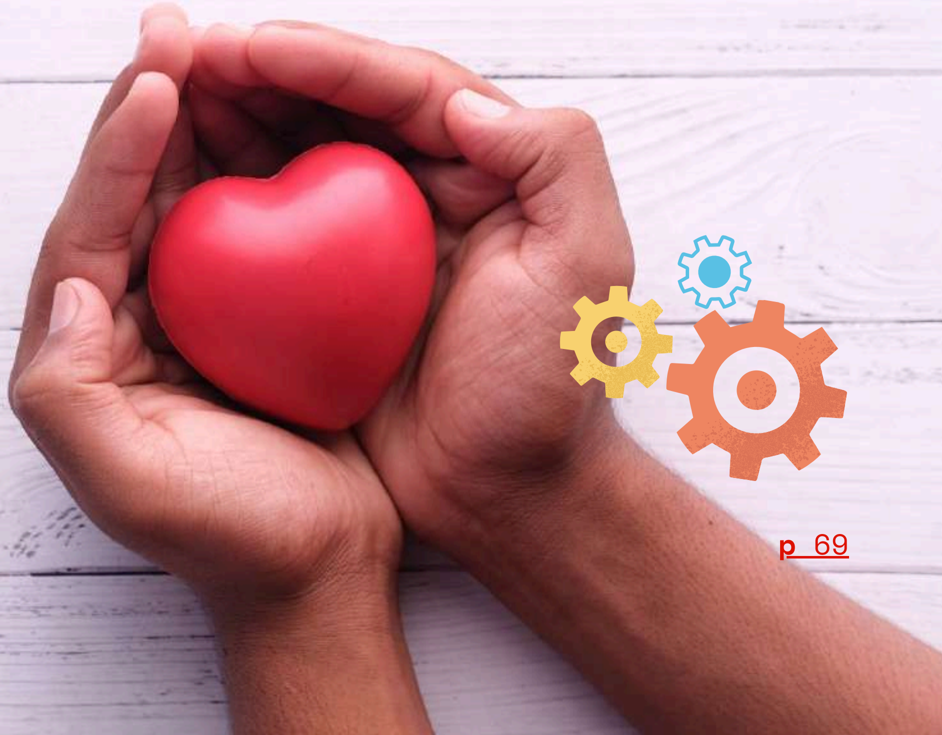

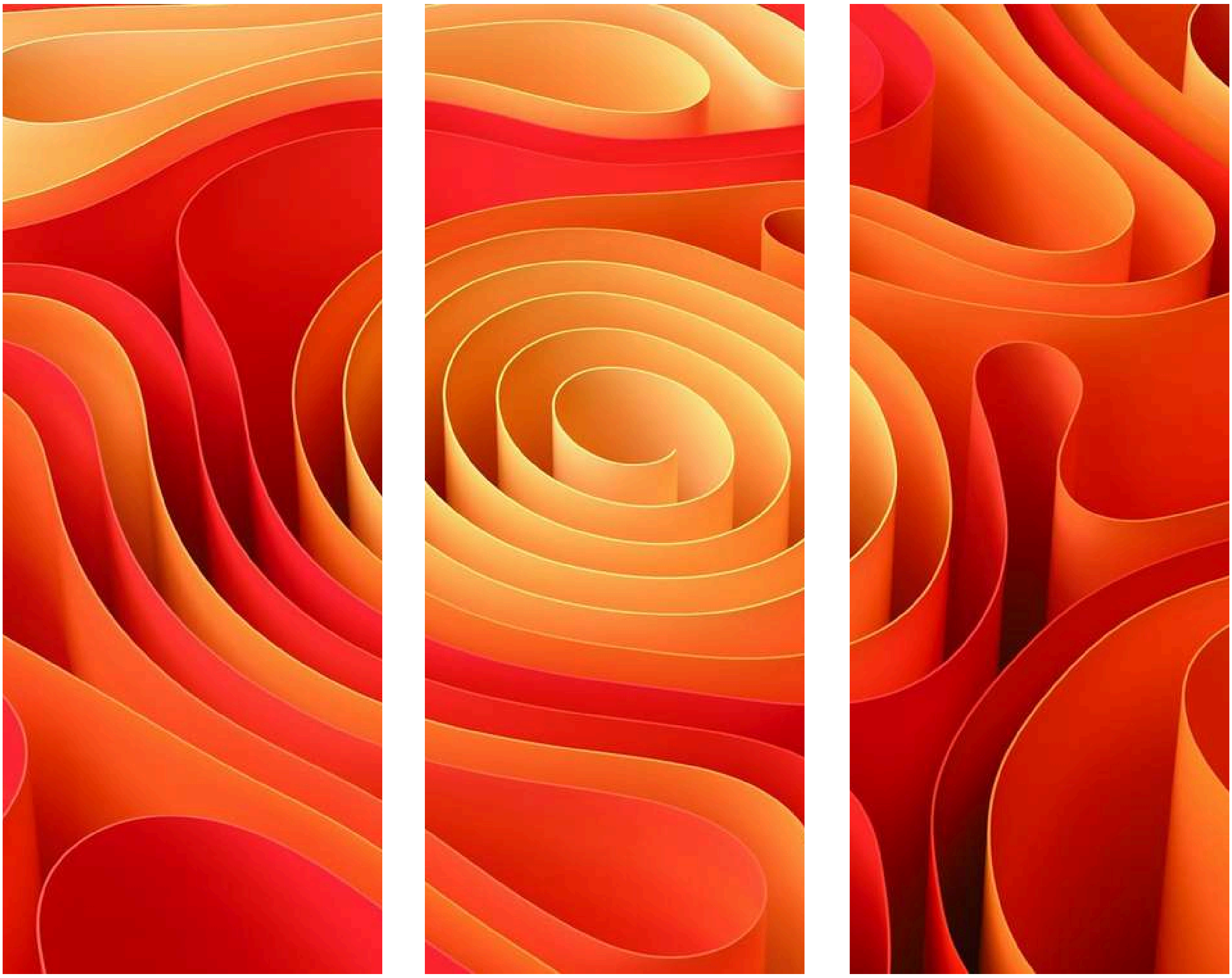

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November 2025
Issue 2511

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