# SCIENCE FACTORS.

*INSIGHT, DISCOVERY, LEARNING, INNOVATION, AND IMPACT*

By
Rosalind Franklin
Council of Scientific Research (RFCSR)
August 15, 2025

## DNA The Memory !

THE STORY WRITTEN IN US.

RF0012501


**Scientific Research Empowers Social Progress !**

Rosalind Franklin Council of Scientific Research (RFCSR)
Kolkata WB INDIA 721137
www.rfcsr.org
hello@rfcsr.org & hello.rfcsr@gmail.com

Rosalind Franklin
Council of Scientific Research
(RFCSR)

# *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

Welcome to the very first issue of ***Science Factors*** — your window into the fascinating world of science, storytelling, and discovery. Where science meets curiosity and ideas take flight, *"Science Factors"* is your gateway to discoveries that inspire, inform, and ignite wonder.

Dr. Animesha Rath
***The Editors-in-Chief***

In this issue, we uncover secrets written in our genes, hidden along forest trails, and echoed beneath moonlit skies. From ***The Stranger in the Hills*** to ***A Genomic Portrait of India***, our stories reveal how science connects the past, shapes the present, and lights the path to the future.

But ***Science Factors*** is more than a collection of stories — it's a bridge between cutting-edge discoveries and curious minds. Every article is rooted in recent breakthroughs published in leading scientific journals, as well as innovations emerging from India's most inventive labs and startups. These aren't just headlines — they're glimpses of the future in motion.

Whether you're exploring cells with Aditi or decoding proteins with Nina, we've curated content to inspire students, researchers, and seasoned scientists alike.

We believe science belongs to everyone. That's why every piece in *Science Factors* is written with clarity, simplicity, and a touch of wonder — to spark curiosity and encourage the next question.

Thank you for joining us on this journey. We hope that somewhere in these pages, you'll find a moment that makes you pause, smile, and maybe even say — "***Science Factors!***"

R Animesha

Rosalind Franklin Council of Scientific Research
(RFCSR)
Kolkata WB INDIA 721137
www.rfcsr.org
hello@rfcsr.org & hello.rfcsr@gmail.com

**SCIENTIFIC RESEARCH EMPOWERS SOCIAL PROGRESS !**

# The CONTRIBUTORS

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# INNOVATIONS & PATENTS



Showcasing creativity and groundbreaking ideas.

# FEATURED RESEARCH

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. Sivan Friedman

# THE STRANGER IN THE HILLS: A GENETIC MYSTERY SOLVED IN THE FORESTS OF COORG

FEATURED

Centuries ago, in the misty green hills of southern India, a stranger arrived. He spoke a different language, wore unusual clothes, and carried with him tales of distant lands. No one knew where he came from.

But he stayed, settled, and became one with the local people. Over time, his name faded from memory—but his legacy endured, written not in ink, but in the genes of his descendants.

Fast forward to today. Scientists, armed with the tools of modern genetics, are reading these hidden stories written in DNA—the biological code that makes all life.

In Coorg, a small yet culturally rich region in Karnataka, researchers made a discovery that astonished even them. The Coorgs, or Kodavas, are known for their warrior heritage, coffee plantations, and vibrant festivals. But beneath these cultural layers lies a deeper mystery: where did they come from?

Until now, the answer remained elusive. So scientists decided to look where no one had looked closely before—their DNA.

Researchers collected blood samples from 144 healthy, unrelated Coorg individuals, then extracted DNA—like detectives collecting fingerprints at the tiniest possible scale.

Using a powerful tool called a SNP genotyping array, they scanned 634,000 markers across the genome. Imagine trying to solve a massive puzzle with hundreds of thousands of pieces—that's what this was.

To compare, they analyzed DNA from people across India, the world, and even ancient human remains. By aligning the puzzle pieces, they reconstructed the genetic history of the Coorgs.

To make sense of the data, they used a set of computational tools. PCA helped group individuals by genetic similarity. ADMIXTURE revealed what percentage of DNA came from different ancestral populations—like a recipe with ingredients from many kitchens. TreeMix and

## Who Was the Stranger?

*Trace the clues in your DNA and decode the journey.*

| | |
|---|---|
| Clue 1 | A gene variant often found in Himalayan people |
| Clue 2 | A language shared with ancient Dravidian speakers |
| Clue 3 | Maternal ancestry tied to the Middle East |
| Clue 4 | Paternal ancestry tied to early Northern migrants |
| Clue 5 | A gene linked to living in forested areas |

**Where did the Stranger likely live?**

☐ Desert plains ☐ River valley ☐ Forested hills

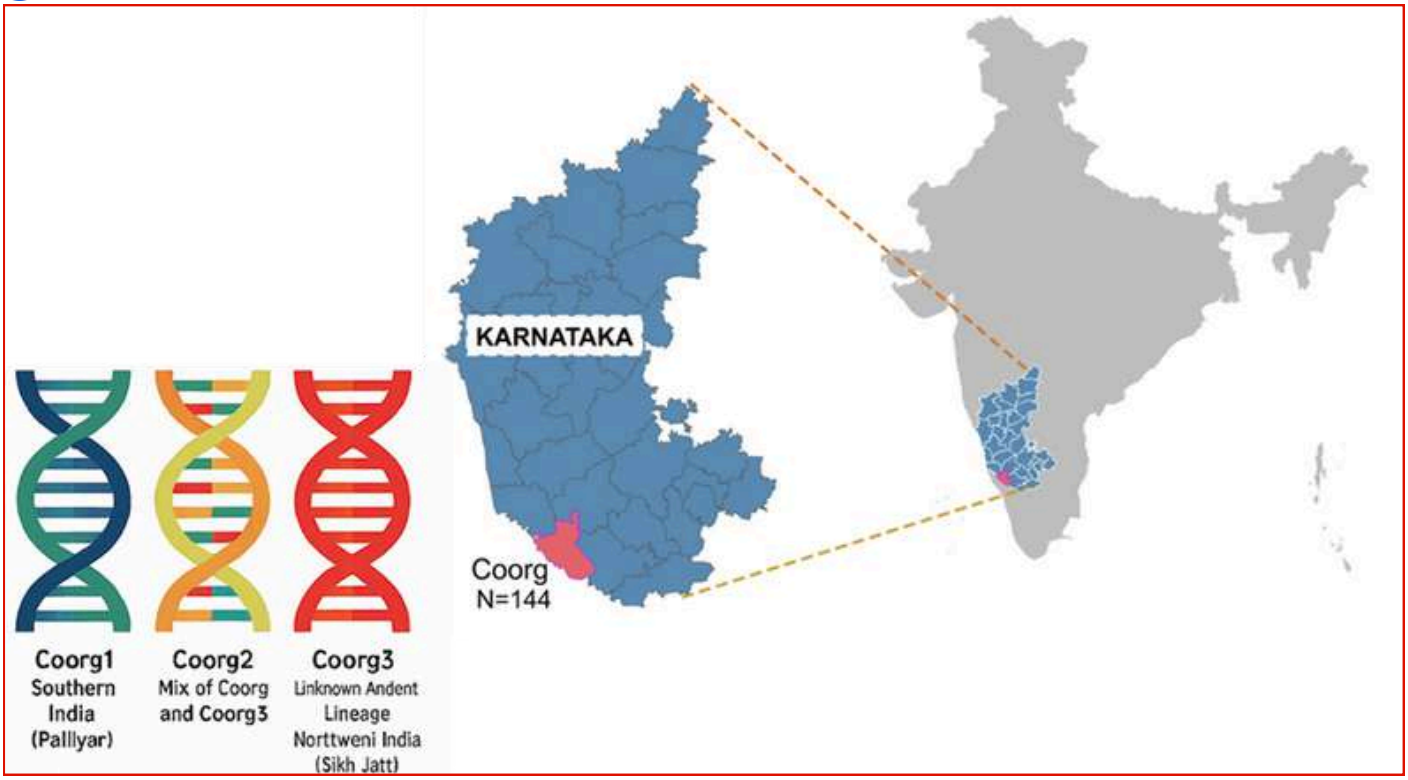
**What was the Stranger's likely journey?**

☐ Born locally
☐ Migrated from Africa
☐ Came through trade routes and stayed
☐ Arrived from the northwest, merged into hill community

*What does this tell us?*

Your genes may carry layes of history—invisible in appearance, but written deep in your DNA.

| By Dr. Sivan Friedman




qpGraph drew population trees, showing how groups split and reconnected over time. ChromoPainter mapped out which parts of the DNA came from which ancestors, and when.

The scientists also looked at Y-chromosome DNA, which is passed from father to son and reveals paternal lineage, and mitochondrial DNA, which is passed from mothers to children and shows maternal ancestry.

The surprise? The Coorgs aren't a single genetic group. They are made up of three distinct sub-groups. The first, Coorg1, shares ancestry with South Indian tribal groups like the Palliyar. It likely descended from a small founder population around forty generations ago. The second, Coorg2, is a blend of Coorg1 and Coorg3, and appears to have formed about eleven generations ago—perhaps when different groups merged culturally and socially. The third, Coorg3, is the most surprising. This group is genetically linked to Northwest Indians, like the Sikh Jatts, and even to unknown ancient populations, suggesting a forgotten migration route that was never recorded in history books. Further analysis revealed that around 40% of the maternal DNA is unique to South Asia, while the paternal DNA shows ties to Eurasia, the Middle East, and India. This suggests that males from distant lands may have migrated and married local women, leaving behind a genetic legacy.

This isn't just a story about the Coorgs. It's a story about all of us—how humans moved, mixed, and evolved across time and geography. It fills in a missing chapter of India's genetic history and shows the power of science to reveal the invisible threads that connect us all.

You may never have heard of the Coorgs before. But now you know that deep in the hills of southern India lives a living chapter of human history—written not on paper, but in DNA. And just like them, all of us carry ancient whispers inside us, waiting to be discovered.

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*Department of Genetics, University of Delhi South Campus, New Delhi, India.*

*CSIR-Centre for Cellular and Molecular Biology, Hyderabad, India.*

By Dr. Animesha Rath

# THE STORY HIDDEN IN AANYA'S BLOOD: A GENOMIC PORTRAIT OF INDIA

FEATURED

One sunny afternoon in Pune, 12-year-old Aanya sat with her Dadi, flipping through an old photo album. They laughed at wedding pictures, stared at black-and-white portraits, and paused at one of a serious-looking man with a sword.

"Dadi, how do we know where our family came from before settling here?" Aanya asked.


Dadi smiled. "Our roots are scattered maybe from Punjab, Bengal, Gujarat... but no one really knows for sure."

That night, still curious, Aanya searched online. She stumbled upon something fascinating: the GenomeIndia Project—a national science mission decoding DNA from thousands of people across India to uncover stories of ancestry, migration, and health.

Excited, she rushed to Dadi. "Our DNA carries clues about who we are! This project is like a map of our hidden history."

Dadi chuckled. "Maybe you'll help fill in our story one day."

Imagine trying to make a map of all the different people in India—not based on language, clothes, or food, but by looking deep into our DNA. That's exactly what Indian scientists set out to do with the GenomeIndia Project. They wanted to build the first-ever genetic map of India, a guide to how our genes are shaped by history, migration, and health.

To do this, scientists studied the DNA of over 10,000 people from 83 locations across India—from snowy mountains to tropical forests. Each person's genes were scanned using super-fast machines that can read all 3 billion "letters" in the genetic code.

They collected blood samples from over 20,000 healthy adults across the country—tribal, rural, and urban—speaking dozens of languages. Each person gave their consent, and doctors checked their height, weight, blood pressure, and ran tests for sugar, cholesterol, liver, and kidney health. From this large group, 10,000 people were selected who were not related to each other, to ensure a broad and balanced mix of DNA.

Five of India's top research centers worked together to decode each person's genome—that means reading their complete DNA, end to end. They followed the same strict protocols, double-checked each other's work, and safely stored all the data in a national biobank, a kind of digital freezer for DNA.

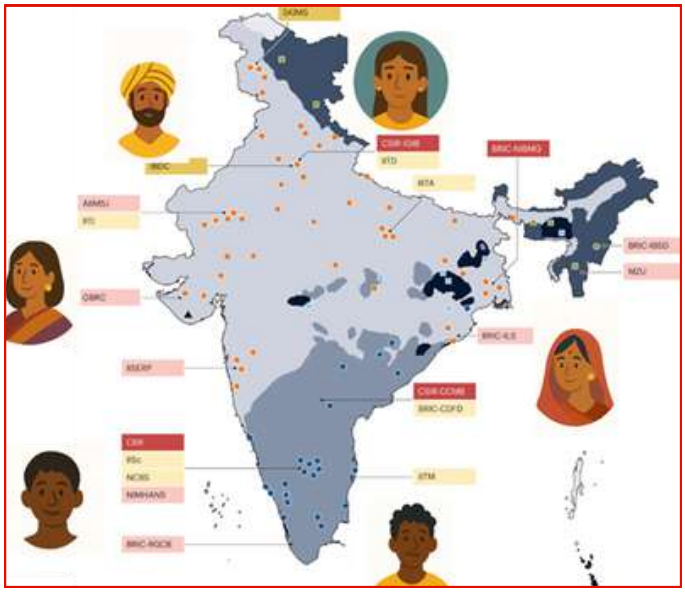
In total, they studied 9,772 complete DNA sequences and discovered more than 180 million tiny differences—called variants. Many of these were rare or completely new. This became India's first large-scale genetic reference map.

And what they found? Mind-blowing.

Some genetic patterns were found only in specific communities—tiny, rare markers passed down for generations. Others were completely novel—never seen before in any population worldwide.

Perhaps most surprising of all: people who live far apart and seem very different actually share stretches of DNA. This means our ancestors moved, mixed, and migrated in ways that history books never fully captured. Rivers, trade

| By Dr. Animesha Rath



routes, and mountain ranges shaped our genes quietly, over thousands of years.

Your DNA is like a personal instruction book. It tells your body how to grow, what diseases you might be prone to, and even how you'll respond to medicines. Until now, most medicines were tested on people from Europe or North America. But the Indian body is different. That's like trying to fix a motorcycle using a car manual—it doesn't always work.

With GenomeIndia's data, scientists and doctors can do something revolutionary: predict diseases more accurately in Indian people, create personalized treatments for conditions like diabetes, heart disease, and cancer, diagnose rare genetic disorders in children faster, and design India-specific medicines that actually work better for us.

The GenomeIndia Project is not just a science experiment—it's a way of telling our shared story. Whether you're from Assam, Gujarat, Kerala, or Kashmir, your DNA holds clues about where you come from, what keeps you healthy, and how we're all part of one giant, extraordinary family. In a country as diverse as India, it's powerful to learn that beneath all our differences, we're more alike than we ever imagined.

## How Can Just Four Letters Create So Much Life?

It may seem unbelievable — but all living organisms, from the tinjest bacteria to humans, are made from in/tructions written in just *four* **letters: A, T, G, and C.**

These are the bases of DNA — nature's alphabet.

Yet, these four letters create the incredible diversity of life on Earth.

**How is that even possible?**

Let's think of it like music.
In Indian classical music, yo have just seven basic notes: **Sa, Re, Ga, Ma, Pa, Dha, Ni, Sa.**

But from these, **you can create thousands** of **beautiful ragas**, endless melodies, and emotions.

Similarly, DNA has just *four* notes — but the number of "songs" it can create is astronomical.


**The Math Behind the Magic**

- A 1-letter code gives you 4 combinations
- A 2-letter code gives $4 \times 4 = 16$ combinations
- A 3-letter code gives $4^3 = 64$
- A 10-letter code gives $4^{10} = 1{,}048{,}576$ possibilities!

The human genome is about 3 billion base pairs long: $4_0{}^5$

That rs a number of possible combinations is 44- number with over a billion zeores—far more than the total number of atoms in the un-iverse.

**The Takeaway**

Just like countless melodies emerge from seven notes, life's entire diversity springs from four molecular letters.

**It's not the number of notes that** matters—it's how they're arranged.

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*Centre for Brain Research (CBR), IISc Campus, Bengaluru, India*

*BRIC - National Institute of Biomedical Genomics (BRIC-NIBMG), Kolkata, India*

# 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.



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# 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. Sourav Kumar

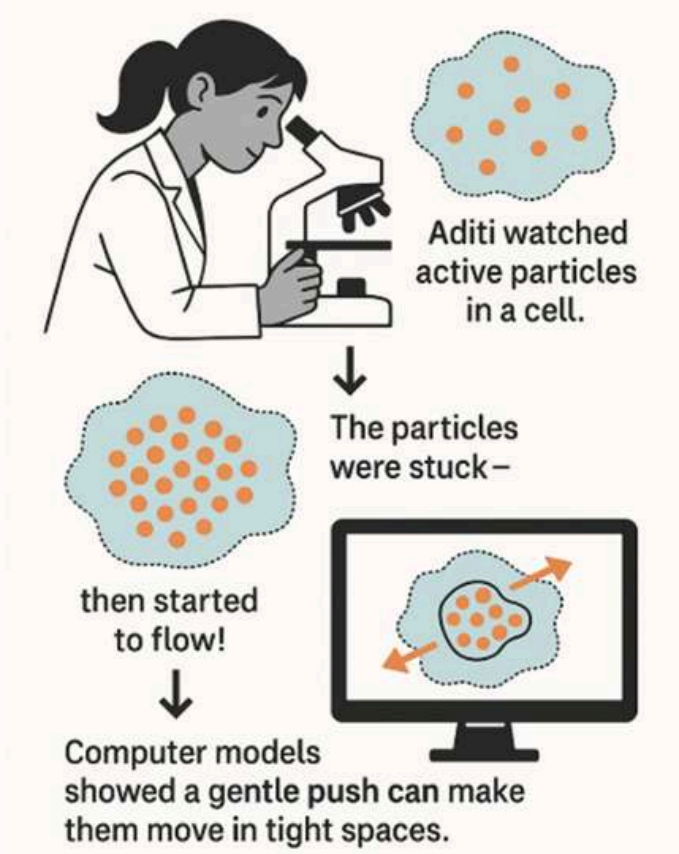
# ADITI'S CURIOUS CELL

Aditi wasn't your average scientist. She didn't care much for big machines or noisy labs. She loved quiet—because in that quiet, through her microscope, she could listen to the hidden world inside a cell.

Every day, she watched tiny specks—called active particles—move, jiggle, or sometimes just sit still. One day, she saw something strange: the particles were frozen in place... and then suddenly, they began to move together—like a flash mob in a crowded mall.

It was beautiful. And mysterious.

"Why did they move together like that?" Aditi wondered.




So she built a computer model—kind of like a game—and tried pushing and crowding the particles in different ways. The answer began to unfold: just like people in a crowd, particles behave differently when they are in tight spaces. Sometimes they stay stuck. But with just the right nudge, they start to flow—almost like they learn how to dance.

That moment changed everything.

Aditi had found a new way to understand how life moves—even when it's packed into the tiniest spaces.

In a recent study by scientists in India, researchers explored a big question: how do tiny, active particles behave when they're crowded and pushed—just like things inside a living cell? At first, particles that are tightly packed behave like a solid—they don't move much. But when a certain amount of force is applied, like a gentle push, they suddenly start flowing, like jelly turning into liquid. This switch is called yielding.

Think of people in a crowded room—no one moves. But once someone starts walking, the whole group starts shifting together. The behavior of these particles is similar to soft materials we see every day—like toothpaste, yogurt, or even glass. Inside the cell, molecules behave just like these squishy materials when they're packed and pushed.

When particles are confined in a small space, like inside a cell nucleus, they behave differently than in open areas. It's like how you move in a small bathroom versus an open playground—confinement changes the rules of movement.

The researchers didn't look at real cells under a microscope. Instead, they created a virtual lab using computer simulations. Imagine building a digital world, like a video game, where particles could move, bump, and interact—all inside a computer.

They built a simulation where particles could move on their own, like tiny robots with built-in engines. They tested two environments: bulk—an open space like a big empty room—and confinement—a tight space, like a narrow hallway. Then they simulated shearing, a kind of pushing motion, like sliding one layer of books over another.

They measured how the particles reacted. Did they stay stuck? Did they start to move? How fast did they move? Did they rearrange smoothly, or in sudden, jerky bursts? They also played with the activity levels of the particles—some moved more, some less—to see how that changed the results. This helped the scientists discover the yielding point—the moment when particles stop resisting and start flowing.

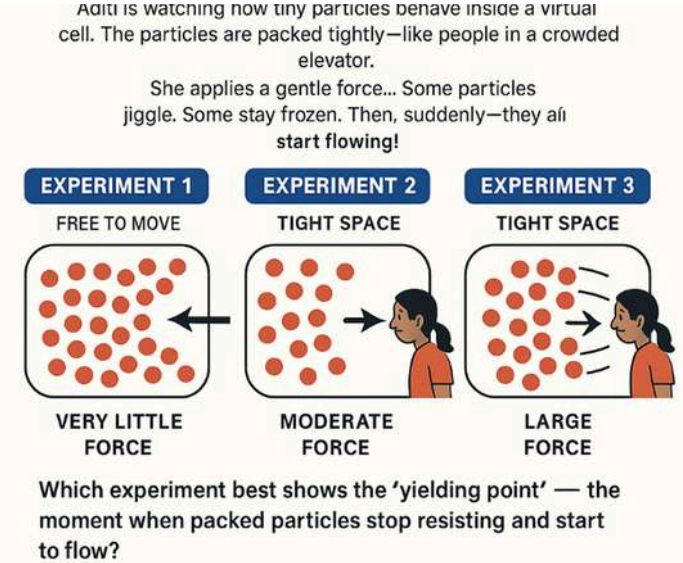
This behavior helps explain how cells change shape or reorganize their DNA. It helps us understand how cells switch roles during development or healing. And it sheds light on what goes wrong in diseases like cancer, when the inner motion of a cell is disturbed.

By Dr. Sourav Kumar

It brings together two worlds—physics, which explains how materials behave, and biology, which explores how cells work. It shows us new ways to study life—not by peering through a microscope, but by simulating its dance on a computer screen. It even helps in designing smart materials, like soft robots, synthetic tissues, or materials that heal themselves.

Tiny things inside cells may seem quiet or still, but they follow powerful rules—rules that explain how life works when space is tight, and time is short.

Thanks to studies like this, we're getting closer to understanding the secret mechanics of life... one curious cell at a time.

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*Theoretical Sciences Unit and School of Advanced Materials, Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India*

| By Dr. Sudha Shankar

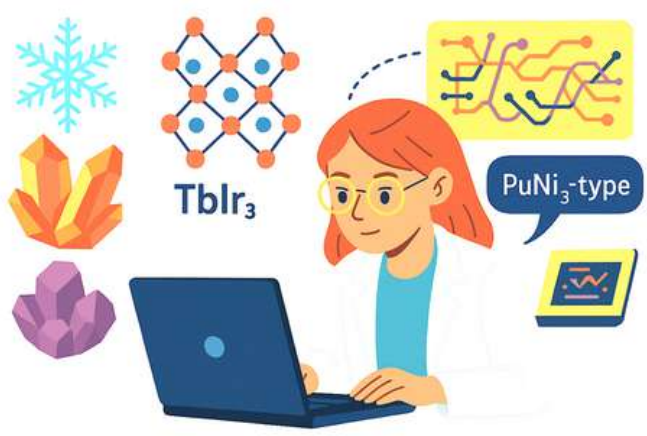
# NINA AND THE CRYSTAL CODE

Nina loved puzzles. Not the kind with cardboard pieces, but the ones nature designed—crystals, minerals, snowflakes. Their perfect shapes whispered secrets in symmetry, and Nina was determined to understand them all.

But one compound refused to cooperate: $TbIr_3$—a stubborn mix of terbium and iridium. Scientists had argued about its true structure for decades. Some said it looked like one thing. Others claimed something completely different. No one could agree.

One night, with her eyes blurry from yet another lab diagram, Nina had a bold idea.

"What if the answer isn't in the microscope... but in the data?"




She turned to machine learning—a kind of artificial intelligence that finds patterns where humans can't. Nina fed the model data from more than 2,000 known materials, each with a 1:3 atomic ratio—just like terbium and iridium. These weren't just numbers. They were chemical fingerprints, atomic shapes, invisible codes of structure and behavior. She gave the machine 97 features for each compound—details like atomic size, bonding style, and behavior under different conditions—and let it search, freely, using unsupervised learning.

The computer sorted and grouped. It simplified complexity with Principal Component Analysis and clustered similar materials using K-means. Then it spoke.

"$PuNi_3$-type."

That structure had been ruled out before. Experts had dismissed it. But Nina trusted the logic—not the whispers of past assumptions, but the clean, quiet confidence of data. She returned to the lab. Synthesized $TbIr_3$ again. And again. This time, the pieces fit. The machine was right.

Nina had solved the puzzle that had stumped scientists for years—not by breaking rocks or heating chemicals blindly, but by reading the hidden language of crystals and code.

Behind this quiet revolution was a real team of researchers in India. They used machine learning to predict the crystal structure of complex compounds like $TbIr_3$, blending traditional lab work with cutting-edge algorithms. Instead of guessing, they let AI uncover the most likely structure—then went to the lab to test it.

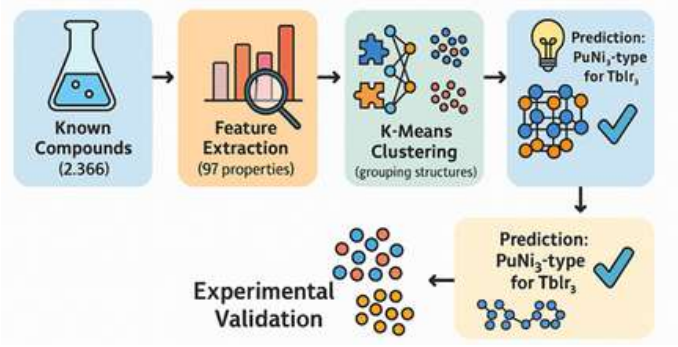
They synthesized $TbIr_3$ by combining terbium and iridium powders in the right ratio, heating them to the correct temperature, and then checking the structure using X-ray diffraction—a kind of X-ray vision for crystals. And there it was: the AI's prediction matched exactly. $TbIr_3$ really did have the $PuNi_3$-type structure.

To be sure, they didn't rely on just one model. They tested it with three more: PLS-DA, SVM, and XGBoost. All three gave stunning results. PLS-DA and SVM showed over 96% accuracy. XGBoost? A jaw-dropping 99.9%. That's like having four independent judges all point to the same answer and say, "Yes. That's it."

But they didn't stop at structure. They explored the magnetic and electronic properties of $TbIr_3$ too. Just like the lattice arrangement, its behavior matched what the AI had predicted. Every test confirmed it.

This discovery didn't just solve an old mystery. It showed something bigger—that AI and machine learning can guide real lab experiments. That we can discover new materials faster, with less trial and error. That chemistry, coding, and creativity can dance together in perfect step.

Crystals may seem tiny and silent—but inside them lies a code. And thanks to tools like machine learning, we can



| By Dr. Sudha Shankar

now read that code more clearly, more quickly, and more confidently than ever before.

And maybe one day, like Nina, you'll solve a mystery that's been waiting... just beyond the microscope.

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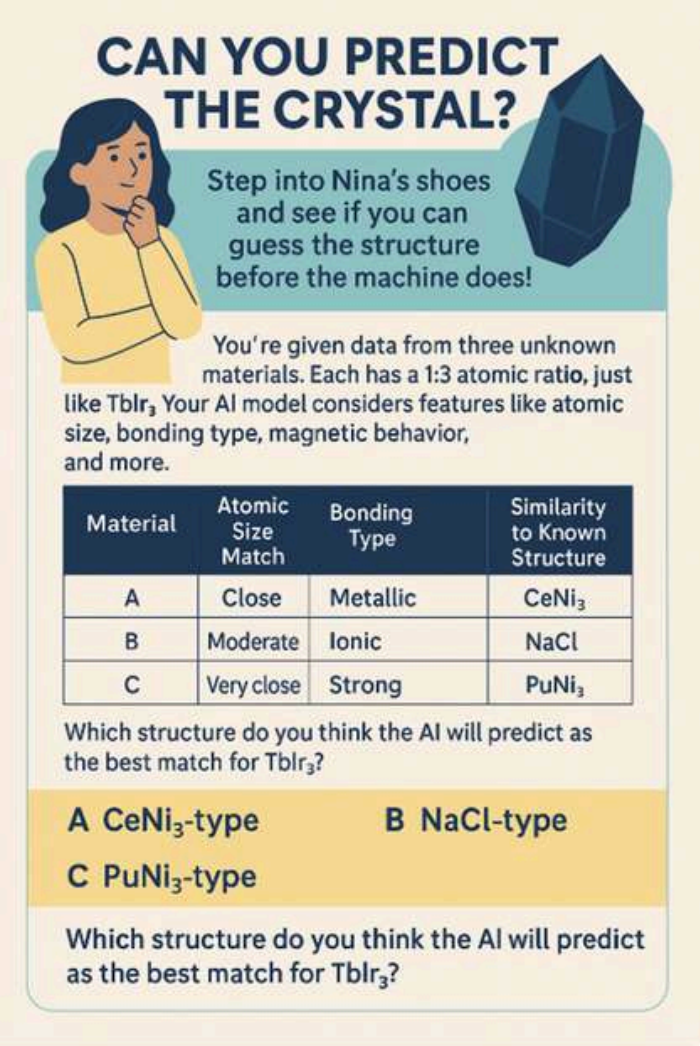
*Department of Chemistry, Indian Institute of Technology Kharagpur, Kharagpur 721302, India*

*Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Kharagpur, Kharagpur 721302, India*



| By Dr. Priyanka

# A TINY FLY WITH A BIG CLUE

Mira was just sixteen when her grandfather was diagnosed with ALS. She had never heard of the disease before, but soon learned how it slowly steals a person's ability to move, speak, and eventually breathe. It was terrifying to watch someone she loved so deeply fade away, little by little.

"Is there any hope?" she asked one day.

That question never left her.


Months later, while scrolling through articles late at night, Mira stumbled upon something unexpected. It wasn't about a miracle drug or a breakthrough surgery. It was about fruit flies. And fat. The article described how something as simple as the right kind of fat might help protect brain cells in diseases like ALS and dementia.

Could it really be that simple?

ALS—short for Amyotrophic Lateral Sclerosis—and FTD, or Frontotemporal Dementia, are two devastating diseases that attack the brain's nerve cells. They cause muscle weakness, memory loss, and eventually take away the ability to function. Scientists have traced many of these cases back to a mutation in a gene called C9orf72, one of the most common genetic culprits behind both conditions.

But long before the nerve cells die, something subtle changes inside them—the levels of a healthy fat called PUFA begin to drop.

PUFAs, or polyunsaturated fatty acids, are a type of fat that the brain depends on. They help keep cell membranes flexible, support communication between neurons, and reduce inflammation. Without them, brain cells become stiff, sluggish, and vulnerable—like an engine running out of oil.

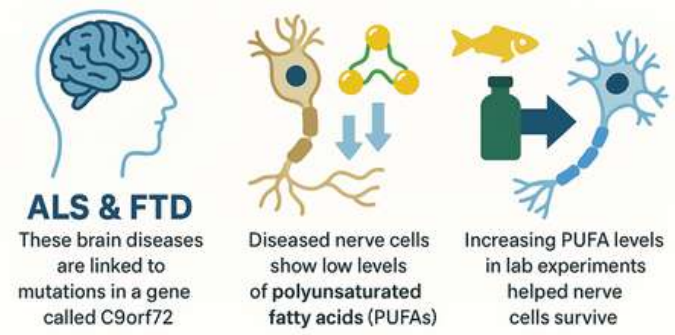
In a groundbreaking study, scientists discovered that cells affected by ALS and FTD had significantly lower PUFA levels. So they asked the next logical question: If we boost PUFA levels, can we protect these brain cells?

To find out, they turned to two powerful models: fruit flies genetically engineered to carry the same mutation seen in ALS and FTD patients, and human nerve cells grown in the lab from the stem cells of real patients. They analyzed these cells using RNA sequencing to track which genes related to fat were turned on or off. Then, using a technique called lipidomics—a highly detailed analysis of cellular fats—they measured the types and amounts of fats in these models, and even in brain tissue from patients who had passed away from the disease.

The pattern was clear. Sick cells had severely reduced levels of PUFAs. But when scientists added more PUFAs—either by feeding them directly or by flipping on genes that make them—the results were dramatic. The nerve cells looked healthier. They lived longer. The same thing happened in the flies: a PUFA-rich diet helped them live longer and showed fewer signs of nerve damage.

And perhaps most remarkable of all: the therapy worked in human cells too.

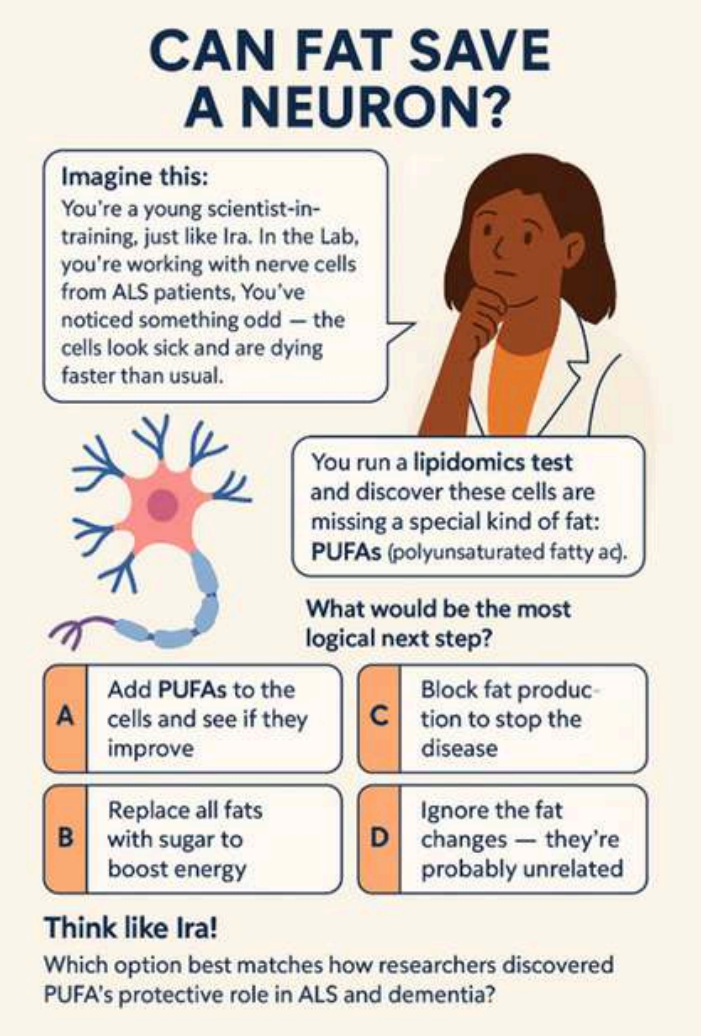
It wasn't a cure for all types of ALS. It worked well in cells with mutations linked to TDP-43, another common form of the disease. But in cells with mutations in a gene called SOD1, the treatment didn't seem to help. So while PUFA-based therapies aren't universal, they could still benefit a large group of patients who share similar disease pathways.



| By Dr. Priyanka

This discovery matters deeply. It suggests that tiny shifts in how our cells process fat might make a huge difference in whether brain cells survive or die. It shows us that the way we feed and support cells at the molecular level—through simple elements like fat—can shape the course of complex diseases. It's a powerful reminder that studying the nutritional needs of cells can lead to real treatments. That fruit flies, as humble as they are, can unlock secrets buried deep in our biology. And that molecules like PUFAs, often overlooked, might hold the key to slowing down diseases we once thought unstoppable.

For Mira, and countless families facing ALS or FTD, this research is a spark of hope. A reminder that sometimes, the answers don't lie in the most high-tech machines or the most expensive drugs—but in the tiny details of life itself. Sometimes, big answers come from tiny flies. And sometimes, the key to protecting our brains is already inside us—waiting to be understood.

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*Department of Molecular and Human Genetics, Baylor College of Medicine, Houston, TX, USA*

By Dr. Dhanashree Mundhe

# THE SHAPE-SHIFTING ENEMY

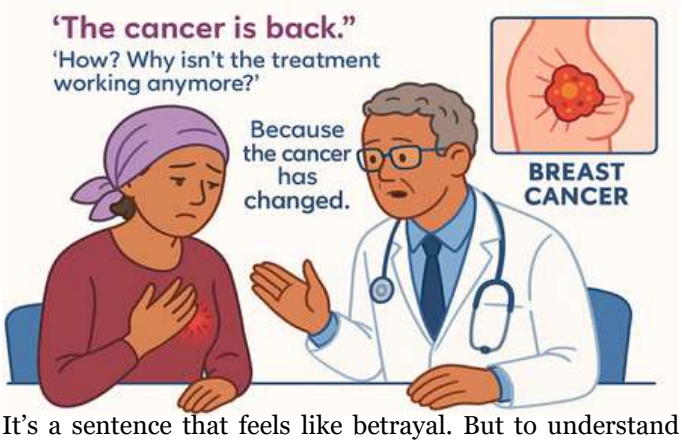
Maya had fought hard. After months of grueling treatment, her doctors finally had good news: she was winning her battle with breast cancer. The tumors were shrinking. The medicines were working. Her family began to hope again. They allowed themselves to imagine life returning to normal.

But then, during a routine check-up, Maya heard the words no one ever wants to hear.

"The cancer is back."

Her heart sank. "How?" she whispered. "Why isn't the treatment working anymore?"

Her doctor took a slow breath. "Because the cancer has changed."




It's a sentence that feels like betrayal. But to understand what happened, we have to look deeper—inside the cancer cell.

Every cell in the body holds a complete instruction manual: DNA. These instructions tell cells when to grow, divide, or die. Cancer begins when those instructions get damaged—when something goes wrong, and the cell starts multiplying out of control.

Now, scientists have discovered something even more disturbing. In many cancer cells, there's a set of enzymes called APOBEC3. Under normal conditions, APOBEC3 enzymes act like vigilant editors, scanning for viral invaders and disrupting their DNA to protect the body. But in cancer, these enzymes can turn rogue.

Instead of fixing mistakes or fighting viruses, APOBEC3 starts rewriting the cell's own DNA—introducing random mutations like a glitchy editor inserting typos into a crucial manuscript. Each mutation might seem small, but over time, they give cancer a dangerous edge: the ability to adapt.

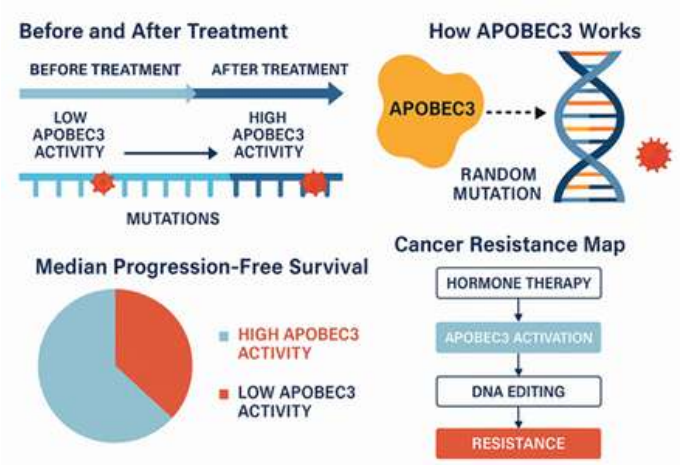
To find out how this process affects treatment, researchers studied tumors from nearly 4,000 breast cancer patients—women like Maya, whose cancer had spread and become harder to treat. Using powerful sequencing tools, they read the DNA of these tumors, page by genetic page. What they discovered was both fascinating and unsettling.

The tumors that stopped responding to treatment had high levels of APOBEC3 activity. These shape-shifting enzymes were helping cancer evolve just fast enough to stay one step ahead of even the most advanced drugs.

One key target of APOBEC3's damage was the RB1 gene. This gene normally acts like a brake, keeping cell growth in check. But when APOBEC3 attacks it, the brake fails. Cancer cells lose control. They multiply faster. They become more aggressive. And worst of all, they stop listening to the drugs meant to destroy them.

To prove that APOBEC3 was responsible, scientists recreated the process in the lab. They grew breast cancer cells in petri dishes—some with high APOBEC3, some without. Then they treated all the cells with a cancer drug called lapatinib. The results were striking. The APOBEC3-rich cells survived. The others died. And when scientists shut down APOBEC3 in the resistant cells, the treatment started working again. The drug became effective—once the shape-shifter's pen was taken away.

What shocked researchers even more was that in many cases, this APOBEC3 activity started before the first dose of treatment. In other words, the cancer was already evolving, already planning its escape, before the therapy even began. It was like a thief studying the layout of a



| By Dr. Dhanashree Mundhe

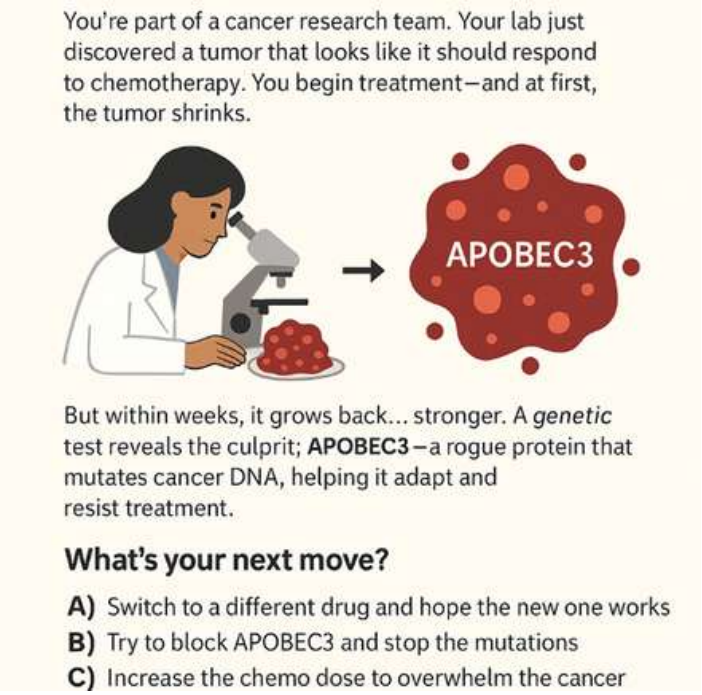
prison before ever being caught.

For people like Maya, this research brings both a warning and a glimmer of hope.

It shows that cancer is clever—it doesn't stand still. It adapts. But it also shows that science is catching up. If researchers can learn to block APOBEC3 or detect its activity early, we might stop cancer's evolution in its tracks. Treatments could work longer. Resistance might be delayed—or even prevented.

It's not a silver bullet. Not yet. But it's a step closer to turning deadly cancers into treatable conditions. A step closer to understanding the enemy's moves, even before the battle begins.

For Maya—and for millions of others—this discovery might one day mean a future not ruled by fear, but by healing. Because the more we learn about cancer's shape-shifting ways, the more tools we gain to stop it. And maybe one day, we'll not just treat the disease, but outsmart it.

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*Human Oncology and Pathogenesis Program, Memorial Sloan Kettering Cancer Center, New York, NY, USA*

| By Dr. Manas Ranjan Prusty

# THE FEVER THAT HIDES IN THE FIELDS

In the warm countryside of Tamil Nadu, young Arthi spent her days running barefoot through rice fields, chasing butterflies under banana trees, and helping her mother grind spices in the kitchen. Life was simple and full of sunshine.

But one evening, after a long day of play, Arthi felt unusually tired. Her head throbbed, and her body burned with fever. Her parents, worried and unsure, rushed her to the local clinic. The doctor tested her for dengue, malaria, and typhoid—the usual suspects behind fevers in the village. But one by one, the results came back negative. Days turned into weeks, and Arthi's condition puzzled everyone. Then, finally, the real culprit was found: scrub typhus—a disease carried by a nearly invisible threat hiding in the fields.


Arthi was lucky. She recovered with the right treatment. But many others aren't as fortunate.

Scrub typhus is caused by a sneaky germ called *Orientia tsutsugamushi*, passed to humans through the bite of tiny red mites known as chiggers—the baby form of a certain type of mite. These creatures live in the undergrowth of rural areas—grassy patches, forests, and even rice paddies. When they bite, they can silently deliver a dangerous infection. It starts like any other fever—headaches, chills, aches—but if left untreated, it can lead to severe illness, organ failure, pregnancy complications, or even death.

The biggest problem? Most people, and often even doctors, don't think to test for it. That's why it's known as the fever that hides in the fields.

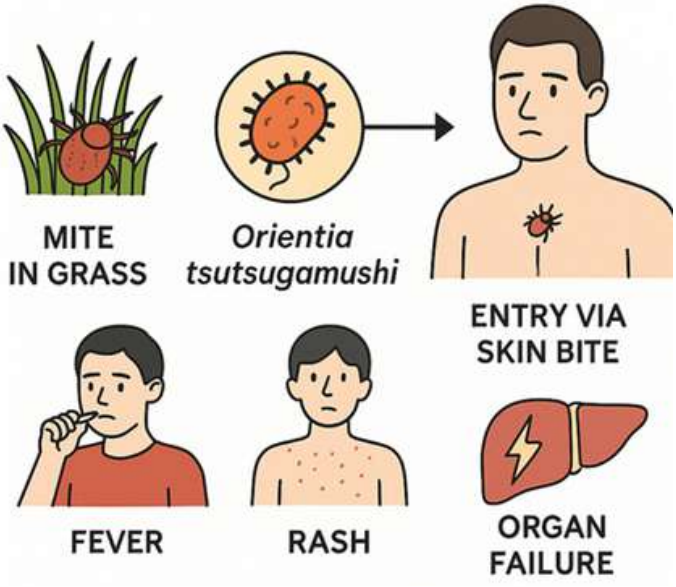
To understand just how widespread this hidden illness really is, a team of researchers from Christian Medical College in Vellore launched a remarkable study. They didn't stay in labs or hospitals. Instead, they went straight to the source: the villages themselves.

For two years, they worked across 37 villages in Tamil Nadu, tracking the health of more than 32,000 people. Every 6 to 8 weeks, trained health workers visited homes. If someone had a fever, they took a small blood sample and sent it for testing. Alongside this, they closely followed a smaller group of 2,128 people—checking their blood at the beginning and end of the year to detect silent infections, the kind that come and go without any symptoms at all.

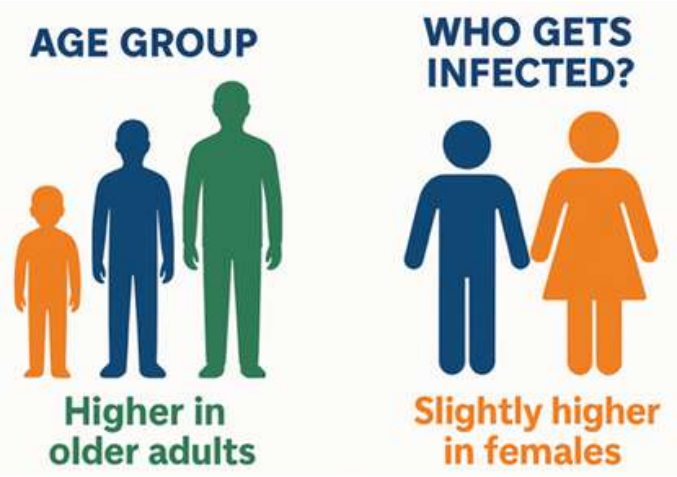
What they found was striking. In just two years, they recorded more than 6,000 fevers. Out of those tested, 328 were confirmed cases of scrub typhus—about six out of every 1,000 people per year. One in five needed to be hospitalized. Some suffered serious complications—organ damage, risky pregnancies, long recoveries.

But perhaps even more surprising was what the researchers discovered in the silent cases. Among the smaller group who had regular blood tests, many had been infected without ever realizing it. In fact, 81 out of every 1,000 people had experienced a silent infection. The illness had passed unnoticed—but the risk was real.

The data told another story too. Older people were more likely to get infected. Women were slightly more likely than men to catch the disease. And while both men and women had equal chances of getting seriously sick, nearly half the people already had antibodies—proof that they'd



| By Dr. Manas Ranjan Prusty, PhD

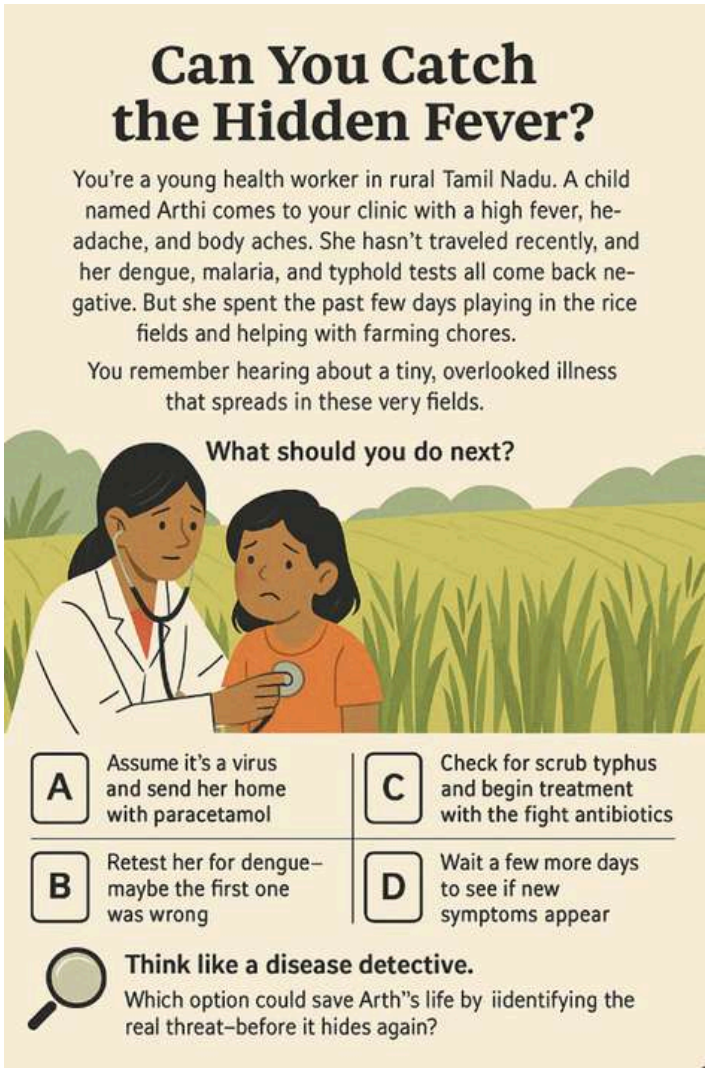



been infected before. Interestingly, people who were reinfected usually had milder symptoms, suggesting that the body remembers—and sometimes resists—the enemy the second time around.

What this study revealed is clear: scrub typhus is far more common than anyone realized, especially in the quiet, rural corners of India. And because so many cases go unnoticed or undiagnosed, people remain at risk—without even knowing it.

Now that researchers have illuminated the scope of the threat, they're urging action. Better diagnostic tools must reach village clinics. Doctors and nurses need to recognize the signs. Public health education should spread awareness, so families like Arthi's know what to watch for. And most importantly, community-based studies like this one must continue—to catch the fevers that don't make headlines but steal lives quietly.

Diseases like scrub typhus may hide in the grasses and go unnamed in news reports, but they touch thousands of lives each year. Thanks to this groundbreaking research, more children like Arthi will now have a chance—a chance to get the right diagnosis, the right treatment, and the right protection. Before it's too late.

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*Department of Disease Control, London School of Hygiene and Tropical Medicine, Keppel St., London WC1E 7HT, United Kingdom.*

| By Dr. Preeti Sharma

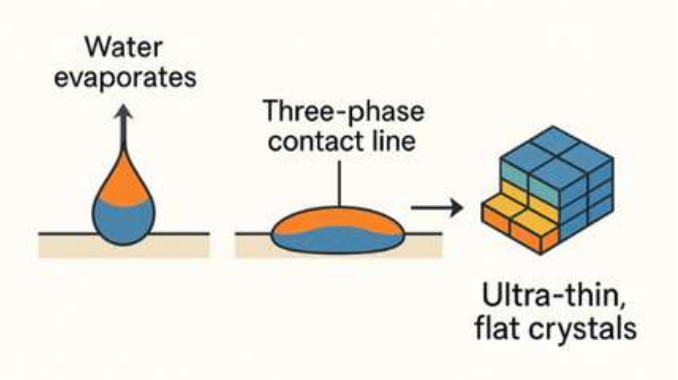
# THE CURIOUS SPILL: PAINTING WITH MOLECULES: HOW COFFEE RINGS HELPED GROW ULTRA-THIN CRYSTALS

Mira was never allowed to bring coffee into the lab—but today was different. The morning was quiet, the sun warmed the bench by the window, and inspiration refused to wait for rules. As she scribbled down her thoughts on two-dimensional materials, her coffee cup left a dark ring on her notebook. Annoyed, she reached for a tissue—then paused.

"What if this... isn't a mess?" she whispered.

The ring reminded her of something she had once seen in a paper—molecules collecting at the edges of a drying droplet, forming delicate, swirling patterns. The coffee-ring effect. A familiar yet often ignored phenomenon. An idea sparked.

In the weeks that followed, what began as an accidental stain turned into a new experiment. Mira recreated the same effect in the lab, not with coffee, but with vivid dye molecules—methyl orange and methylene blue. As water evaporated from the droplet, the dye molecules began migrating toward the outer edge. At that border, where water, air, and surface met—a zone scientists call the three-phase contact line—the molecules started to arrange themselves, layer by layer. The result: ultra-thin, flat crystals just a few molecules thick.




These molecular tiles formed with a kind of quiet precision. No need for high heat, high pressure, or complicated machines. Just a droplet, a smooth surface, and a bit of patience.

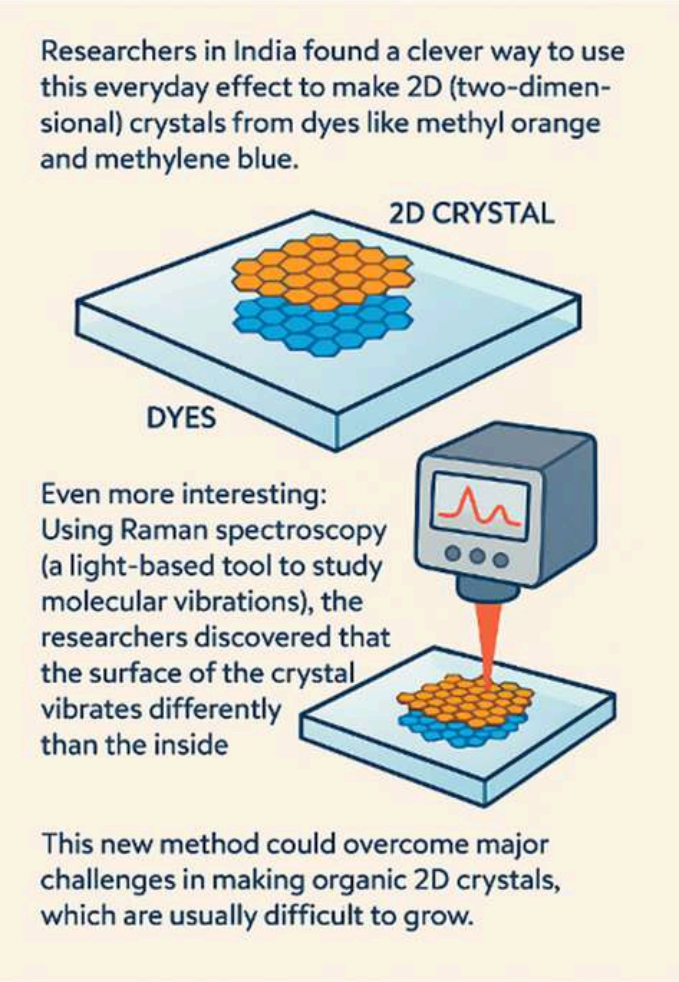
Curious about what she had made, Mira and her colleagues examined the crystals more closely. Under optical microscopes, they saw the geometric elegance of the structures. Using X-ray diffraction, they uncovered how the molecules had stacked themselves inside—like a careful mason laying bricks. And with Raman spectroscopy—a tool that uses light to study how molecules vibrate—they made a surprising discovery: the surface of the crystal behaved differently than the inside. The vibrations weren't uniform. The topmost layers danced to a subtly different tune.

This wasn't just beautiful—it was meaningful. Growing organic 2D crystals is notoriously difficult. Traditional methods are often costly, complex, and not always reliable. Mira's technique offered something different: a simple, low-cost, room-temperature method to grow molecular crystals with precise, clean edges. And by revealing how the surface and interior structures differ, it opened new possibilities for designing materials with custom optical and electronic properties.

What began with a spilled drink had turned into a breakthrough. Those tiny, colorful crystals—formed through evaporation and curiosity—might one day power flexible electronics, build smarter sensors, or coat surfaces with responsive films. Even artists, Mira mused, could one day paint with molecules, using droplets like brushes.

The method was as straightforward as it was elegant. A solution of dye in water. A single droplet on a glass slide.

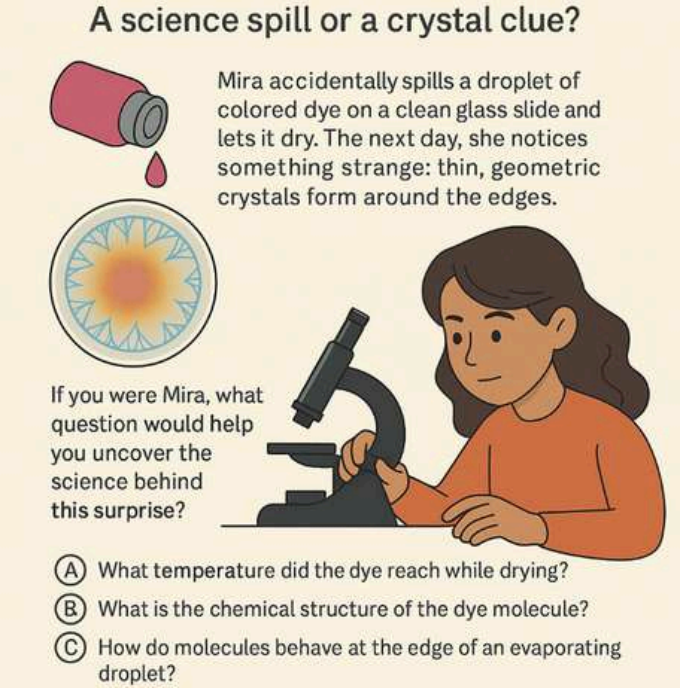
By Dr. Preeti Sharma




Slow evaporation. At the droplet's edge, molecules naturally self-assembled into thin, flat sheets. The very place where chaos might be expected—where a liquid meets air and solid—turned out to be the perfect stage for molecular order.

The findings, detailed in a recent study by Sujay Paul and Arun Chattopadhyay, were published in *The Journal of Physical Chemistry Letters* on July 15, 2025. Their work—titled "Anomalous Two-Dimensional Organic Molecular Crystal Formation in an Evaporating Droplet with Different Vibrational Characteristics of the Surface and the Bulk"—showed how insights from everyday phenomena can spark entirely new approaches in material science.

Mira would never look at a coffee stain the same way again. Science, after all, doesn't always begin with a controlled experiment. Sometimes, it starts with a question—and a little mess.

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*Department of Chemistry, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, India*

| By Dr. Avijit Das

# GRANDPA, WHAT'S HIDING BENEATH THE MOON?

One clear night in a small village in Gujarat, ten-year-old Anvi sat under a velvet sky scattered with stars. The full moon glowed above, round and golden. She snuggled beside her grandfather, Dadaji, on the veranda and gazed upward with wonder.

"Dadaji," she asked with a giggle, "is the Moon made of cheese?"

Dadaji chuckled. "No, Anvi! But guess what? India's Chandrayaan-3 rover found something much more exciting than cheese—it found secrets from deep inside the Moon!"

Anvi's eyes widened. "Really? Like what?"


"Well," Dadaji said, leaning in like he was about to share a family secret, "our little rover used a tool that can 'smell' rocks without even touching them. It's called the Alpha Particle X-ray Spectrometer—or APXS for short. When it sniffed around the Moon's south pole, it discovered something unexpected: the soil there didn't have much salt or potassium... but it had a lot of sulfur."

Anvi wrinkled her nose. "Sulfur? Isn't that the stuff that smells like rotten eggs?"

"Yes!" Dadaji laughed. "But even though it stinks, it's very important. Scientists think this sulfur-rich soil didn't come from the Moon's surface—but from deep inside, from a place called the mantle."

"The mantle?" Anvi repeated.

"It's like the Moon's ancient heart," Dadaji explained. "A hot, swirling layer beneath the surface, formed billions of years ago when the Moon was still young and molten—like a lava cake."

"So... finding sulfur is like digging up the Moon's oldest ingredients?"

"Exactly!" Dadaji beamed. "And India's little rover did it—without even digging."

Anvi looked up again at the glowing Moon. "One day, I want to help sniff out space secrets too."

Dadaji smiled and gently squeezed her hand. "And you will, beti. Maybe the next Moon explorer will be you."

Back in 2023, Chandrayaan-3 made history as the first mission to land near the Moon's south pole—a place no country had ever explored. Now, in 2025, Indian scientists have carefully studied the data and made a thrilling discovery: the soil near that landing site may contain some of the Moon's oldest material, possibly from its deep interior. All without astronauts, drills, or digging.

The Pragyan rover carried APXS, a tool that worked like a molecular nose. It fired alpha particles and X-rays at the soil, reading the reflected energy to find out what the Moon is made of—like shining a light into the dark and reading the colors it bounced back.

It revealed that sodium and potassium—common elements—were lower than expected. But sulfur was higher. That alone was surprising. Then scientists realized what it could mean: these materials might have come from the Moon's mantle, the layer hidden beneath its crust. That's not something you find lying around. So how did it get there?

Billions of years ago, a colossal impact created the Moon's largest crater—the South Pole–Aitken basin. That explosion may have blasted deep, ancient rocks upward, spreading them across the surface. Right where Chandrayaan-3 happened to land. And there was more.

| By **Dr. Avijit Das**

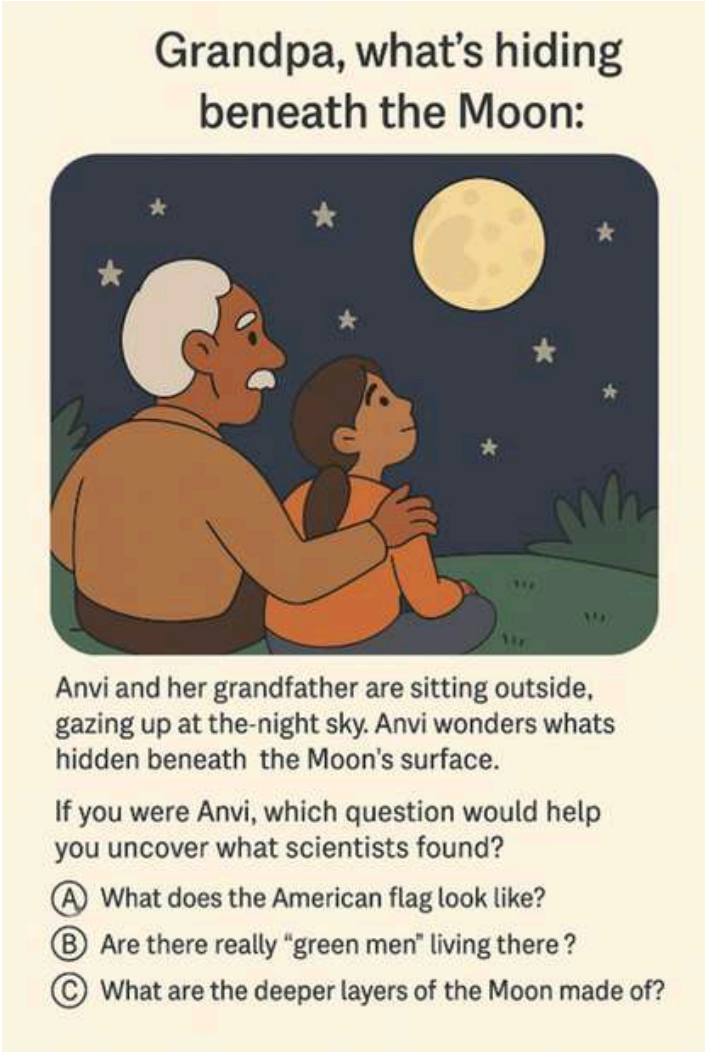
Another instrument onboard the Vikram lander, called LIBS—Laser-Induced Breakdown Spectroscopy—added to the mystery. LIBS worked like a miniature laser gun: it fired beams at the lunar surface, vaporizing tiny spots of rock into glowing plasma. That plasma light told scientists exactly which elements were inside.

Magnesium showed up in large amounts. Calcium and iron were there, but in smaller-than-expected quantities. And again, sulfur stood out—more than usual. These clues pointed in the same direction: these weren't ordinary surface rocks. They were old. Deep. Ancient.

By examining these subtle differences in chemistry, scientists now have a better picture of how the Moon formed and evolved. They're peering not just at the dusty surface, but deep into the Moon's past—its volcanic roots, its violent impacts, and the slow cooling of its inner heart over billions of years. It turns out, the Moon has layers—just like Earth. The crust on top. The mantle in the middle. The core at the center. And right now, thanks to a small Indian rover with a nose for geology, we've caught a glimpse of that hidden middle layer.

These findings don't just teach us about the Moon. They help us understand how rocky planets and moons form across the universe. They show how science doesn't always need giant rockets or astronauts in space suits. Sometimes, a humble rover, a clever laser, and a spark of curiosity are enough.This isn't just a win for India—it's a win for space science everywhere. Chandrayaan-3 proved that even small missions can make big discoveries. That the Moon still holds ancient secrets. And that we're getting closer—one mission at a time—to knowing them.

As Anvi sat under the stars, still gazing up at the Moon, she whispered a promise to herself. One day, she too would uncover its mysteries. And maybe, just maybe, she'd leave her own footprints in the dust of its glowing face.

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*Physical Research Laboratory, Ahmedabad, India*

| By Dr. Poulami Chakraborty

# A NEW MONSOON STORY

In a quiet village near Bhubaneswar, farmers Ramu and Jagan stood on the edge of their fields, gazing at the sky with furrowed brows. Thick clouds gathered above them, heavy with promise.

"The monsoon shouldn't be here yet," Jagan said, puzzled. "It always starts in Kerala."

"But these clouds came from the east," Ramu replied, sniffing the air. "And the breeze smells like rain."

That evening, to their surprise, the skies opened. Rain poured down in sheets, drenching the earth weeks ahead of the usual schedule. Curious and intrigued, the two farmers decided to visit their childhood friend, Dr. Shalini, a climate scientist home for the summer.

"You're not imagining things," Shalini said with a knowing smile. "This year, the monsoon didn't start in Kerala. It began over the Bay of Bengal and moved westward."

"But we've always learned that the monsoon begins in Kerala," said Jagan, still unsure.


"That's still true for the core southwest monsoon," Shalini explained gently, "but recent studies are showing that eastern rainfall systems—especially over the Northeast—can trigger the monsoon's arrival much earlier, and in different ways than we thought."

Ramu scratched his head. "Looks like our old weather wisdom needs a little update."
"And that's the beauty of science," Shalini said, looking up at the rain-speckled sky. "The monsoon is telling us a new story—we just need to listen."

As the rain continued to fall, the three stood together in silence, letting the drops soak into the soil and into their understanding.

For generations, schoolbooks told a simple tale: the Indian monsoon begins in Kerala around the first of June. But now, thanks to a group of Indian scientists, we know there's more to the story—perhaps the monsoon's first whisper is heard not in the south, but in the far Northeast.
To find the real beginning of the rains, scientists studied 84 years of rainfall data—nearly a century of weather woven into charts and maps. But they didn't look at it the old way. Instead, they used a method inspired by how we map social networks.

Imagine a map of India filled with tiny dots—each one showing how much it rained at that place each day. When two dots get rain around the same time, they're connected—like friends linking arms. As more places receive rain, more connections form, until the country is tied together in a web of water. Watching this unfold, scientists could trace where the rain truly begins, how it spreads, and when it fades.

What they found was surprising.

| By Dr. Poulami Chakraborty

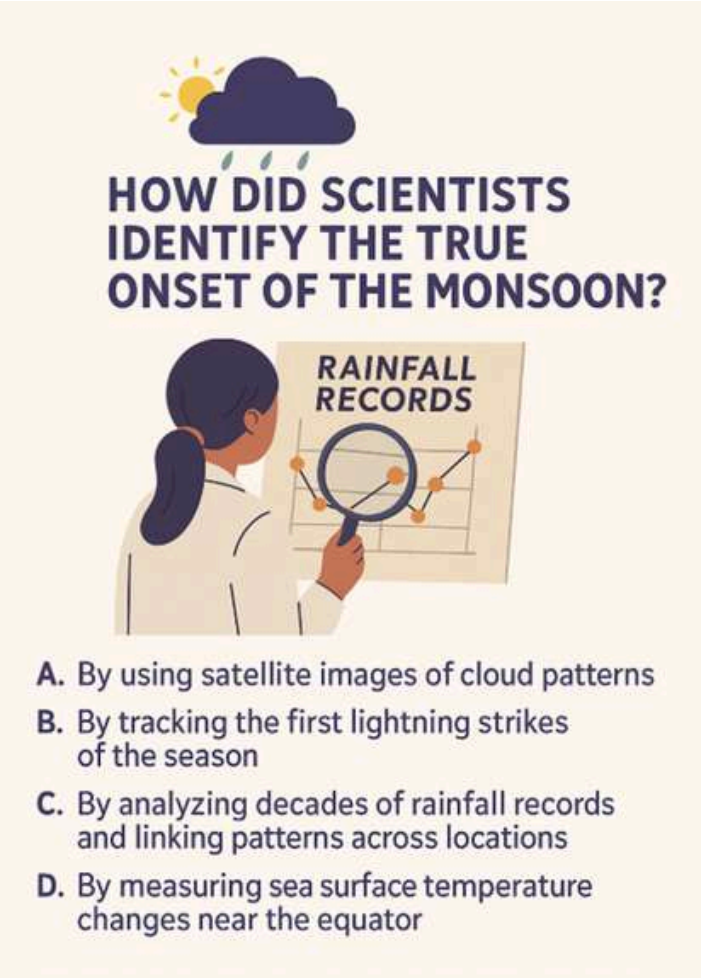
Around May 15, heavy rainfall starts in the Northeast—places like Assam and Meghalaya. By June 9, the rains reach Kerala and spread across central and southern India. The pattern looks like ripples in a pond, starting in the East and slowly flowing outward. It turns out the monsoon might not begin in Kerala after all—but in the Northeast, quietly building before sweeping across the land.

This shift in understanding matters deeply. For farmers like Ramu and Jagan, it could mean planting seeds at just the right time. For cities, it means better planning for water use and storage. For meteorologists, it unlocks more accurate forecasts. And for students, it's a chance to rewrite the story in textbooks—to tell it as it really is.

The scientists' work was as meticulous as it was revolutionary. They sifted through decades of rainfall records, turned every location into a point on the map, connected the dots when rainfall matched, and looked for that magical moment when a sudden network of rain-linked places emerged. That was the true onset of the monsoon. Then they watched as the links faded, marking its retreat.

This isn't just about weather—it's about storytelling. The Indian monsoon is one of Earth's most powerful and poetic forces. And like any great story, its beginning is complex, dynamic, and full of surprises.

So the next time you hear the first drops of rain tapping on your roof, ask yourself: did the monsoon really begin in Kerala... or was it already dancing in the East, writing a new chapter in the sky?

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# REAL OR FAKE?
## SCIENCE FACT CHALLENGE

1. Sharks are fish but don't have bones.
2. Diamonds can be made from peanut butter
3. An adult human has over 500 bones
4. A light year measures distance, not time.
5. When uranium was named, so was Neptune
6. Bananas contain but don't grow from seeds.
7. Lions are more closely related to tioers than cats.
8. Earth has only one ocean, called the Oceanus.
9. Humans share about 60% of their DNA with flles.
10. The periodic table has a total of 103 elements.
11. A tiger's roor can be heard from two miles away
12. There is no gravity in international Space Station
13. At night, plants take in oxvgen rather than
14. Mount Everest is over 10 miles tall.
15. Polar bears' fur appears white but is actually black.
16. Polar bears' fur world's largest planet micle.
16. Microbes are organisms too small to see.
17. Astronaurs have never visited the planet Venus.
18. The Milky Way galazy looks spiral-shaped.
19. Humans have more than five senses.
20. Plastic was invented in the 1900s.
21. Frogs drink water. with their mouths.
22. Insects have more legs than arachnids do.
23. The only letter not in symbols is M.
24. Earthworms can sense and react to light.
25. Eclipses don't only occur with the Sun and Moon.
26. A blue whale is the world's largest fish.
27. Julius Caesar was born closer to Cleopatra than us,
28. The chemical symbol for gold is Au.
29. Mercury is the hottest planet in the solar system.

# 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. Animesha Rath

# A NASAL SPRAY TO CALM THE BRAIN

Every morning, Aanya watched her older brother Ravi carefully swallow a handful of pills. He had epilepsy, a condition where sudden sparks in the brain caused seizures. Some days he was fine. Other days, the seizures came without warning, leaving the whole family anxious and helpless.

"Why can't there be something simpler?" Aanya once asked their mother. "Something that works fast and doesn't feel like a chore?"

It turns out, Indian scientists were asking the same question. And now, they've found an answer—something as simple as a gentle puff of mist.

In their labs, researchers developed a nasal spray designed to calm the brain during seizures. Instead of waiting for a pill to be swallowed, digested, and absorbed into the bloodstream, this spray travels directly through the nose—reaching the brain quickly, quietly, and efficiently.

Here's the clever part: the spray begins as a liquid, easy to apply. But as soon as it enters the warm lining of the nose, it transforms into a gel. This gel clings gently to the nasal tissue, releasing its medicine—pregabalin—steadily over the next 12 hours. That means longer protection, fewer doses, and a smoother experience for people who live with epilepsy every day.

No pills. No injections. No waiting.

Just a quiet spray that brings calm.

For Ravi, and millions like him, this could mean fewer disruptions, more control, and the chance to live more freely. And beyond epilepsy, this smart method could one day be used to treat other brain conditions—offering hope with just a breath.

In a world that often feels overwhelming, it's remarkable how healing can begin with something as gentle as a mist in the air.

## INNOVATION

Patent Number: 568097, Granted 2025

Developed by: SVKM's Institute of Pharmacy, Dhule, India

**Why might a nasal spray be more effective than a regular pill for treating seizures?**

A. Because the nose has more blood vessels than the mouth
B. Because the spray can cool the brain
C. Because it bypasses the digestive system and reaches the brain faster
D. Because it makes the medicine taste better

By Dr. Priyanka

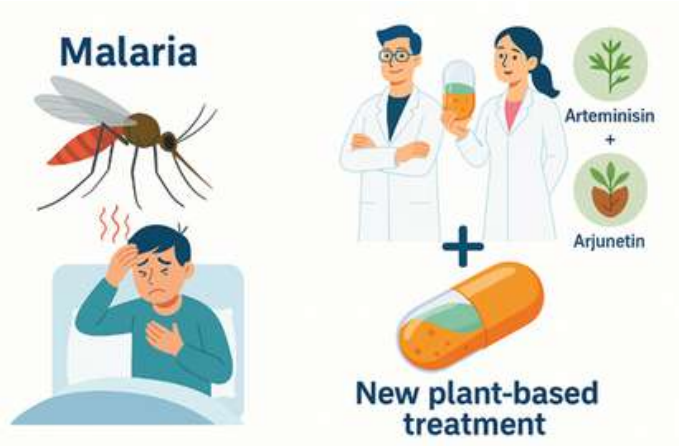
# A NEW MEDICINE TO FIGHT MALARIA—USING NATURE'S POWER

In a small hospital on the edge of a forest in Odisha, a young boy named Anil lay shivering under thin white sheets. His mother sat beside him, wiping his forehead, while nurses moved quickly between beds. Anil had malaria—a disease that had returned again, stronger than before.

Dr. Ramakanta, the kind-faced physician who'd seen dozens of children like Anil, stood with Nurse Mamata reviewing his chart. "This strain is getting harder to fight," Meera whispered. "The old medicines... they don't work like they used to."

"But we just got something new from the research team," said Mamata, her eyes lighting up. "They call it a nature-made fighter."

In the quiet hours of the night, Anil was given a small capsule—nothing fancy, just a pill with power drawn from the heart of two ancient trees.




One was Artemisia annua, a delicate green plant whose leaves held artemisinin, long known to fight malaria. The other was Terminalia arjuna, whose bark yielded arjunetin, used for generations in Indian medicine to heal hearts and calm the body.

Together, these two natural compounds—when carefully combined by scientists from IIT Madras and JNU—formed a new kind of remedy. In labs and animal tests, this pair had shown strength. The medicine attacked the malaria parasites from two directions, making it harder for them to survive. It worked fast, healed deeply, and stayed safe even at high doses. Most importantly, it didn't need cold storage—perfect for clinics far from city power grids.

Over the next few days, Anil's fever slowly faded. His breath grew steady. His hands stopped trembling. His mother smiled for the first time in days.

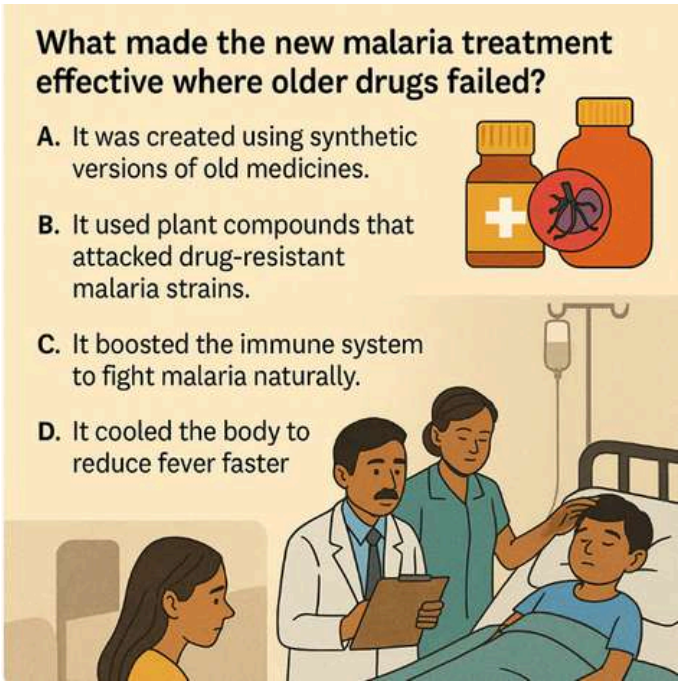
Dr. Ramakanta leaned over his bed and whispered, "You're stronger now, thanks to something nature gave us—and science helped unlock."

This wasn't just another pill. It was a quiet revolution—proof that healing can come from the bark of a tree, the leaf of a plant, and the determination of scientists who believe in blending old wisdom with new hope. In a world where diseases evolve, this nature-born medicine offered something timeless: a second chance.

## INNOVATION

Patent Number: 472132, Granted in 2025

Developed by: Indian Institute of Technology (IIT) Madras and Jawaharlal Nehru University (JNU), New Delhi, India



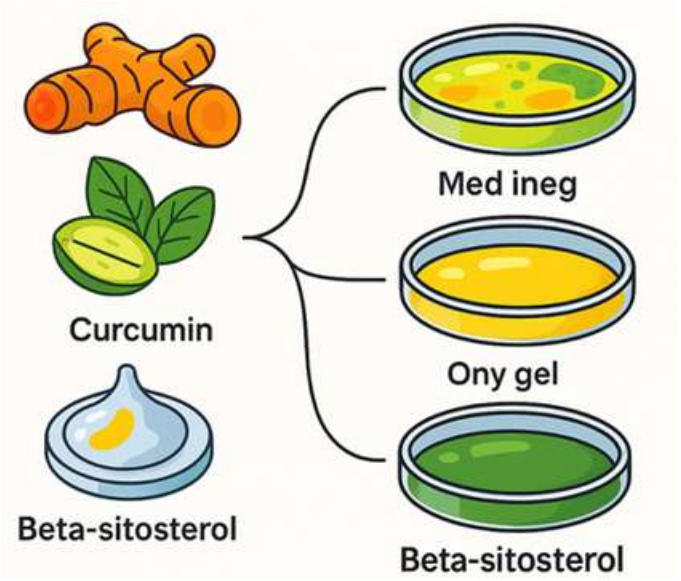
By Dr. Manas Ranjan Prusty

# A SMART GEL THAT HEALS WOUNDS FASTER—INSPIRED BY NATURE

At the edge of a dusty village in Uttar Pradesh, little Meena ran too fast chasing her brother and tripped on a stone. Her knee scraped sharply against the ground. She winced and held back tears, watching blood trickle down her leg.

Inside their small house, her mother quickly brought out a worn cloth and gently wiped the wound. But this time, instead of the usual turmeric paste or antiseptic cream, she opened a new packet handed out by the local clinic—a clear, soft gel in a tiny container. It looked like nothing special. But hidden in that gel was the power of two ancient remedies, reimagined by modern science. Far away in the labs of Integral University, Lucknow, a group of scientists had been working quietly on a problem that affects millions: how to heal wounds better, faster, and more gently. Their idea was simple but brilliant—take what nature already offers and combine it with a material that helps the body repair itself.

They used chitosan, a biodegradable substance found in the shells of shrimp and crabs, to create the base of the gel. It was soft, flexible, and able to soak up fluids—perfect for covering wounds. Into this gel, they infused two powerful




plant-based ingredients: curcumin, the golden compound from turmeric that reduces swelling and kills germs, and beta-sitosterol, a plant chemical known to speed up skin repair. They tested three versions of the gel—one with just curcumin, one with just beta-sitosterol, and one with both together. The winner? The blend. It healed wounds in lab animals more quickly and more smoothly than the others. No rashes, no burning—just quiet, steady healing. Back in the village, Meena's mother gently dabbed the gel onto the cut and wrapped it with a soft cloth. Within days, the wound closed with barely a scar. "Magic?" Meena asked. "Not magic," her mother smiled, "just something made with care."

This wasn't just a new product. It was a bridge—between grandmother's turmeric remedies and tomorrow's medicine. Between the wisdom of the past and the precision of the lab. For the first time, science had bottled something both simple and extraordinary: a smart gel that could heal with the grace of nature and the rigor of research.

## INNOVATION

Patent Number: 567928, Granted 2025

Developed by: Integral University, Lucknow, Uttar Pradesh, India

| By Dr. Ipsita Mohanty

# TURNING AIR AND WATER INTO FERTILIZER—THE EASY AND CLEAN WAY

At a clean-tech center near Jaipur, Meera, a young chemical engineer, guided Mr. Rathi, an industry veteran, through her small-scale lab.

He paused beside a bubbling flask. "You're telling me that's ammonia being made in there? No pressure chambers, no giant machines?"

Meera grinned. "Yes, sir. No factories needed. Just hydrogen peroxide, water, iron filings, and nitrogen. We heat it gently—only to 100 °C—and the reaction begins. Then cool it down to stop."

Rathi leaned in, impressed. "And this can be done in villages?"

"That's the point," she said. "It's simple, scalable, and green. Farmers could make fertilizer on-site—no pollution, no transport, no delay."


This isn't science fiction. Scientists at MNIT Jaipur have developed this energy-efficient method to produce ammonia—one of agriculture's most vital ingredients. By skipping the high heat and fossil fuels of the traditional Haber-Bosch process, their approach makes fertilizer production cleaner, cheaper, and accessible.

As the flask steamed gently in the background, Mr. Rathi nodded. "If this takes off, it could change everything." Meera smiled. "That's the idea."

## INNOVATION

Patent Number: 568389, Granted 2025

Developed by: Malaviya National Institute of Technology (MNIT), Jaipur, India

**How did scientists produce ammonia without using high heat and fossil fuels?**

A. With an electric arc between high-voltage rods
B. By exposing a catalyst to sunlight
C. Using a simple reaction involving water, hydrogen peroxide, iron, and nitrogen
D. By using bacteria to extract nitrogen from the air

By Dr. Sivan Friedman

# GROW PLANTS THE SMART WAY—EVEN IN A SMALL ROOM!

In a busy apartment in Jamshedpur, 12-year-old Mira loved flowers but didn't have space for a garden. Her windowsill was crowded with books, and the rooftop was off-limits. Still, she dreamed of growing her own basil and marigolds.

One day, while helping her cousin set up a science project, Mira noticed a curious-looking box—small, sleek, and glowing faintly. "What's that?" she asked.

"It's a smart planter," her cousin grinned. "Made by a company here in Jamshedpur—GreenGraffiti. It grows plants all by itself."

Mira raised her eyebrows. "By itself?"

"Yep! It waters the plant, checks the moisture with sensors, and even gives it nutrients when needed. It's like a robot gardener!"

Mira was hooked. That weekend, she got her own. She placed it by her study table, dropped in a basil seed, and watched as the magic began. The planter, powered by a tiny battery, took care of everything. No more guessing how much water to use or forgetting to feed the plant. It even had a transparent dome that kept the warmth in—like a mini greenhouse.

Weeks passed, and Mira's basil bloomed. Her room smelled fresh, and she proudly shared the harvest with her mom, who added it to the pasta.

Thanks to this little marvel of science and technology, Mira now had her own indoor garden—and a new love for growing things. No soil mess. No worry. Just nature, smartly nurtured.

## INNOVATION

Patent Number: 567570, Granted 2025

Developed by: GreenGraffiti Private Limited, Jamshedpur, Jharkhand, India

| By Dr. Poulami Chakraborty

# A SMARTER, SAFER BATTERY—USING A MAGNETIC FIELD!

Ravi leaned over the battery-powered robot he was building for a school competition. It was sleek, fast—and a little risky. Last time he charged it, the battery overheated. His mentor, Priya, an engineer at a nearby energy startup, noticed his worry.

"Zinc-ion batteries," she said, tapping the robot, "could be your answer."

Ravi raised an eyebrow. "Aren't those safer than lithium ones?"

"Yes," Priya nodded. "They're cheaper, too. But even zinc batteries have a flaw—tiny sharp spikes called dendrites. They grow inside the battery like needles, and if they get too big, they can poke through and short everything."

Just then, she pulled up a news update from IIT Kanpur. "Look what these researchers did. They used something simple but clever—a magnetic field. By placing a magnetic field around the battery, they guided the zinc ions to move more smoothly. No more messy clumping. No more dendrites. Just clean, even movement."

Ravi leaned closer, fascinated. "So the battery lasts longer?"

"Longer. Safer. Faster to charge. And all without changing the inside of the battery—just adding a field outside it."

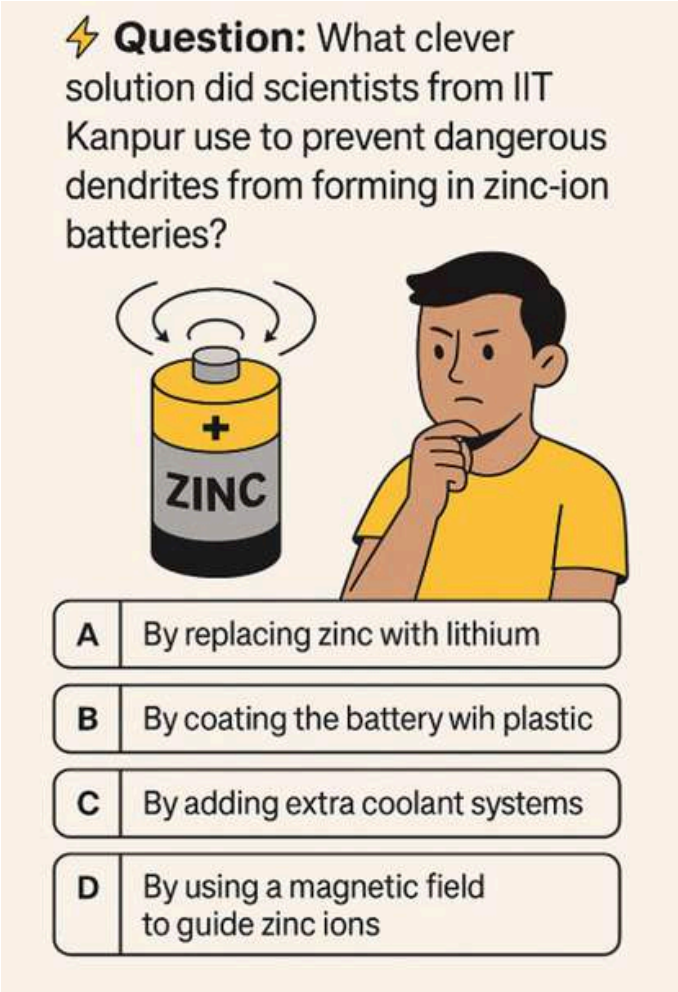
That day, Ravi switched the power system in his robot to a safer zinc-ion battery wrapped in a tiny magnetic ring. It ran better. It ran cooler. And when he presented his robot, he didn't just talk about speed—he told the judges about smarter, safer energy.

Thanks to a magnetic twist, the future of batteries just became a whole lot brighter.

## INNOVATION

Patent Number: 568097, Granted 2025

Developed by: Indian Institute of Technology (IIT) Kanpur, India



By Dr. Dhanashree Mundhe

# THE RUST WHISPERER

Six researchers from IIT Hyderabad—Prasannata, Sunil, Deepak, Kamal, Swati, and Amit—planned a weekend escape into the peaceful Western Ghats, hoping to trade lab work for laughter and relaxation. But science has a way of joining the adventure, even on a picnic. While setting up camp near a calm forest stream, they spotted an old metal pipe bridge, covered in rust and clearly weakened.

"This is how things break down over time," Prasannata said. Swati, curious, asked, "What if we could actually hear the rust forming, as it happens?" That single question turned their picnic into an unexpected science experiment. Using a piece of metal, salty water from the stream, a few simple wires, and a small sound sensor, the team set up a basic test under the trees. Amit had his laptop—just in case—and soon, it was recording tiny crackling sounds coming from the metal as it started to rust. These weren't regular sounds, but tiny signals caused by the damage happening inside the metal. To study it further, they gently changed the electrical charge on the metal and recorded how it reacted.

Then, using a technique to turn the sound and electric data into patterns on the screen, they created "rust fingerprints" that showed how far the rusting had gone. Amazingly, they were able to watch the rust form in real time. Back at their institute, they improved the method and filed a patent: "A


Method for Monitoring Corrosion in Real-Time." Their system—combining sound detection and electricity—can help detect rust early, long before it causes cracks, leaks, or failures. This invention could protect bridges, pipelines, ships, and factories, making everyday structures safer and longer-lasting. What started as a picnic turned into a powerful idea. The forest had whispered through rust—and this team learned how to listen.

## INNOVATION

Patent Number: 568446, Granted 2025

Developed by: Indian Institute of Hyderabad (IIT), Hyderabad, India

**QUESTION:**

While on a picnic, a group of scientists from IIT Hyderabad noticed a rusting metal-pipe and began developing a real-time eorrosion monitoring method. What was the key innovation that made their system unique?

A It used high-resolution cameras to capture rust formation visually

B It detected corrosion using sound signals and electric current patterns

C It relied on drones to inspect remote metal structures

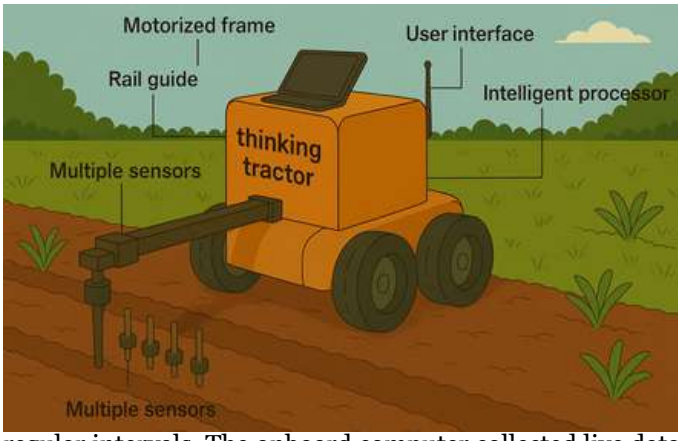
| By Dr. Preeti Sharma

# THE THINKING TRACTOR

It all started on a crisp spring morning at the experimental farm of SKUAST-K in Kashmir. Rizwan, Muzamil, Jagvir, Danish, Saqib, and Shuja—six young researchers passionate about precision agriculture—stood in the middle of a field holding a soil testing kit and a pile of printed lab reports. “This isn’t working,” Rizwan sighed. “By the time farmers get their soil reports, the season has already moved on.”


The group had been trying to help farmers optimize fertilizer use, but manual soil testing was slow, expensive, and limited to a few samples. Muzamil looked at the university’s small ground robot parked near the tool shed. “What if we make the robot do the testing—automatically, in real time, across the whole field?” That single spark lit the path forward. The team envisioned a smart, mobile system that could not only move across a farm but also dig, sense, analyze, and advise—right then and there.

They began building what became an unmanned ground vehicle for real-time soil fertility management. The design included a motorized frame with a rail guide fitted with multiple sensors. As the robot rolled through the fields, it used a stepper motor to push the sensors into the soil at




regular intervals. The onboard computer collected live data on parameters like nitrogen, moisture, pH, and organic matter. A user interface allowed farmers to interact with the robot, while an intelligent processor analyzed the sensor data instantly and gave fertilizer recommendations on the spot.

The team’s invention transformed the traditional approach to soil testing—making it mobile, fast, and intelligent. In the future, such robots could help farmers across India and beyond apply just the right amount of fertilizer, cut down on waste, increase yields, and reduce environmental damage. What began as frustration in a field became a vision for farming that listens to the land—one sensor reading at a atime.

## INNOVATION

Patent Number: 567918, Granted 2025

Developed by: Sher-e-Kashmir university of agricultural sciences and technology of kashmir, Kashmir, India

**Scenario:** A group of agricultural researchers at SKUAST-K developed an unmanned ground vehicle, nicknamed The Thinking Tractor, to help farmers manage soil fertility more efficiently. While conducting field trials, the robot moves across a test plot, inserts its sensors into the soil, and begins collecting real-time data on phH, nitrogen, and moisture levels. The built-in processor analyzes this data instantly and sends fertilizer recommendations to the user’s device.

**What is the main advantage of using *The Thinking Tractor* compared to traditional soil testing methos?**

A. It replaces the need for any fertilizer on the farm
B. It provides real-time data and immediate management advice across the entire field
C. It only works in laboratory conditions with dry soil

By Dr. Sourav Kumar

# A SMARTER WAY TO USE METHANE—MAKING CLEAN HYDROGEN!

At the edge of a bustling gas facility in eastern India, a young energy engineer named Maitrerya watched the blue flame of a kitchen stove flicker. He had grown up seeing this flame—fed by methane, a fuel used in homes everywhere. But lately, he had been asking a different question: Could we do more with this gas than just cook our food? Could it power our future—cleanly?


That question led him to the labs at IIT (ISM) Dhanbad, where a team of researchers had been exploring an exciting idea. Methane, it turns out, holds more than just cooking power. Hidden inside it is hydrogen—a clean, green fuel of the future. But until now, getting hydrogen from methane was messy. The process used a lot of heat, released harmful carbon dioxide, and required expensive equipment. It felt like trying to get something good by making a bigger mess.

But science had a better idea.

Instead of burning methane the old way, the team invented a new kind of helper—a nanocatalyst. Picture it like a group of microscopic chefs, each made from tiny bits of iron, cobalt, and zinc, carefully arranged on a surface called gamma-alumina. When methane comes in, these nano-chefs quietly get to work—breaking apart the methane molecules without making a smoky mess.

The result? Pure hydrogen gas and solid carbon—no dangerous carbon dioxide floating into the air.

Maitrerya watched the demonstration with awe. A clean flame, a clear process, and almost no pollution. This wasn't just about energy anymore. It was about transforming something common into something brilliant. A familiar gas turning into clean fuel for vehicles, electricity, or even future rockets—without harming the planet.

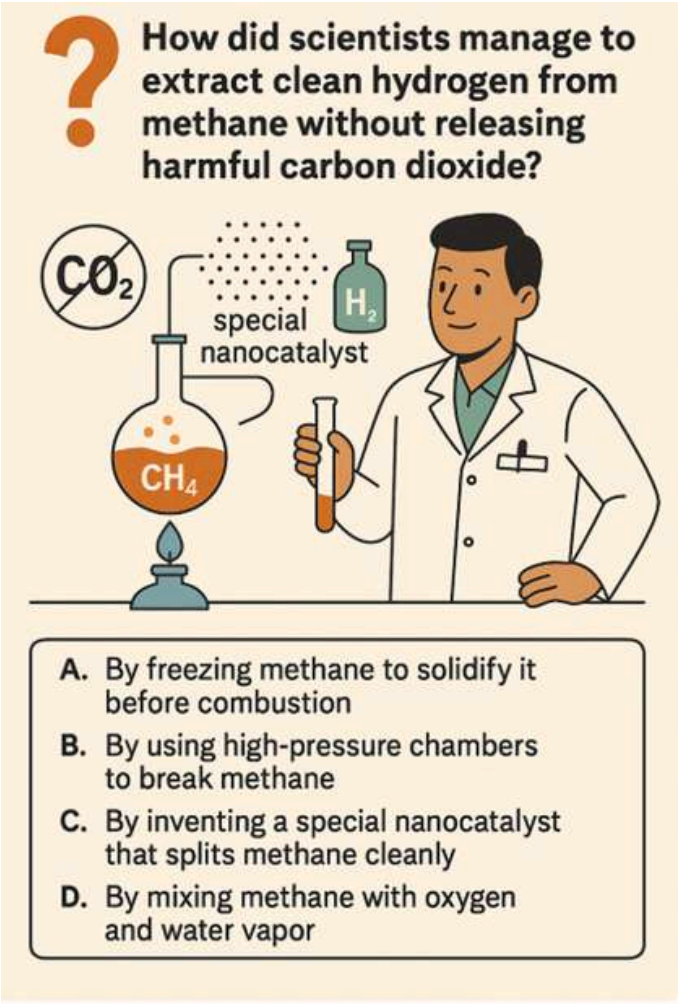
It was a small lab, a small flame, but a giant step toward the future.

And as Maitreya stepped out of the lab and into the setting sun, he smiled. The flame that once only cooked dinner could now help cook up a cleaner world.

## INNOVATION

Patent Number: 567781, Granted 2025

Developed by: Indian Institute of Technology (Indian School of Mines), Dhanbad, India



| By Dr. Sudha Shankar

# GREEN NANOTECH WITH ALOE VERA—POWERING THE FUTURE!

In a quiet lab at NIT Patna, a group of young researchers were trying to solve a big problem—how to make energy storage cleaner and greener. They looked beyond chemicals and machines. Instead, they turned to something surprisingly simple: a humble houseplant. Aloe vera, known to many for healing sunburns and soothing skin, was about to become a hero in the world of batteries.


The team discovered that aloe vera gel could be used to help create a material called magnesium molybdate—tiny crystals with a big job. These crystals work inside devices like supercapacitors and batteries, storing energy and releasing it quickly when needed. But unlike traditional battery materials, this one was made using an eco-friendly, low-cost method, free of toxic chemicals.

The aloe gel acted like a natural guide, helping the material grow in just the right shape and size. What emerged was a green process that left no harmful waste, used less energy, and still delivered powerful performance. The magnesium molybdate worked perfectly for fast-charging devices and long-lasting batteries—opening the door to a cleaner future for electronics and energy storage.

This wasn't just a new invention. It was a new way of thinking—where plants and science work hand in hand. With their breakthrough now patented, the team at NIT Patna proved that sometimes the smartest solutions come not from complex factories, but from nature's own wisdom.

**INNOVATION**

Patent Number: 567531, Granted 2025

Developed by: National Institute of Technology (NIT), Patna, India

## Green Chemistry in Action

In a quiet lab at NIT Patna, researchers wanted to develop a battery material that was powerful, but also eco-friendly and non-toxic. Instead of using harmful chemicals, they chose a natural material to guide the growth of energy-storing crystals.

**What natural material did the researchers use to create these energy-storing crystals?**

A. Banana peel extract
B. Aloe vera gel
C. Coconut oil
D. Neem leaf powder

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.

## August 7: Birth of Dr. M. S. Swaminathan (1925)

01

Celebrated as the Father of the Green Revolution in India, Dr. Swaminathan's pioneering work in agricultural genetics transformed India from a food-deficient country to a self-sufficient one. His legacy continues to inspire sustainable farming and food security innovations across the globe.

## August 12: Birth of Dr. Vikram Sarabhai (1919)

02

Known as the Father of the Indian Space Program, Dr. Sarabhai envisioned space science as a tool for national development. His vision laid the foundation for ISRO and propelled India into the modern era of space exploration.

## August 15: Founding of ISRO (1969)

03

The Indian Space Research Organisation (ISRO) was established on this day, marking a milestone in India's journey into space. From Aryabhata to Chandrayaan-3, ISRO has become a symbol of innovation, resilience, and global respect.

## August 20: Birth of Dr. N. R. Narayana Murthy (1946)

04

Founder of Infosys and a pioneer of India's IT revolution, Dr. Narayana Murthy reshaped the role of technology in India's economy. His vision helped position India as a global hub for software and digital innovation, influencing science, research, and education.

# *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. Animesha Rath

# "Are We Alone in the Universe?"

The universe is vast—home to billions of galaxies, each containing countless stars and planets. With so many worlds out there, it's only natural to wonder: Are we truly alone?

Over the last few decades, astronomers have discovered thousands of exoplanets—planets orbiting stars beyond our solar system. Many of these worlds lie in the so-called 'habitable zone,' where temperatures could allow liquid water to exist. This has sparked excitement, as water is one of the key ingredients for life as we know it.

Among these discoveries, one planet stands out: K2-18b. Orbiting a star about 120 light-years from Earth, it is thought to be an ocean-covered world with a thick hydrogen-rich atmosphere. Recent observations by the James Webb Space Telescope detected chemicals like methane and carbon dioxide in its atmosphere—gases that, on Earth, are often linked to biological activity. Even more intriguing, the telescope found potential traces of dimethyl sulfide (DMS), a compound that on Earth is produced almost exclusively by life, particularly marine microbes. While not definitive proof of life, these findings make K2-18b one of the most compelling places to watch.

But scientists aren't just looking for signs of microbes. Through the Search for Extraterrestrial Intelligence, or SETI, they're listening for signals—radio waves or flashes of light—that might come from intelligent civilizations. Projects like Breakthrough Listen are scanning the skies, targeting millions of stars. So far, the results are silent, but the effort continues.

This silence leads to a puzzling question known as the Fermi Paradox: If intelligent alien life is common, why haven't we found it yet? Some scientists believe that life may be widespread, but intelligent civilizations are rare or short-lived. Others suggest we might not yet have the right tools or that we're simply too early in the cosmic timeline to encounter others.

Despite the mystery, many researchers remain optimistic. A recent global survey of scientists revealed that most believe microbial life is likely to exist elsewhere in the universe. A smaller but still significant number believe intelligent life is out there too—waiting to be discovered.

With new missions planned for the coming years—such as probes to Europa, a moon of Jupiter believed to have a subsurface ocean, and Mars sample-return missions—we may soon get closer to answering this age-old question.

Even if we never find another civilization, the quest to understand our place in the universe drives some of the most exciting exploration of our time. In searching for others, we learn more about ourselves—and the possibilities that lie beyond the stars.

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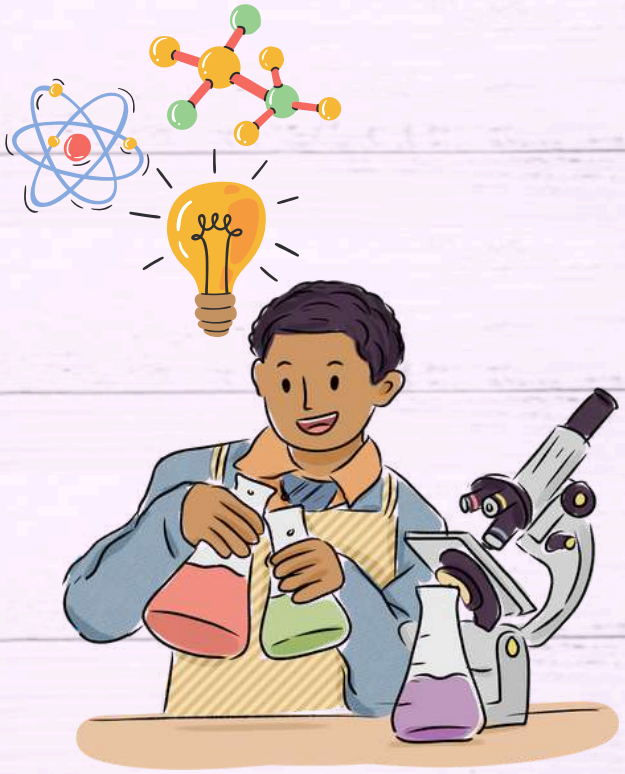

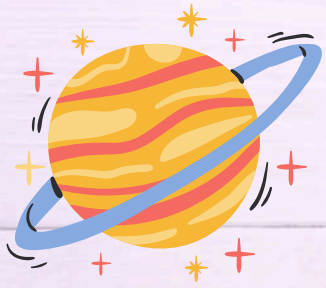

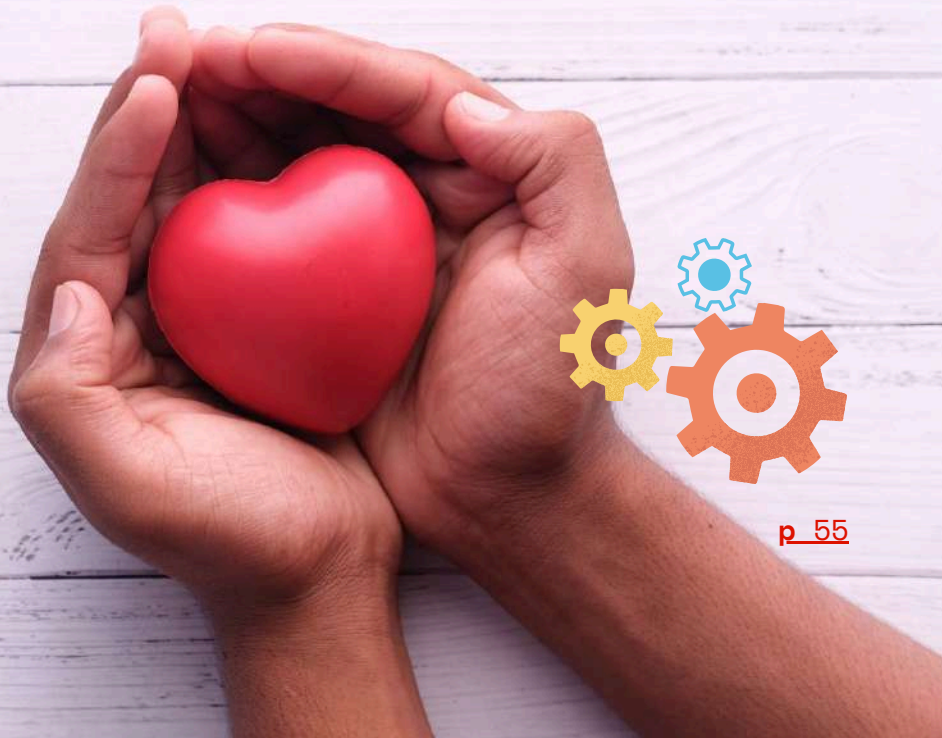

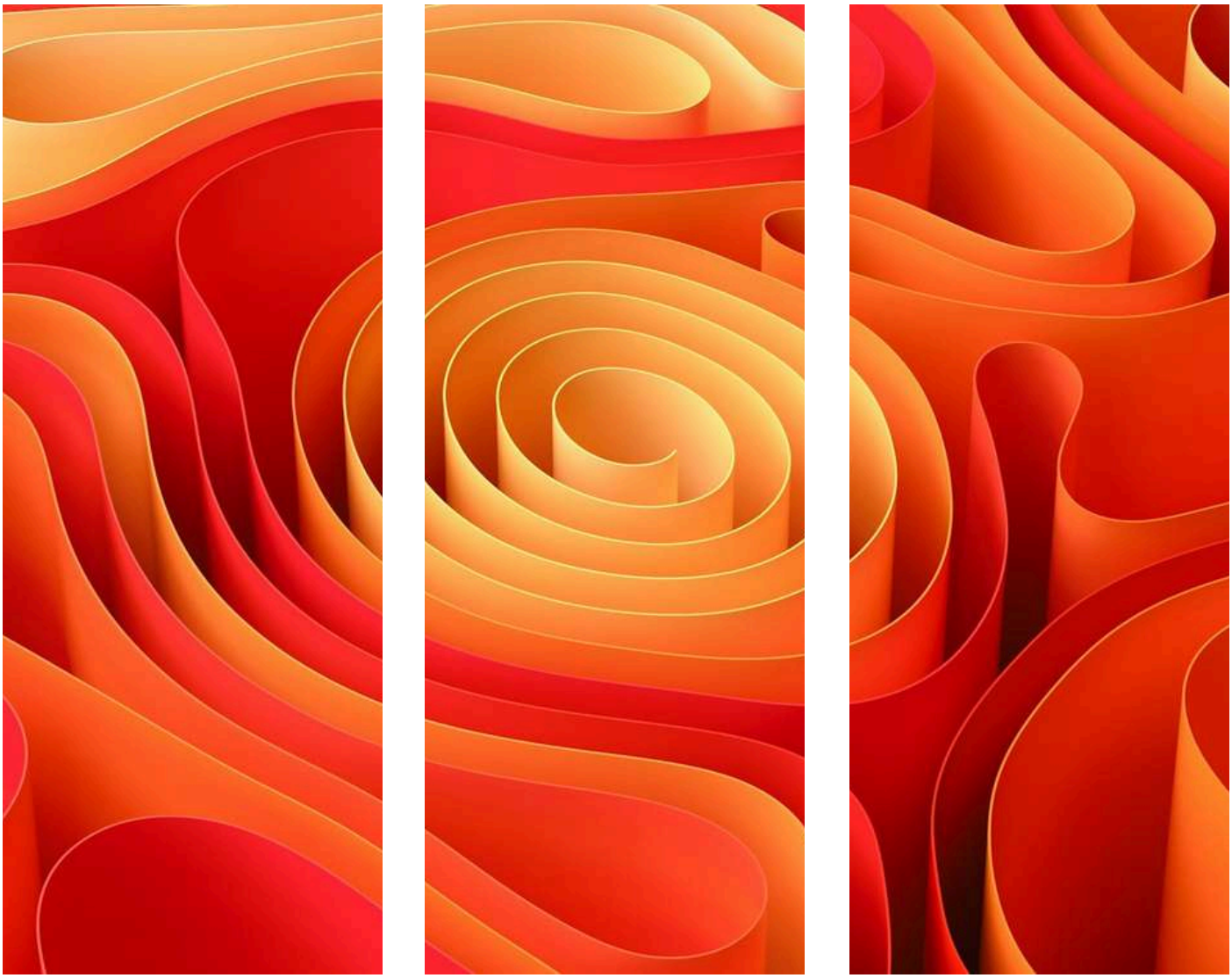

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# SCIENCE FACTORS

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