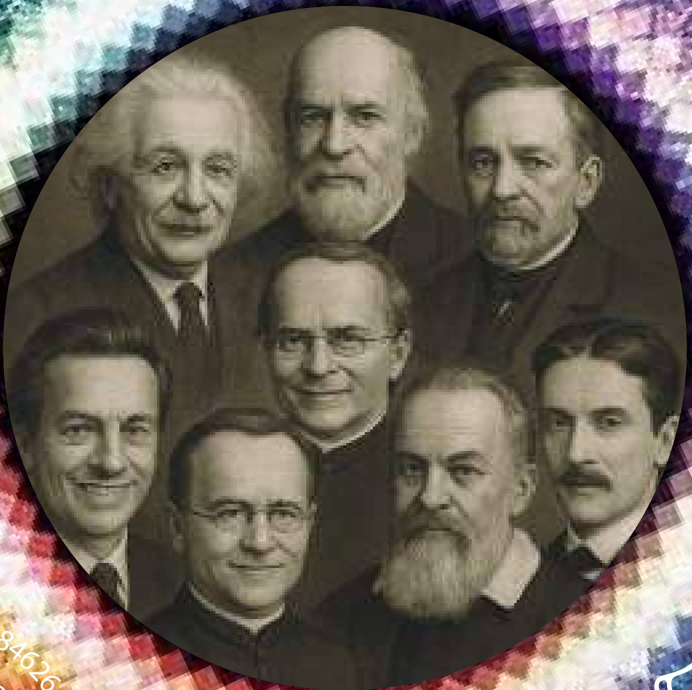
Shree Vasishtha Vidhalaya

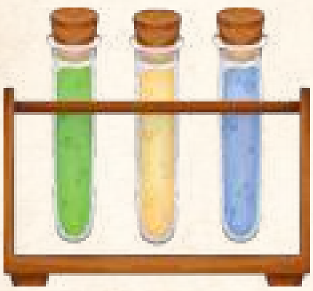
PRESENTS

ODYSSEY 3.0
A Voyage Of Science



SCIENCE

ODYSSEY 3.0!!



VASISHTHA GROUP OF SCHOOL

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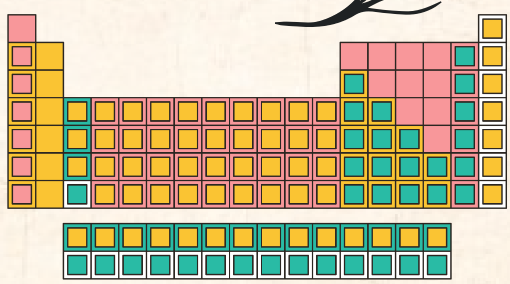
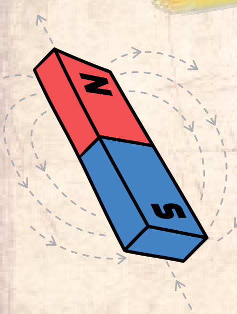
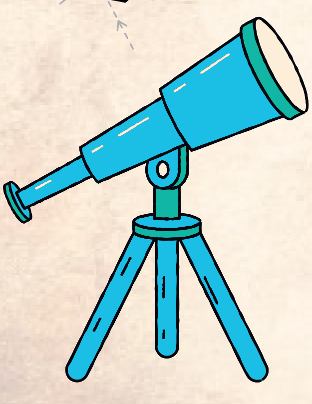


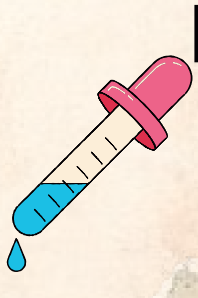


TEAM

VASISHTHA

PRESENTS





FOREWORD BY THE ADVISOR

Dear Readers,

Welcome to the latest edition of our students' science magazine, Odyssey 3.0, a publication that celebrates the boundless enthusiasm, inquisitiveness, and innovation of our talented students. It is with great pride that I introduce this edition, which showcases the remarkable achievements and profound insights of our young scientists.

In an age where scientific discoveries and technological advancements are accelerating at an unprecedented pace, it is imperative that we nurture a spirit of inquiry and foster a deep appreciation for the scientific method. This magazine is a testament to our commitment to these values. Each article, experiment, and project featured here reflects the dedication and passion of our students, as well as the guidance and support of our exceptional faculty members.

This edition covers a diverse array of topics, from the mysteries of quantum physics to the latest developments in environmental science and biotechnology. Our students have not only demonstrated their ability to grasp complex scientific concepts but also their talent for communicating these ideas in an engaging and accessible manner. Their work exemplifies the interdisciplinary approach essential for addressing the multifaceted challenges of the 21st century.

I would like to extend my heartfelt thanks to all the contributors, editors, and mentors who have worked tirelessly to bring this magazine to fruition.

As you delve into these pages, I hope you will be as inspired and enlightened as I have been by the incredible work of our students. Let us continue to support and encourage them as they explore the wonders of the natural world and strive to make a positive impact on our society.

With warm regards,
Dr. A.K. Gaur
B.Sc. (Hons.), M.Sc. (Zoology), B.Ed., PhD, National Awardee 2010
Advisor
Shree Vasishtha Group of Schools

FOREWORD BY THE PRINCIPAL

Dear Students, Faculty, and Esteemed Readers,

It is with immense pleasure and pride that I present to you the latest edition of our school science magazine ODYSSEY 3.0. This publication stands as a testament to the remarkable curiosity, creativity, and intellectual fervour of our students and faculty. As we delve into its pages, we are reminded of the boundless wonders of science and technology that continue to shape our understanding of the world and drive our collective progress.

Promoting a scientific temperament is at the heart of the educational mission of Shree Vasistha Vidyalaya. In today's rapidly evolving world, fostering a mindset of inquiry and critical thinking is more crucial than ever. We aim to encourage our students to ask questions, challenge assumptions, and embrace the thrill of discovery. At SVV, science is not just a subject to be studied but a lens through which we view and interpret the complexities of the universe.

Curiosity and exploration are the twin engines that propel scientific advancement. It is this spirit of inquisitiveness that has led to the creation of ODYSSEY 3.0. In doing so, our students not only expand their horizons but also contribute to the vast tapestry of human knowledge.

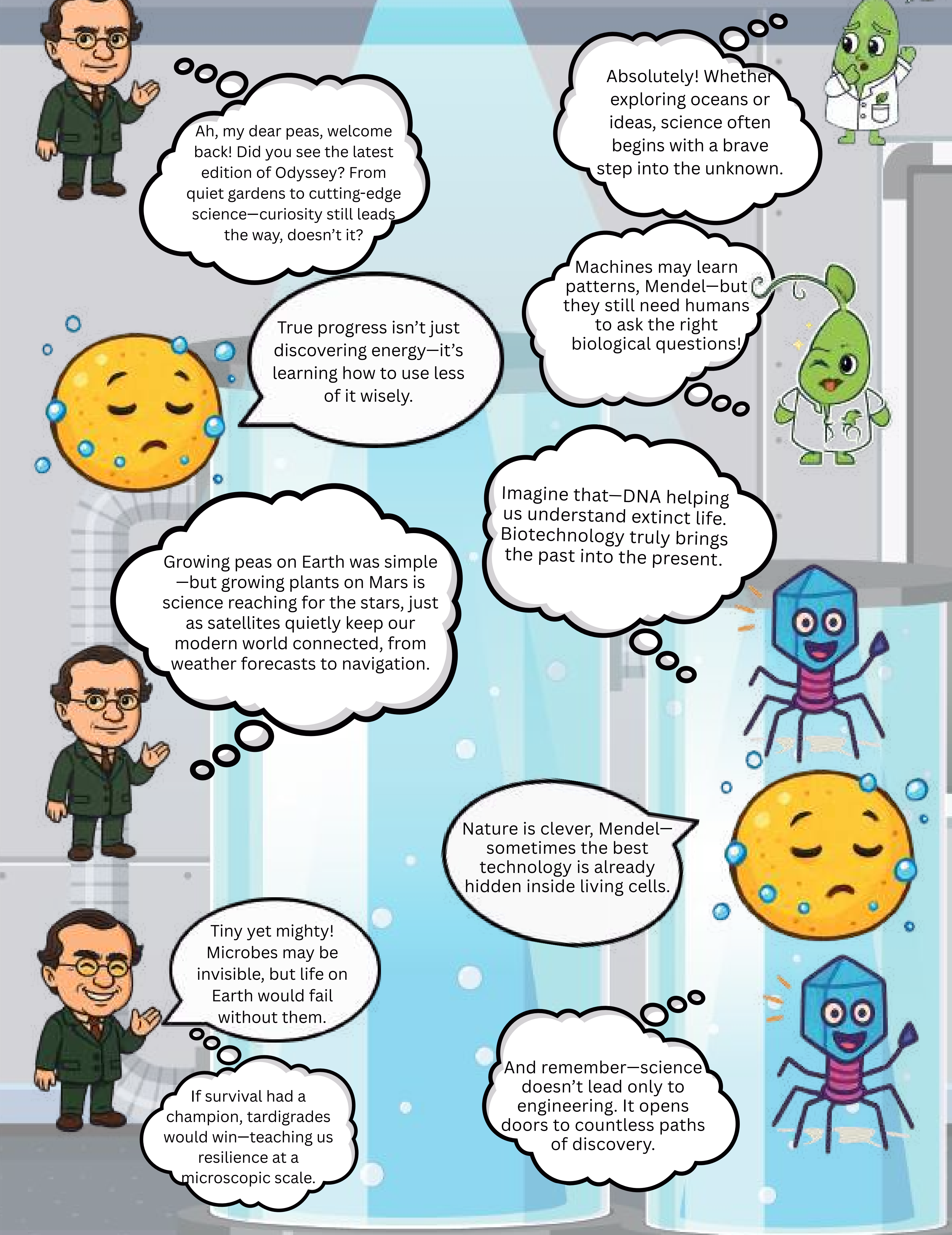
The world of science and technology is indeed marvellous, filled with endless possibilities and exciting frontiers. The future holds even more promise, with advancements in artificial intelligence, renewable energy, biotechnology, and space exploration poised to transform our lives in unimaginable ways.

As you explore this edition of our science magazine, I hope you feel inspired by the passion and dedication of our students and educators. May their work ignite your curiosity and drive to explore the wonders of science. Together, let us embrace the excitement of discovery and the promise of a future shaped by knowledge and innovation.

Happy reading!

Mrs Shubhra Srivastava
M.Sc. in Mathematics (Gold Medalist), B.Ed
Principal

TINY TALES B/W MENDEL & HIS PEAS WHILE THEY EXPLORE ODYSSEY 3.0



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Random Voyages to the Deep Unknown

One of the most basic and unique instincts we humans have is our curiosity - the urge to learn, to discover, to know, to explore, and understand. The world is not enough when it comes to a curious mind, and trust me -your curiosity is all you need to conquer any hurdles you meet on the path of discovering the universe (and beyond).

Let's take a quick walk through the corridors of Science history to see what I mean. Michael Faraday left school at the age of fourteen with only the most basic school education and was self-taught by reading books while working as an assistant to a bookbinder in London. Faraday acquired his genius by reading every book he could get his hands on initially, including The Encyclopædia Britannica, and discovered his fascination with science. In fact, interest in a particular book, Conversations on Chemistry, later paved the way for his astonishing career in electrical Sciences.

Not only Faraday, but most of the history of path-breaking successes in almost every field is the history of self-tutelage, self-belief, and the ability to learn against all odds. There are instances where people read everything they could lay their hands on and carried on with the legacy of the human mind, even in Nazi captivity and Japanese POW camps. Like the Jewish mathematician Jakow Trachtenberg, who developed his system of mental arithmetic during his imprisonment in a Nazi concentration camp, or our very own S. Ramanuja, who fought against abject poverty and proved his mathematical prowess, without any formal education in the subject.

With no schooling and quite rudimentary education, Caroline Herschel grew to become the first (woman) paid scientist, by assisting her astronomer brother (William Herschel) and reading to him as he worked. So the question is, did they have some secret formula for success, or was it some inherent magic in the air they inhaled, which enabled them to do something beyond the ordinary? The answer is NO. What they achieved was simply the by-product of the explorations of their inquisitive minds.

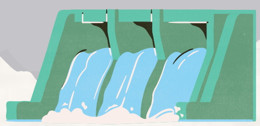
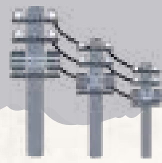
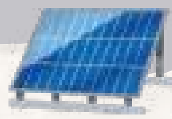
And there is no better friend, philosopher, or guide you may get to help you with this quest than a good book. So read, question, seek, and discover. It is for this joy of knowing the unknown and discovering the undiscovered that people before us have crossed the oceans and have soared across intergalactic space. As the QI researchers put it, this (reading and thinking) simple way of distilling knowledge leaves behind a rich residue of astonishment and delight.

There(in books) nestling among the known and numbered, are the mysteries of the enormous and the minuscule; of human comedy and tragedy; of heat, light, speed, life, art, and thought. So, let us all explore, inquire, and as Star Trek puts it, set out on a mental voyage 'to boldly go where no man has gone before.'

Happy learning

Mrs Shubhra Srivastava
Principal

The Power of Energy Efficiency

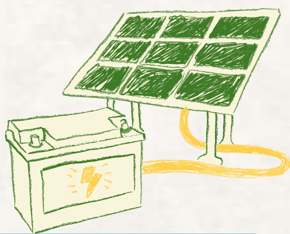





Schools are more than just places of learning—they're like second homes for students. However, they also rank among the largest energy consumers in the country. Beyond education, schools play a crucial role in fostering sustainable practices, and one standout concept in this movement is Energy Efficiency.

What is Energy Efficiency?

Energy efficiency means using less energy to achieve the same level of performance and output. It's about getting more while consuming less. This is a powerful strategy to reduce one of the biggest environmental culprits: the carbon footprint.

But how can schools implement energy efficiency? Let's explore how my school is leading the way in adopting sustainable practices.



1. Solar Cells:

Location: Primary building

Type: polycrystalline

Powering Learning with the Sun: A Bright Idea at Our School as a 'Shift to conventional energy' is the need of the hour.

Electricity is essential for creating the right classroom environment in today's tech-driven schools. At our school, we're leading the charge in energy efficiency by harnessing the power of the sun! We've installed 168 solar panels across our campus, reducing our electricity consumption by an impressive 14-15%. These solar panels work by capturing sunlight and converting it into electricity, providing us with clean, renewable energy. Not only does this help the environment, but it also slashes our energy bills, keeping those payment notices in check. It's a win for both our school and the planet!

Solar Power: A Smart Move for Our School and the Planet

One incredible statistic about our solar panels is that the total amount of energy they generate is enough to power our entire school building! And it doesn't stop there. The electricity we produce can be sold back to the government, allowing our school to earn money in return. How cool is that? Not only does this help the environment, but it's also a win for the school budget!

But here's the catch: As students, it's up to us to take responsibility for the energy we use. By being mindful of how much power we consume, we can help keep our school's energy-efficient system running smoothly and reduce our carbon footprint even more. It's all about smart choices and sustainability—let's make every kilowatt count.

2. Turning AC Water into Green Power: A Cool Solution!

Location: All ACs in every building
Type: Water Conservation
Utilising every drop of water productively

Water is essential for everyone, especially our green plants. In today's modern schools, with ACs keeping us cool, there's an unexpected bonus: air conditioners produce a surprising amount of water every day. While we can't drink it, our plants can sure!

Think of it like this: just as moms say, "Don't waste yesterday's food—make it better," we can apply the same logic here. Why waste water when we can use it to nourish our plants?

At our school, we've taken this idea to heart by planting saplings right under the ACs, so they can drink up the water directly. This simple yet brilliant solution saves water.

(no more over-watering with motors) and reduces electricity by cutting down on the need for pumps.

Plus, it's a win-win: less labour, fresh air, and more oxygen thanks to the thriving plants! This small change adds up to big energy savings and contributes to a greener, more sustainable campus.

3. Air Ventilation

Location: Secondary Building
Type: Mechanical
Why Ventilation beats ACs any Day?

Ventilation is the unsung hero when it comes to improving indoor air quality. It works by bringing in fresh outdoor air to push out pollutants away from the room. And let's face it—many classrooms in some schools don't even have windows that open to the outside world. But here's why a ventilation system is a smarter choice than a traditional AC:

1. **It's Budget-Friendly:** Ventilation systems are way cheaper to install than air conditioners.

2. **Low Maintenance:** They require far less upkeep, making them an easy win for schools looking to reduce costs.

3. **Eco-Friendly & Energy Efficient:** Unlike ACs, ventilation systems operate on the same basic principle as a fan. The exhaust fan pushes out indoor carbon dioxide and draws in fresh air, helping keep the room breathable without using much electricity. Plus, they can run on solar power, making them a green alternative.

So, why not go with ventilation, just like we have at our school? It's better for the planet, lighter on the wallet, and helps create a healthier environment for everyone.

Now, I'll admit, whenever I see lights or fans on in an empty room, I don't hesitate to switch them off. Just like our teachers teach us discipline, I've learned the importance of saving energy—one switch at a time!

Wrapping It Up: Smart Solutions for Energy-Efficient Schools

To wrap up all the awesome ideas we've discussed, here are a few actionable steps schools can take to boost their energy efficiency:

1. **Switch to LED Lights**: Forget old tube lights and bulbs that guzzle energy! LED lights consume far less power and last longer, making them a smart and eco-friendly choice.

2. **Wind Power Innovation:** Why not turn sustainability into a fun challenge? Schools could organise windmill model-making competitions to inspire students and promote the power of clean, renewable wind energy.

3. **Rethink School Transport:** To cut down fuel consumption, why not create common bus stops for students in the same area? This reduces the number of individual vehicles on the road, saving both CNG and petrol, and ensures less fossil fuel depletion.

With these simple yet impactful ideas, we can all work together to make our schools not only places of learning but hubs of sustainability. Let's start today, for a brighter, greener tomorrow!

I would like to end with a beautiful quote: "Sustainability Fuels the Future, and Energy Efficiency Powers a Better Tomorrow!"

Jiya Patel
12th-S3

When AI meets Biology!!!

ज्ञानं हि परमं बलम्।
तस्मात् प्रज्ञामयं यन्त्रं,
करोति कार्यमुत्तमम्।

Knowledge is indeed the supreme strength. Therefore, a machine endowed with wisdom (intelligence) performs excellent work.

? So here is the question: how can we impart knowledge to a machine?

Science and technology enable humans to teach machines how to learn patterns and develop skills such as data interpretation, problem-solving, and reasoning. These abilities allow AI systems to process information from sources like images and sensors. AI is not classified biologically but by capability. Artificial Narrow Intelligence **(Weak AI)** is the only type that currently exists and performs specific tasks like image and speech recognition, language translation, recommendations, self-driving cars, and game-playing AI. Artificial General Intelligence **(Strong AI)** is a theoretical concept where machines would have human-like intelligence across all tasks, while Artificial Superintelligence **(Super AI)** is a hypothetical future stage where AI would exceed human intelligence. AI can also be categorised by functionality, ranging from simple reactive systems to limited-memory systems that learn from past data.

Here, the question that arises is how can we use the machine's intelligence to help the God-gifted human intelligence? To date the AI provides the following tools for this.

1. **Virtual Assistants:** AI-powered assistants like Siri, Alexa, and Google Assistant.
2. **Image Recognition:** AI-powered systems that can recognise objects, faces, and patterns in images.
3. **Natural Language Processing:** AI-powered systems that can understand and generate human language.
4. **Predictive Maintenance:** AI-powered systems that can predict equipment failures and schedule maintenance.
5. **Healthcare:** AI-powered systems that can diagnose diseases, predict patient outcomes, and personalise treatment plans.

AI algorithms are being used to analyse vast amounts of biological data, including genomic sequences, protein structures and medical images, enabling faster and more accurate insights. The intersection of Artificial Intelligence (AI) and Biology is a rapidly growing field, driving innovation in:

1. **Bioinformatics:** Analysing biological data using computational tools.
2. **Computational Biology:** Modelling and simulating biological systems.
3. **Medicine: Personalised** Tailoring treatments using AI-driven genomics analysis.
4. **Synthetic Biology:** Designing novel biological systems with AI assistance.
5. **Biomedical Imaging:** Enhancing image analysis with AI for disease diagnosis.

Artificial Intelligence (AI), particularly Machine Learning (ML) and deep learning, is significantly transforming various aspects of biology, from fundamental research to applied fields like medicine and agriculture.

Here's how AI is impacting biology:

1. Genomics and gene editing-Analysing massive datasets: AI algorithms help process large genomic datasets to identify variations and potential drug targets.

Improving gene-editing tools: AI aids in developing gene-editing technologies like CRISPR by predicting outcomes and optimising guide RNAs.

Predicting gene expression: Deep learning models can predict gene expression from DNA sequences.

Identifying disease markers: Machine learning assists in identifying disease-causing genomic variants.

Understanding evolutionary forces: Deep learning applied to genomic data helps us to understand the forces driving genetic diversity.

2. Drug discovery and development

Accelerated drug discovery: AI transforms drug discovery by improving accuracy and reducing time, evaluating compounds and assessing adverse effects.

Predicting efficacy and toxicity: AI and ML models predict the effectiveness and toxicity of potential drugs.

Identifying drug targets: AI helps find novel drug targets like proteins or genetic pathways involved in diseases.

Drug repurposing: AI assists in finding new uses for existing drugs.

De novo drug design: AI enables the creation of new chemical structures with desired features.

Optimising chemical synthesis: AI's integration into chemical synthesis improves reaction prediction.

Enhancing clinical trials: AI analyses patient data to identify biomarkers and patient characteristics for more efficient trial designs.

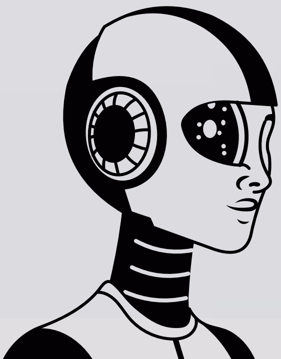
Post-market surveillance: AI analyses data to support drug safety and efficacy.

3. Personalised medicine and precision healthcare

Tailoring treatments: AI uses DNA sequencing and patient records to identify genetic predispositions, predict treatment responses, and provide tailored healthcare.

Precision diagnostics: AI algorithms trained on genomic datasets assist in diagnosing genetic diseases.

Real-time monitoring: AI can monitor patient vital signs and track the effects of drug doses on living tissue.



4. Agricultural biotechnology

Improving crop yields: AI facilitates data-driven agriculture to enhance yields, improve disease resistance, and aid in climate adaptation.

Optimising agricultural practices: AI helps decipher plant genomes to find genes for desired characteristics.

Real-time monitoring: AI-driven drones and sensors gather data on crop health, pests, and soil, providing insights for optimal planting and early disease detection.

Reducing agrochemical dependence: AI is being developed to reduce reliance on agrochemicals

5. Industrial biotechnology

Optimizing biomanufacturing: AI improves the scalability, consistency, and efficiency of biomanufacturing processes.

Real-time monitoring and control: AI systems track variables like temperature, pH, and nutrient levels to optimize yield and quality.

Designing synthetic biological pathways: AI aids in designing synthetic biological pathways by forecasting how changes affect cellular function.

6. Protein structure prediction

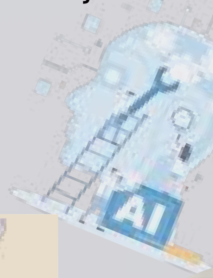
Predicting protein 3D structures: AI models like AlphaFold predict the three-dimensional (3D) structure of proteins from their amino acid sequence.

Accelerating experimental structural biology: AlphaFold's capabilities accelerate experimental structural biology and guide research in protein engineering and drug discovery.

So, AI is increasingly intertwined with biology, revolutionising research and applications. Addressing challenges related to data quality, interpretability, and ethics will accelerate scientific discovery and improve human health. Hence Strong collaboration between biologists and computational scientists is essential for advancing the field of AI for biology.

Developing AI models that are more transparent and interpretable is important for gaining trust and ensuring responsible use of AI in biology. Australian researchers, including those at the Charles Perkins Centre at the University of Sydney, have created a groundbreaking system that uses what they describe as "Biological artificial intelligence " to develop and refine molecules with enhanced or entirely new functions inside mammalian cells. The convergence of AI and biology is transforming scientific discovery, medicine, and biotechnology.

With AI-powered breakthroughs in genomics, neuroscience, drug discovery, and bioengineering, the future of biology is more interconnected with information systems than ever before. While challenges remain, AI-driven platforms have the potential to reshape healthcare, environmental conservation, and life sciences, paving the way for a new era of intelligent biology.



Challenges ?

Despite the potential of AI in biology, challenges include:

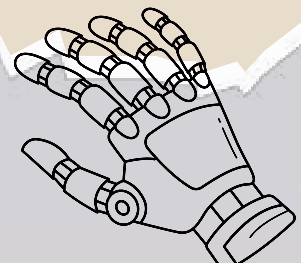
Data Quality and Availability: AI requires high-quality data, which can be scarce or biased in biological and health data.

Interpretability and Explainability: AI models can be "black boxes," making it difficult to understand their decision-making processes, which is crucial for healthcare trust.

Ethical Considerations: AI raises concerns about data privacy, consent, and potential biases in algorithmic decision-making, particularly with genomic and health data.

Regulatory Frameworks: Existing frameworks need to adapt to assess AI-driven biotech products.

Integration with Traditional Methods: Integrating AI with traditional methods and clinical practices requires careful planning.



Miss Saleha Naaz
PGT computer Science

"BRAIN BREAK: CRACK THE PUZZLE... AND IT JUST MIGHT CRACK OPEN A SECRET WITHIN YOU.

1.

Instructions:

- Fill empty cells with 1–6.
- No repeats in any row, column, or box.
- Given numbers cannot be changed.

5		1		4	2
	2	4			1
	1		4	5	
4		5	1		
	4		6	3	
6		3		1	4

		5		2	3
1	3		4		
6		3	2	5	
	5	4	3		
	2			4	1
5			6	3	2

6	4			2	
2		1	4	3	
5	1	2	3		
4			2		5
		4		5	3
	6	5			2

4	5		2	3	
3		6			1
2		5			3
	4			2	5
6		2	5	1	
	1	4	3		

2.

Can you find the words hidden in the puzzle?

E	B	H	E	R	U	P	T	I	O	N	W
A	C	E	F	N	T	S	U	N	A	M	I
R	A	A	P	L	S	U	I	F	E	C	L
T	W	T	D	R	O	U	G	H	T	Y	D
H	F	W	C	R	A	O	D	I	O	W	L
Q	R	A	A	G	I	F	D	C	R	N	I
U	O	V	O	L	C	A	N	O	N	R	F
A	C	E	S	I	A	J	N	G	A	U	E
K	I	L	A	N	D	S	L	I	D	E	F
E	N	S	O	O	T	H	E	F	O	I	I
C	S	N	O	W	S	T	O	R	M	C	R
A	N	T	H	U	R	R	I	C	A	N	E

EARTHQUAKE	TSUNAMI	HEATWAVE	HURRICANE
SNOWSTORM	TORNADO	DROUGHT	VOLCANO
WILDLIFE FIRE	ERUPTION	LANDSLIDE	FLOOD

3.

4.

Question: Which cube weighs more?

A. The cube with large steel balls

B. The cube with small steel balls

C. Or do both cubes weigh the same?

Hint: Does the number or size of the balls really matter when the material and volume are the same?

ANSWERS:

3. 042
4. Both cubes weigh the same

SPACE FARMING: HOW HUMANS WILL GROW FOOD ON MARS

A DREAM THAT STARTS WITH FOOD

When we think about living on Mars, we imagine rockets, robots, spacesuits, and futuristic cities. But before any of this becomes real, humanity must solve a much simpler-looking but extremely challenging problem: What will we eat?

Mars is not Earth. It is a cold, dusty planet with poisonous soil, extremely thin air, and temperatures that can fall below –60°C. Nothing grows naturally there. Yet, human beings are seriously planning to build habitats on Mars. And without a reliable source of food, no human mission can survive for long.

This brings us to a fascinating scientific question: Can we grow food on a planet where nothing grows?

The answer is yes, and the solution lies in a revolutionary idea called space farming — growing plants in specially designed environments, using advanced technology, completely without Earth-like soil.

Space farming is not just a scientific experiment; it is the foundation for the future of human life beyond Earth.

WHY TRADITIONAL FARMING IS IMPOSSIBLE ON MARS

Although the reddish Martian surface looks like desert soil, it's nothing like the fertile soil we use on Earth. Scientists have found several major problems:

1. Martian soil has no nutrients

Earth's soil is full of bacteria, minerals, and organic matter that support plant life. But Mars has none of these. The soil is dry and lifeless.

2. Toxic chemicals

Mars soil contains perchlorates, dangerous chemicals that are harmful to humans and deadly for plants. They must be removed or avoided entirely.

3. Extreme cold

Mars is extremely cold. Even hardy plants cannot survive in –60°C temperatures.

4. Thin atmosphere
Mars' atmosphere is 95% carbon dioxide, but with extremely low pressure. Plants cannot breathe or exchange gases properly.

5. Weak sunlight
Mars receives only half the sunlight Earth gets. Dust storms can block the sun for weeks.

Because of all these challenges, farming on Mars cannot depend on soil, sunlight, rain, or natural weather.
We must build artificial environments for plants.

SOIL-FREE FARMING: THE FUTURE OF SPACE AGRICULTURE

Plants don't actually "need" soil. What they need are:
Water
Minerals
Carbon dioxide
Light
A stable environment

So if humans can provide these conditions artificially, farming becomes possible anywhere — even millions of kilometres away from Earth.

Three major technologies will make Martian farming possible:

TECHNOLOGY THAT MAKES SPACE FARMING POSSIBLE

Farming in space is not just about giving plants water and light. It requires a complete ecosystem designed and controlled by technology.

1. Climate-Controlled Habitats

Mars is too cold for plants, so they will grow inside sealed rooms where:
Temperature is kept around 20–25°C
Humidity stays stable
Pressure is Earth-like
Carbon dioxide levels are adjusted carefully

These habitats are basically "mini Earths" built inside domes or underground structures.

2. Closed-Loop Life Support Systems

Every resource in space must be reused because resupply from Earth is expensive.

A closed-loop system works like this:
Astronauts exhale CO_2 → plants use it to make oxygen
Plants release oxygen → astronauts breathe it
Water is purified, recycled, and reused
Plant waste becomes compost
Minerals are collected and reintroduced

It's a perfect cycle that keeps both humans and plants alive.

3. Microgravity Research

Growing plants in space is tricky because microgravity changes how roots sense direction. But experiments on the ISS show that:

Plants use light to guide upward growth
Hormones help roots grow downward
Water and nutrients are spread evenly with proper systems

This research helps design better Mars farming chambers.

WHAT CROPS WILL BE GROWN FIRST ON MARS?

Scientists choose crops that:
Grow quickly
Need a little water
They are rich in nutrition
Provide vitamins, fibre, and calories
Can grow in small spaces

Likely first Martian crops:

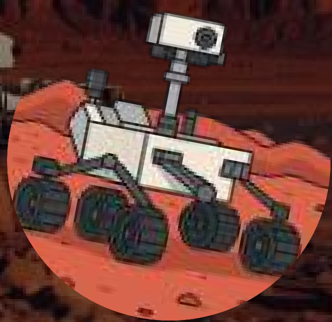
Lettuce — grows quickly
Beans — high in protein
Tomatoes — rich in vitamins
Potatoes — high calories, very reliable
Spinach — iron-rich
Wheat — a basic carbohydrate
Microgreens — nutrient-packed

Potatoes are essential. NASA tested them in Mars-like soil and successfully grew them under controlled conditions.

WHY IS HYDROPONICS PERFECT FOR MARS?

No need to carry heavy soil from Earth
Uses nearly 90% less water
Plants grow 25–30% faster
No pests or insects
Controlled environment = healthy plants

NASA has already grown lettuce, radishes, and chillies on the International Space Station using hydroponics. These experiments prove that plants can grow in space-like conditions.



Dritya Jogani
11th-S2

FROM FOSSIL TO FLESH:

BIOTECHNOLOGY RESURRECTS THE EXTINCT DIRE WOLVES

Lost long ago in the frozen pages of prehistoric extinction, the Dire wolf makes a breathtaking comeback – not by Fantasy or Cinema but by precise Biotechnological procedures. This flabbergasting breakthrough is a testament to the advancement of technology in the Scientific realm.

Dire Wolves Aenocyon Dirus) used to roam the modern day North and South America about 12,500 years back . They had spread their expanse from Mount Denali of Alaska to the Tulum Coast-line of Mexico and from Angel falls of Venezuela to the Uyuni salt desert of Bolivia . The Dire wolves were scarcely acknowledged. It was in 2011 that the Dire wolves received limelight when a Drama series named 'Game of Thrones' introduced six Dire wolf characters named: Lady, Grey-Wind, Ghost, Nymeria, Shaggydog, and Summer.

These White Wolves had a life span of 15-20 years. They were large, robust and much stronger than other wolves of the present-day Canine family. They had thicker and muscular legs along with a pair of Stealthy shoulders. Their head was broader and accommodated a vigorous Jaw that could effortlessly clamp down the prey with a bite force of nearly 1500 Psi (Pound-force per square inch). They were about 3½ feet tall and 6 feet long. They weighed around 68.03 kg/150 pounds. They used to hunt the Megafauna like bison, Mammoths, wild horses and Ground sloths.

They had Survival skills which enabled them to endure in harsh circumstances to an extent. However, they couldn't stand against the challenges that came with the end of the Ice Age. Rapid global warming led to a tragic shift in the worldwide ecosystems. Dire wolves couldn't stand the new environment. They also suffered a humongous loss of prey as the Megafauna that they hunted had also been affected by the transitioning climate. They faced Starvation to a great extent. Their packs had also failed to efficiently reproduce and rebuild their population. With progressing time, they became even more vulnerable, and their population was gradually wiped out. Great scientists like George Church, Beth Shapiro and Eriona Hysolli made the daunting task of their comeback possible!! Here is how......

The primary step was the extraction of the Ancient D.N.A. from available fossils. Scientists extracted the genetic information from a 13,000-year-old tooth and a 72,000-year-old skull.

After this, the extracted genotypic information was assembled like a big puzzle to portray a morphologically and meaningfully accurate Dire wolf. Then, all the present-day wolves of the Canine family were searched for familiar traits. It turned out that Gray wolves and domestic dogs showed unique genetic traits that matched the initial genetic traits that were decoded previously.

Furthermore, the exact genotypic fragments that gave unique characteristics to the Dire wolf were mapped on the Gray wolf's DNA to get a modified DNA template that could accurately resemble Dire wolves.

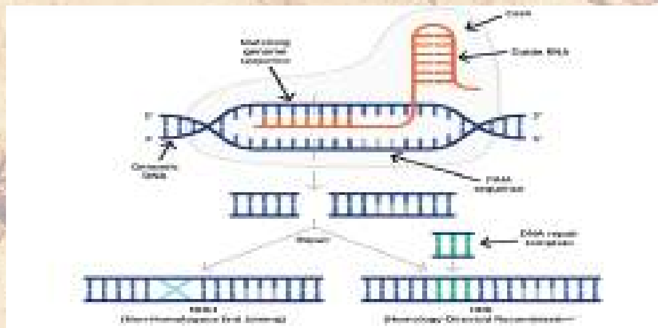
Some specific features like Fur and Skin shade, broad and strengthened jaw, muscular and wide back limbs were taken into consideration in the previous process.

Later, using CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) technology, specifically targeted genes were edited in their respective genome. 20 major and 3 minor changes were made to make a final D.N.A. model.

This genetic material was then inserted into a wolf's egg cell, which had its original D.N.A. removed. This resulted in the formation of a cloned Embryo of the Dire wolf.

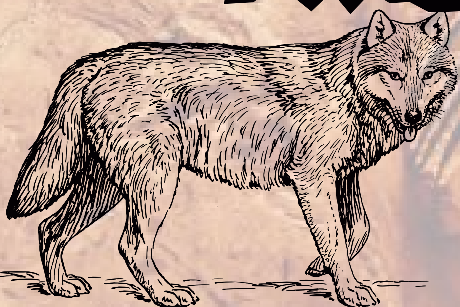
The Embryo was initially grown in culture. After early development (in about 1 week and 3 days), the Embryos were transplanted into a Surrogate Domestic Dog's Uterus. After a gestation period of 2 months, 3 healthy and hearty Dire wolf pups were born on 1st October in 2024. The Pups were named Remus, Romulus (males) and Khaleesi (female).

And that was how the closest clones of Dire wolves came into being.



The CRISPR gene editing technique

Kalp Trivedi
11th-S2

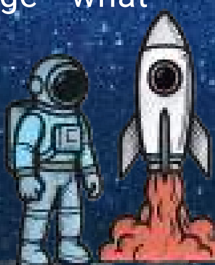


SATELLITES IN OUR LIVES: UNDERSTANDING THE GLOBAL OBSERVING SYSTEM

"THE SCIENCE OF TODAY IS THE TECHNOLOGY OF TOMORROW."
— EDWARD TELLER

Dreaming in orbits and writing in waves
-Parikshit

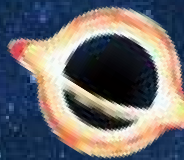
In today's world, it's hard to imagine life without the services that satellites provide. From checking the weather to navigating across cities or tracking an approaching cyclone, satellites silently support our daily routines. The image titled "Global Observing System" perfectly captures how various satellite types and ground systems work together to monitor and manage what happens on our planet.



This system is not just about satellites in the sky; it's a vast network that involves aeroplanes, ships, buoys, radar, weather balloons, and ground stations—all communicating with one another. These elements form what is called the Global Observing System (GOS). Let's understand what this system does and why it matters so much to all of us.

1. What Is the Global Observing System?

The Global Observing System (GOS) is an international setup managed and coordinated by the World Meteorological Organisation (WMO). It collects and shares real-time data from land, sea, air, and space to help predict weather, monitor the environment, and warn against natural disasters.



The GOS includes:

- Satellites (polar and geostationary)
- Weather radars
- Aircraft and ships
- Weather balloons (upper-air stations)
- Surface-based weather stations
- Ocean data buoys
- Satellite ground stations

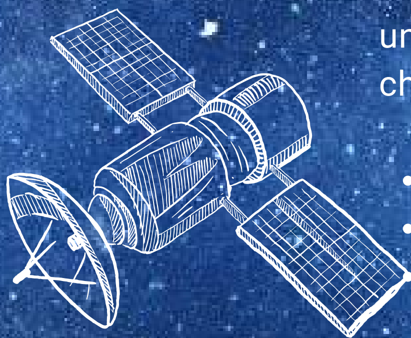
Each of these play a special role in watching over the Earth. They act as our planet's "senses", constantly measuring temperature, humidity, wind speed, cloud patterns, ocean conditions, and even pollution levels.

2. Why Is It So Important?

We may not see them, but satellites and their support systems affect many aspects of our lives:

A. Weather Forecasting

Thanks to the GOS, meteorologists can now forecast weather of the days and even weeks in advance. The satellite data helps track:



- Rainfall patterns
- Storm development
- Wind directions
- Cloud formations

This not only helps us plan daily activities but also assists farmers, fishermen, and airlines.

B. Disaster Management

The most critical role of the GOS is during emergencies. For example:

- Cyclones are tracked using satellite images.

- Earthquakes and floods are monitored with ground sensors and ocean buoys.
- Wildfires are detected with thermal imaging from space.

Early warning systems save thousands of lives each year, and most of that data comes from the Global Observing System.

C. Climate Monitoring

By gathering long-term environmental data, satellites help scientists understand how our climate is changing. This includes:

- Tracking ice melting in the Arctic
- Monitoring sea levels
- Measuring atmospheric greenhouse gases
- Without satellites and the GOS, we would have no way of knowing how fast the Earth is warming or what action is needed.

3. A Unified Global Effort

- How does each country contribute to the GOS using its technology? For example:

- India's INSAT series and ISRO's satellites provide weather data and communication for South Asia.
- USA's NOAA satellites deliver advanced imaging for hurricane tracking.
- European satellites (EUMETSAT) help monitor environmental changes and weather.
- All of this data is shared globally, ensuring that even a small country without its own satellite program can still receive weather alerts and information—free of cost. This global unity in science is what makes the GOS one of the greatest cooperative achievements in modern history.

"Satellites may be out of sight, but they are never out of service—they are the silent guardians of Earth"

- Satellites fly so fast they can revolve Earth in just 90 minutes.
- Your phone finds your location using signals sent from space.
- Earth has a digital copy built from satellite data, updated every day.
- Astronauts aboard the International Space Station see 16 sunrises daily.
- Even dead satellites keep orbiting, creating space junk around Earth.

Satellites don't just orbit - they observe, connect, and protect.
From predicting monsoons to mapping forests, they're the quiet architects of modern life.
As we look up, they look down - seeing the Earth as one.
"In the age of data, the sky is no longer the limit - it's the library."

Parikshit Gondaliya
11th-S2

Is 3I/ATLAS a Comet or Alien Technology?

Space discoveries often begin quietly, with a small moving dot on a telescope screen, but sometimes they grow into something much bigger, sparking curiosity, debate, and even theories about extraterrestrial life. One such case is 3I/ATLAS, an interstellar object detected by NASA's ATLAS survey. From its first observation to wild speculation about alien spacecraft, 3I/ATLAS became more than just a scientific discovery; it became a cultural moment.

1. The First Observation of 3I/ATLAS

The first observation of 3I/ATLAS was made through the Asteroid Terrestrial-impact Last Alert System (ATLAS)—a NASA-funded sky survey designed to track near-Earth objects—on 1 July 2025. ATLAS constantly scans the sky for fast-moving bodies, and during one such scan, astronomers noticed an object behaving very differently from typical asteroids or comets arriving from the direction of the constellation Sagittarius. It was located about 420 million miles (670 million kilometres) away.

What immediately caught attention was its unusual speed and trajectory, far higher than the previous interstellar visitors, 'Oumuamua and 2I/Borisov. This high eccentricity confirms its extrasolar origin and exceptionally high velocity. When scientists calculated its orbit, they found that it followed a hyperbolic path, meaning it was not gravitationally bound to the Sun. It has exhibited a suite of extraordinary characteristics following its closest approach to the Sun (perihelion). This was a major red flag that the object did not originate within our solar system.

2. Why It Felt Alien—or Like an Alien Spaceship

Soon after the initial observations, speculation began to spread, especially online. Many people compared 3I/ATLAS to 'Oumuamua, which famously triggered debates about whether it could be artificial in origin. Similarly, 3I/ATLAS displayed behaviour that seemed unusual to the public.

Its high velocity, unfamiliar origin, and sudden appearance made it feel "alien" in the literal sense—coming from another star system. Some early observations also suggested irregular brightness changes, which led to imaginative theories. On social media, people speculated that it could be an alien probe, a spacecraft, or advanced technology sent intentionally through our solar system.

Unprecedented Orbital Dynamics and Acceleration:

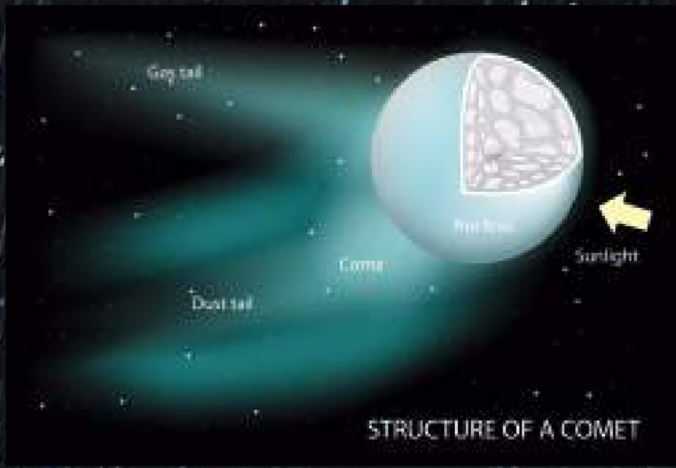
3I/ATLAS is travelling through our solar system at a staggering 130,000 miles (209,000 kilometres) per hour, the highest velocity ever recorded for a solar system visitor. It was moving so fast that it could circle our Earth 5 times in 1 minute. The object was moving at approximately 58 km/s relative to the Sun when it entered the system, and sped up to a maximum of 68 km/s at perihelion (October 29th). This sudden, breathtaking sprint near the perihelion is evidence that the comet has been drifting through interstellar space for many billions of years. The longer 3I/ATLAS was out in space, the higher its speed grew. Near perihelion, 3I/Atlas displayed an exceptionally high level of Non-Gravitational Acceleration(NGA), an acceleration not caused by gravity alone.

Atypical Composition: Spectroscopic analysis detected unusual abundances of carbon-based compounds:
High Methanol and Hydrogen Cyanide: 3I/Atlas is emitting substantial amounts of methanol and hydrogen cyanide, far exceeding the trace amounts found in typical Solar System comets. Methanol accounted for about 8% of all vapor escaping the comet, compared to a mere ≈2% in local comets.

3I/ATLAS displayed an extreme carbon dioxide burst that nearly erased its water signature — a phenomenon almost never seen in nearby comets. It also produced a massive, sun-facing Anti-Tail stretching about 0.95 million km, making it one of the most visually striking features observed.
This intense activity indicates a large and durable nucleus, capable of shedding multi-million-kilometre plumes without breaking apart. While early size estimates ranged from 440 m to 5.6 km, the evidence points toward a much larger body, likely around ~10 km across.

Carbon Dioxide Burst: The comet exhibited such an extreme burst of carbon dioxide that it nearly erased the spectroscopic signature of water, a characteristic rarely, if ever, seen in comets within our cosmic neighbourhood.
Anti-Tail Formation: One of the most striking features was the development of a massive, sun-facing plume known as an Anti-Tail, measured at 0.95 million kilometres (590,000 miles) in length.

3. What 3I/ATLAS Actually is?
As more data were collected, scientists were able to better understand the true nature of 3I/ATLAS. Spectroscopic analysis suggested that the object was natural, not artificial, and not alien. If it were an artificial spacecraft, the spectrum would likely have shown materials like reflective metals or a composition inconsistent with known natural astronomical objects.

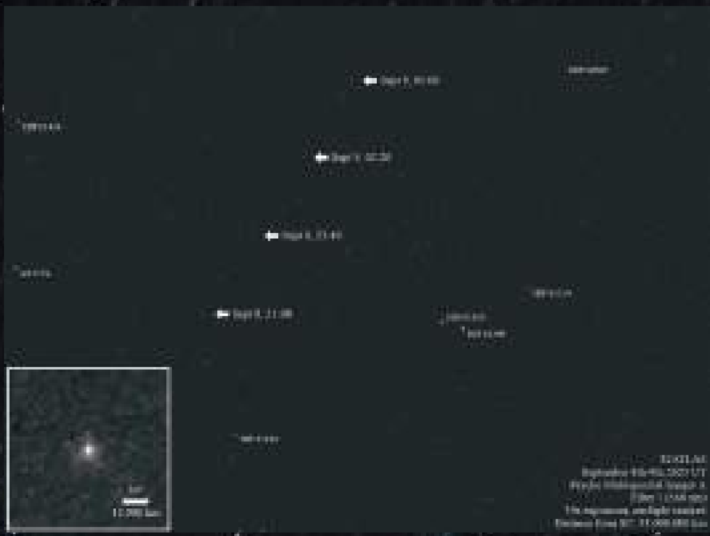


This confirmed that 3I/ATLAS was most likely an interstellar comet, composed of ice, dust, and rocky material formed around another star billions of years ago. As it approached the Sun, heat caused volatile substances to evaporate, creating the observed glow. Rather than being evidence of alien technology, 3I/ATLAS became valuable for a different reason: Since the object was formed around another star, it serves as a physical sample of another star system's building blocks. This material is a frozen record of the conditions and chemistry present in the protoplanetary disk of its home star. Studying its composition allowed scientists to compare extrasolar material with objects from our own solar system. It diversified the study on the question: Is planet formation universal? Do all star systems form planets and smaller bodies from the same basic recipe of materials, or does the chemical mixture vary significantly across the galaxy? In short, while 3i/Atlas felt alien, it was alien only in origin, not in intention.

Conclusion

31/ATLAS began as a faint observation on a telescope screen and quickly became a symbol of how science, speculation, and human curiosity intersect. From its first detection by NASA's ATLAS system to theories of alien spacecraft, it captured both scientific and public attention.

In reality, 31/ATLAS was a natural interstellar object, not an alien spaceship. It provided rare insight into material formed around another star and reminded us that our solar system is not isolated. While the search for extraterrestrial life continues, discoveries like 31/ATLAS show that the universe is far more dynamic and interconnected than we once believed. 31/Atlas is currently the subject of an unprecedented, system-wide observation campaign, with over 20 spacecraft and ground-based telescopes—including Hubble, James Webb, and the Mars Reconnaissance Orbiter—collecting data.



DID YOU KNOW?

It's a cosmic traveller: 31/ATLAS has spent who knows how long drifting between stars systems before we ever spotted it.

Speed record: It zoomed through our system very fast — much too fast to be trapped in orbit, confirming its interstellar origin.

Rich in exotic stuff: Observations suggest it has abundant carbon dioxide and other ices, perhaps formed in a very different stellar environment than ours

Dia Patel
11th-S2

Mrs Vipul Goswami
PGT-Physics

MICROBES:

THE INVISIBLE POWERHOUSES OF LIFE

When we think of the living world, we often picture plants, animals, or even insects. Yet the most abundant and influential life forms on Earth are too small to be seen with the naked eye. These microscopic organisms-collectively known as microbes-are the unseen architects of life. From the depths of the oceans to the human guts, microbes are everywhere, shaping ecosystems, influencing health, and driving evolution.

What Are Microbes?

Microbes, or microorganisms, are tiny life forms that include bacteria, viruses, fungi, protozoa, and archaea. Though they vary in structure and function, what unites them is their microscopic size. A single drop of seawater can contain more than a million microbial cells, and a teaspoon of soil might hold billions.

These organisms are extraordinarily diverse.

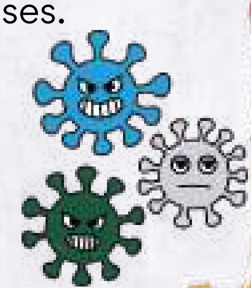
Bacteria and archaea are single-celled prokaryotes, lacking a nucleus, while fungi and protozoa are often eukaryotic, with complex cell structures. Viruses, on the other hand, are not considered fully alive by many scientists, as they cannot reproduce without a host cell.

Microbes: The Invisible Powerhouses of Life

Microbiome refers to the trillions of microorganisms living in and on us, particularly in the gut. These microbial communities are essential for digestion, producing vitamins, training the immune system, and protecting against harmful invaders.

Emerging research suggests that the microbiome also influences our mood, metabolism, and even behavior.

Disruptions to the microbiome are caused by antibiotics, poor diet, or illness which have been linked to conditions such as obesity, diabetes, depression, and autoimmune diseases.



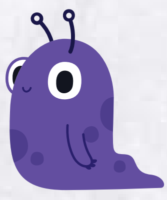
Microbes in the Environment

In the environment, microbes are vital to nutrient cycling. Decomposer microbes break down dead plants and animals, returning essential elements like nitrogen and carbon to the soil and atmosphere. Phytoplankton,microscopic photosynthetic organisms, produce at least half of the Earth's oxygen and form the base of aquatic food chains.

Soil microbes form symbiotic relationships with plant roots, helping them absorb nutrients and protect against pathogens. Without microbes, agriculture would be far less productive, and ecosystems would collapse.

Industrial and Medical Uses

Microbes are widely used in both industrial and medical fields due to their ability to carry out important biological processes. In industries, microbes are used in the food industry for the production of curd, cheese, bread, wine, and beer through fermentation. They help in the manufacture of organic acids, enzymes, antibiotics, and biofuels like biogas and ethanol. Microbes also play a major role in waste management by decomposing organic waste and treating sewage, and in agriculture as biofertilizers and biopesticides to improve soil fertility and crop yield. In the medical field, microbes are used to produce antibiotics, vaccines, insulin, and other therapeutic substances. They are also used as probiotics to improve digestion and gut health, in diagnostic tests, and in biotechnology and genetic research. Thus, microbes are essential tools in modern industry and medicine.



The Invisible Powerhouses of Life engineered bacteria now produce insulin and other life-saving drugs. Biotechnology has opened even more doors. Microbes are used to produce biodegradable plastics, clean up oil spills through bioremediation, and even generate renewable energy in the form of biofuels. Synthetic biology allows scientists to design microbial genomes with custom functions, such as detecting toxins or producing vaccines.

The Dark Side of Microbes

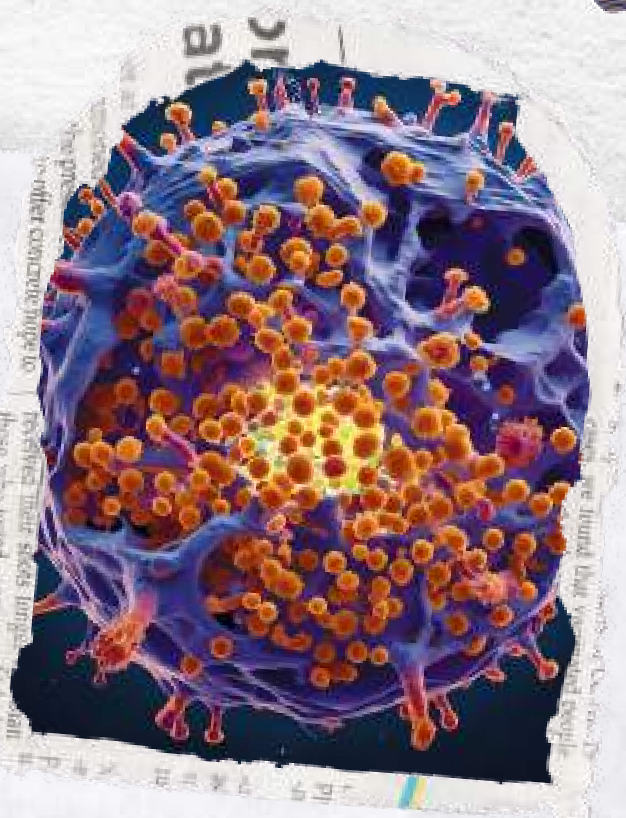
Microbiologists enjoy things of course, but not all microbes are beneficial. Pathogens-disease-causing microbes-have shaped human history through pandemics like the Black Death, smallpox, and most recently, COVID-19. Viruses, bacteria, and protozoa can all be deadly, especially when they spread rapidly or evolve resistance to treatments.

This dual nature of microbes

-as both saviours and threats-drives global efforts to understand and manage them. Vaccines, antibiotics, and public health measures are our primary tools for combatting infectious diseases, while microbiome research is offering new strategies for maintaining health.

The Frontier of Microbial Science

The frontier of microbial science explores advanced research on microbes in genetics, synthetic biology, and microbiomes. Scientists use microbes to develop new medicines, biofuels, biodegradable materials, and environmental solutions. These discoveries are transforming healthcare, industry, and sustainability, making microbes a key to future scientific innovation.



Conclusion

Microbes are the foundation of life on Earth. They are invisible, yet their impact is immense in shaping ecosystems, advancing medicine, and sustaining our very existence. As we continue to explore their diversity and potential, one thing is clear: understanding microbes is not just a scientific endeavour; it is essential for the future of our planet.

MICROBIAL SUPERPOWERS

- SOME MICROBES CAN SURVIVE IN EXTREME ENVIRONMENTS, LIKE HIGH TEMPERATURES, RADIATION, OR TOXIC CHEMICALS.
- CERTAIN MICROBES CAN PRODUCE ELECTRICITY, CLEAN UP POLLUTION, OR EVEN HELP US DIGEST FOOD.
- MICROBES ARE INCREDIBLY DIVERSE, WITH ESTIMATES SUGGESTING THERE MAY BE TRILLIONS OF MICROBES
- MICROBES PLAY A CRUCIAL ROLE IN OUR GUT HEALTH, HELPING US DIGEST FOOD AND ABSORB NUTRIENTS.
- MICROBES ARE USED IN FOOD PRODUCTION, LIKE YOGURT, CHEESE, AND BREAD.
- MICROBES CAN EVEN INFLUENCE OUR MOOD AND BEHAVIOUR, WITH SOME RESEARCH SUGGESTING A LINK BETWEEN GUT MICROBES AND MENTAL HEALTH.
- MICROBES ARE ANCIENT, WITH EVIDENCE OF MICROBIAL LIFE DATING BACK TO BILLIONS OF YEARS.

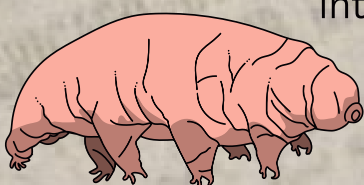
Purva Patel
12th-S2

Tardigrades The Future of Science

Tardigrades, also known as water bears or moss piglets, are some of the most fascinating creatures on Earth. Despite being only 0.5 mm long, these micro-animals have superpowers:

- They can survive temperatures from just above absolute zero to over 150°C.
- They endure lethal doses of radiation, complete dehydration, and even the vacuum of space.
- They survive for decades in a suspended state called cryptobiosis, where they lose all water and stop metabolic activity—essentially hitting pause on life. But what's really mind-blowing is that these tiny creatures might also help unlock the mysteries of the quantum world.

The Quantum Tardigrade: Science collaboration with Sci-Fi- In a 2021 experiment, a team of researchers, including Dr Rainer Dumke and his colleagues at Nanyang Technological University in Singapore, did the unthinkable. They placed a tardigrade between two superconducting quantum qubits at a temperature close to absolute zero. This setup is used to observe quantum entanglement—one of the strangest phenomena in physics. The tardigrade didn't just survive the ultra-low temperatures—it became a part of the quantum system, possibly entering into a quantum entangled state with the qubits. This made the tardigrade the first known living organism to be involved in a quantum physics experiment, opening doors to research into how life can interact with the quantum world.



So... What's the Big Deal? • This discovery could revolutionize how we understand life at a subatomic level. • It might lead to biological quantum sensors, long-distance quantum communication, and new quantum computing technologies. • The research also hints at the possibility of preserving life for long-term space travel using cryptobiosis, just like tardigrades.

About the Scientist: Dr. Rainer Dumke is a German physicist working in the field of experimental quantum physics. His team focuses on the interface between quantum systems and biology—a bold and futuristic area of study. In the famous 2021 study, Dr. Dumke and his team used Circuit Quantum Electrodynamics (CQED) to observe the interactions between a tardigrade and a quantum device. They reported that the tardigrade might have coupled with the qubit system, hinting at biological compatibility with quantum machines. Dr. Dumke's work is considered pioneering, as it bridges the gap between life sciences and quantum mechanics—two fields that were once thought to be completely separate.

Why It's Important for the Future?

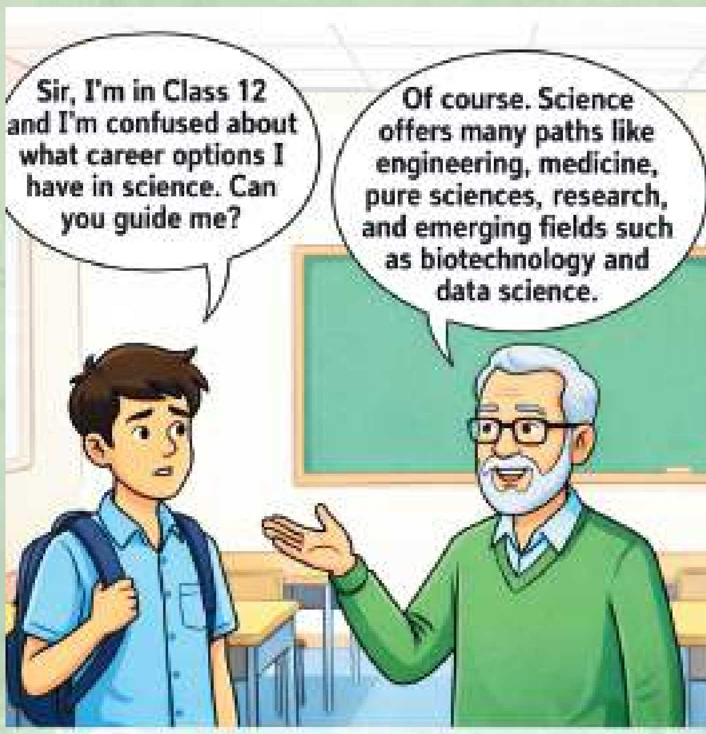
- **Quantum biology**—a field that could explain mysteries like animal navigation and human consciousness.
- **Cryo-hibernation for space travel**—tardigrades could help us learn how to preserve astronauts for long journeys.
- **DNA protection and biotechnology**-tardigrade proteins might be used to protect cells from radiation and ageing.

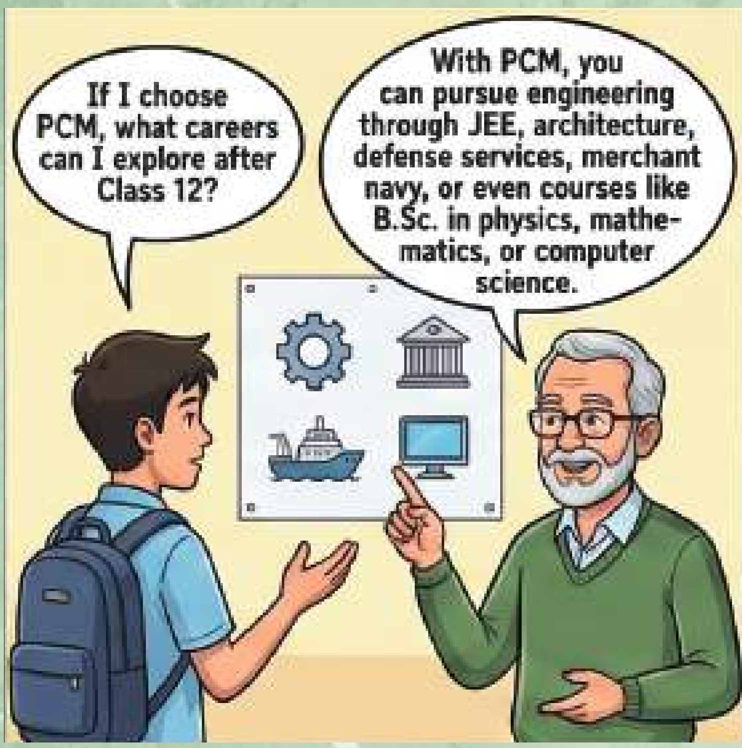
Conclusion

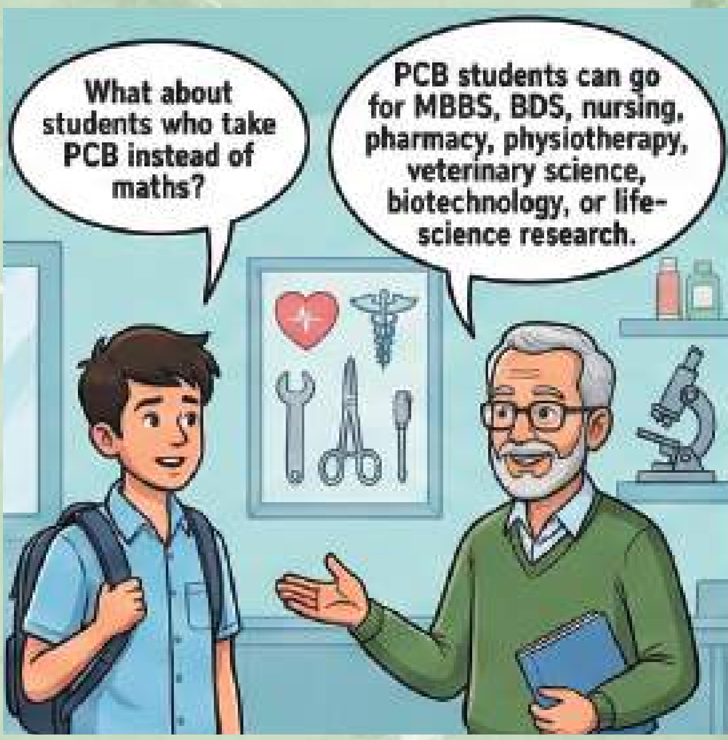
Tardigrades might be tiny, but their potential is larger than life. From surviving cosmic chaos to possibly becoming quantum beings, these creatures are a testament to nature's brilliance. And thanks to scientists like Dr Rainer Dumke, we are now beginning to understand just how deep their power goes. As we venture deeper into space and quantum science, one thing's for sure: tardigrades are coming with us.

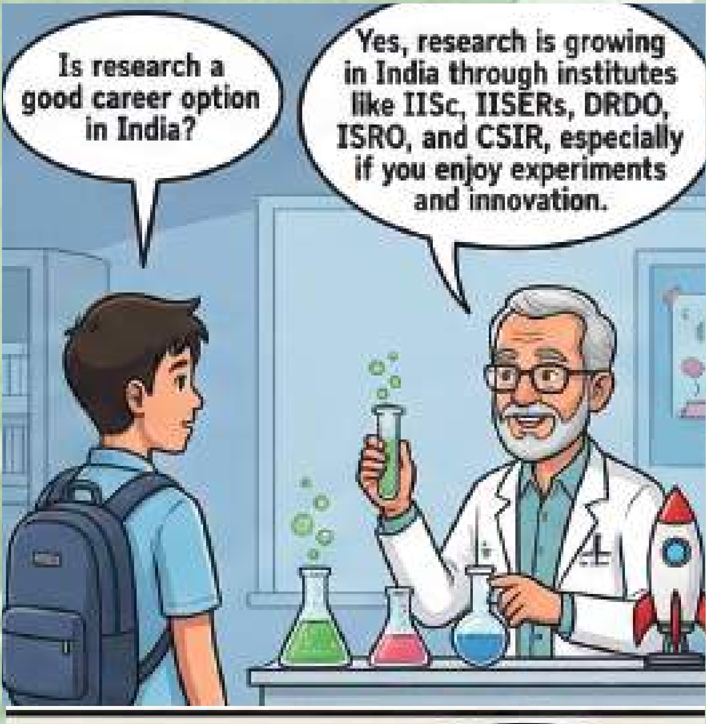
Rivaa Patel
11th-S1

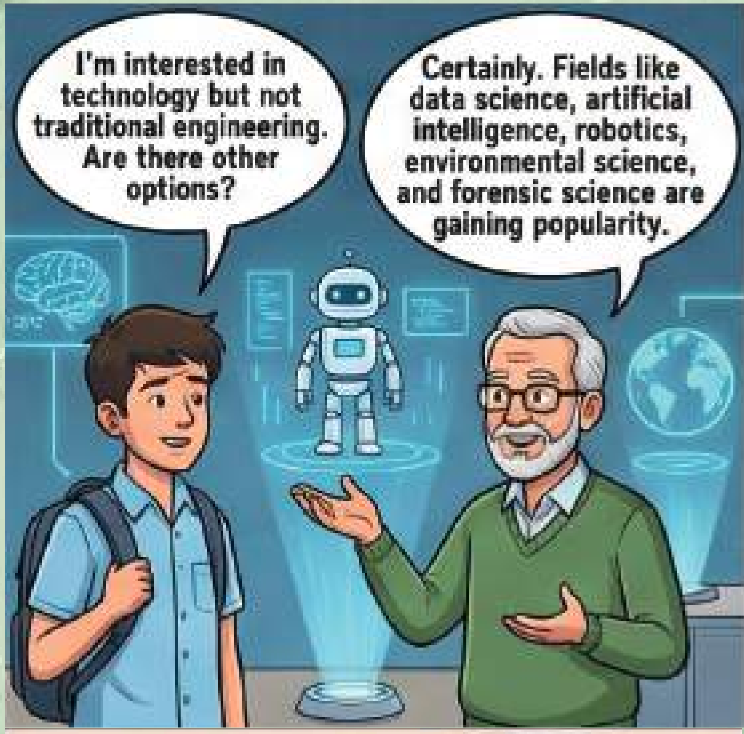
THE MOST POPULAR CAREERS AFTER GRADE 12 SCIENCE

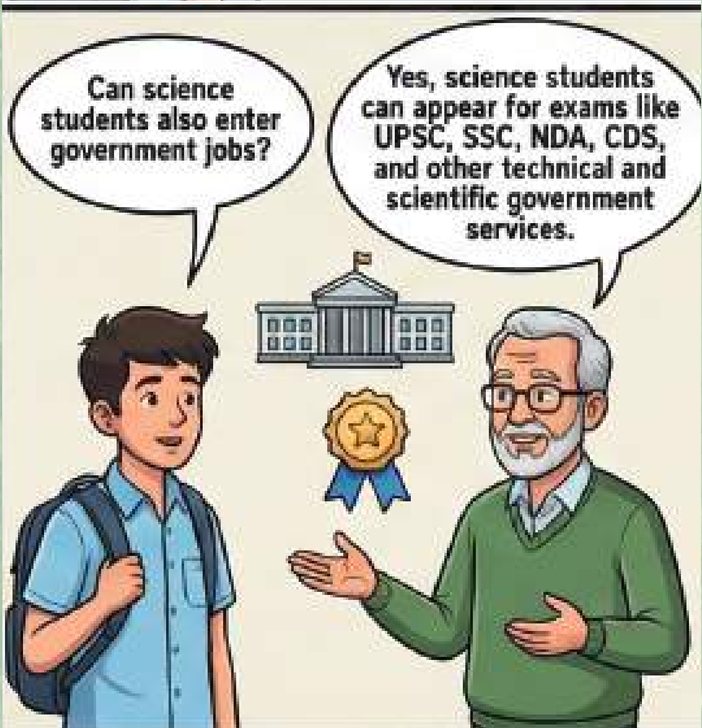


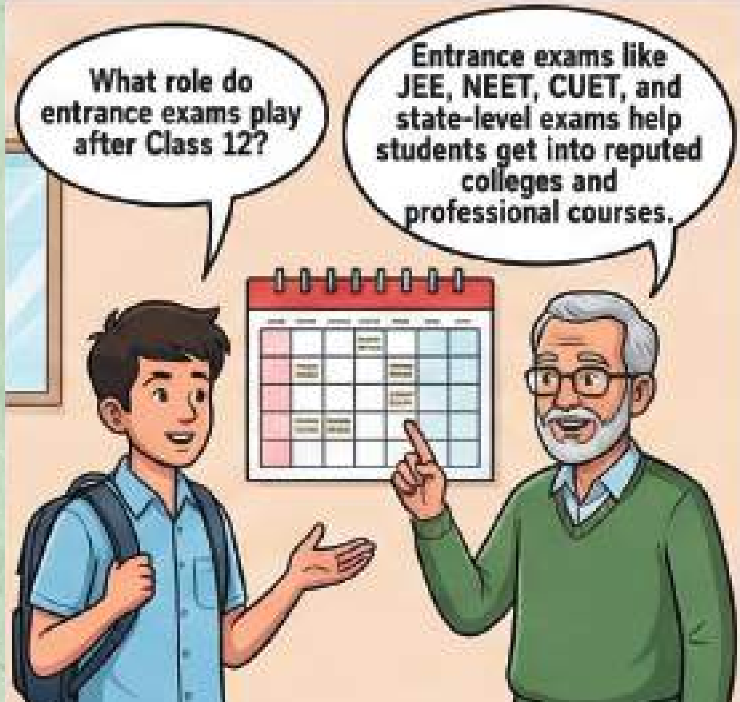












Career Talks by:
Mr. Umesh Pandey
PGT chemistry

CREDITS AND ENDINGS

Vasishthians engage with science as an evolving way of thinking—one that encourages curiosity, observation, and informed questioning. Each edition of Odyssey reflects this mindset through original ideas, thoughtful research, and meaningful scientific expression that goes beyond textbooks.

The completion of the third edition marks a continued commitment to academic growth and intellectual curiosity. This publication stands as a reflection of consistent effort, disciplined inquiry, and a modern approach to learning. We acknowledge and appreciate the contributions of all students who played a role in shaping this edition of the magazine.

With regards,

Team Odyssey

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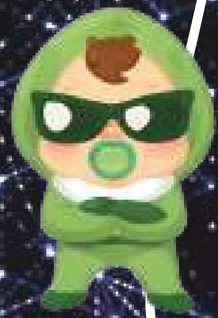
FUN FACTS



🌍 Venus Has Days Longer Than Years

A single day on Venus is longer than one complete orbit around the Sun. Time behaves very different on this planet.

🐙 Octopuses Have Three Hearts

Two hearts pump blood to the gills, while one supplies the rest of the body. Their blue blood uses copper instead of iron.

🍌 Bananas Are Naturally Radioactive

They contain potassium-40, a harmless radioactive element, showing that radioactivity exists naturally around us.

🌳 Earth Has More Trees Than Stars

Scientists estimate about 3 trillion trees on Earth, which is more than the stars in the Milky Way galaxy.

🔬 Every Two Minutes, Humans Take More Photos Than the Entire 19th Century.

Modern technology has accelerated image creation at an unimaginable scale, reshaping how we record history.