



*Which side of history will you stand on?*

As I look back at the 7 years behind me, I ask - “What have I achieved?” Perhaps the only claim I can make is that I tried to listen. The truth is that the world today is overcast with polarisation, intolerance, and bigotry. With an increasing number of hate crimes, acts of terrorism, political violence, and even genocide, perhaps all we need is a moment to *breathe* and *listen*. Amidst extreme and divergent viewpoints, let us pause, deliberate and then consider the nuances of the situation.

Because *logic is not absolute*. Neither is morality, ethics or the human conscience. In the black and white world of today, let us be the converging and sensitive grey, neither overpowering nor empty. Let us be conscious, fluid and accepting. The world might be “dark and gory”, but we can be the change. This is perhaps the best gift we can give our communities.

The dynamic field of science is one of constant change and growth. From the dual nature of matter, laws of quantum mechanics, or the fact that the moon is slowly drifting away from the earth, science is a contradiction in itself. With its intricate balance and innumerable options, the only thing science can reliably provide you with is a *choice*.

With this issue of the Delphic, we implore you to find your balance and seek the symbiosis of seemingly contrasting phenomena. We have covered topics ranging from the asymmetry of the universe, complex causes of schizophrenia, use of origami in astronomical instruments, to the relation of obesity and poverty.

Stay Curious!

Merry Christmas and happy reading,

*Keya Aggarwal*

*Editor-in-Chief*

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AI-generated artwork from Magic Media on Canva as a testament to our theme





The nervous system works as the commander of our intricately intertwined mind and body. The autonomic nervous system (ANS) plays a direct role in initiating and maintaining our body's response to stress. It is divided into the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS).

The perception of stress as a villain in our daily lives is often reiterated by the immediate response of the body, which is mobilized to fight a broad array of stressors. This intense reaction, known as the “fight or flight” response, is mediated by the SNS. As dramatic as it might sound, the body, like the most agile soldier at war, shifts its energy resources towards either fighting off a threat or fleeing from an enemy. However, peace is often brought forth by the PNS, which generally has opposing effects to the SNS. (To complete the war analogy, the PNS is a peace mediator that, for once, actually does the job.)

Despite our dramatic presentation in the aforementioned paragraph, the most noteworthy point is that both subdivisions of the ANS work complementary to each other, smoothly regulating both our psychological and physiological states. An unbalanced nervous system goes into what is referred to as a state of dysregulation. Short bursts of dysregulation are normal. Longer, extended periods of dysregulation often go hand in hand with symptoms of psychological distress.

In mental health disorders such as anxiety disorders and major depressive disorder, the SNS is often chronically activated without the normal counteraction of the PNS. This means that the calming and relaxing functions of the PNS, such as reducing heart rate and promoting digestion are not as effective, leading to symptoms like rapid heartbeat, gastrointestinal disturbances, and muscle tension. The continuing dominance of SNS over PNS can lead to symptoms such as chronic fatigue, sleep disturbances, decline in immunity and increased susceptibility to illness. Returning to our war analogy, imagine the soldiers chronically fighting the enemies without rest or resources. It would not be surprising to see that our army is left severely depleted, and we are now more susceptible to defeat.

Rebalancing the ANS is a common goal of effective treatment plans. Meditation, yoga, exercise, stress-reduction methods, and mindfulness-based techniques are often effective in activating the PNS and reducing distress. Both psychological and pharmacological treatments can be utilized to balance the ANS and control neurotransmitters.

**Ms Ritika Uniyal & Ishaani Bhatia**

*\*The title is a quote from War and Peace by Leo Tolstoy*



# HOW TO MAKE A VAMPIRE

The myth of vampires has existed for hundreds of years and has a well-established place in popular culture. From The story of Sekhmet, an Egyptian goddess to The Vampire Diaries, vampire folklore has many flavours. From pale faces, sharp fangs, bloodshot eyes, to garlic aversions and sunlight and the most gory- need to drink human blood to survive, these creatures of the night are certainly frightening enough to send a shiver down one's spine. But don't worry, scientific advancements have led us to believe that this myth found its origins in an age-old blood disorder.

Porphyria is an inherited blood disorder caused due to the accumulation of porphyrins, a molecule our body uses to create heme, a key component of haemoglobin(a protein that binds with oxygen in our blood). Due to a disturbance in the heme production pathway, the porphyrins build up in tissues and organs. Acute attacks of the disease are associated with considerable pain, and both mental and physical disturbance. Patients suffering from porphyria are sensitive to sunlight which leads to facial disfigurement, blackened skin and hair growth. They tend to grow fang-like teeth due to receding gums could have an aversion to garlic due to its high sulfur content which could lead to an attack of porphyria.

Before you ask, no they do not sleep upside down or sleep in coffins, and I hardly think they can turn into bats spontaneously. The origin of these myths is unknown, but I guess that it cannot be anything good. Perhaps all that spice has been added over the years to put us, kids, to sleep early in fear!

**Aadyaa Bajaj**



## A CONCRETE SOLUTION

A recent discovery at MIT has unveiled that when cement and carbon black are mixed with water, the resulting concrete assembles itself to make a capacitor. Capacitors are integral to the world of electronics since they act as 'storehouses' of energy in different appliances and devices. This unconventional yet intriguing concoction of materials can lead to a cheaper alternative to the existing capacitors and open a wide range of possibilities, even allowing a building to store energy in its frame.

A typical capacitor consists of dielectric material sandwiched between conductive terminals or plates. The newer approach contains a mixture of carbon black, water, and cement. Carbon black is a finely divided form of carbon known for its excellent electrical conductivity. The small particle size and high surface area allow it to coat the main cement matrix after being mixed with water, thus forming a highly conductive network. The cement acts as the poor conductor or the dielectric material and this entire mixture is sandwiched between 2 conductive plates which act as electrodes. When the cement interacts with water, it undergoes a hydration process. This constant interplay between the mixture and the calcium silicates of cement is the main chemistry behind the supercapacitor. The carbon black allows for the flow of electrons, while the cement acts as a separator between the two conductive plates.

It truly is fascinating to see how the most common of materials can come together to form such complex devices. Keeping in spirit with the theme of this issue, this discovery beautifully depicts how often it is the simplest of things that answer the most complex of questions.

**Twisha Mahajan**



# The Living Extinct

Evolution has been a long journey, around 375 million years, in which the modern human seems to have evolved from 'fish'. Somewhere over these years, we developed a sense of superiority that comes with being the Homo Sapiens, or the wise human. We believe that we alone are the most developed and advanced creatures, with our complex idiolects, cultures and lifestyles, which is primarily because of the genetics and neuron density (and an inflated ego) that we attained as we evolved over time.

However our DNA isn't ours alone. Cue in the Neanderthals, a species belonging to the same genus as Sapiens. Multiple fossil evidences prove that Neanderthal lineage ranged widely in Eurasia about 400,000 years ago. On comparing the two, Neanderthals had stronger limbs for hunting and smaller brains that consumed less energy and were lighter.

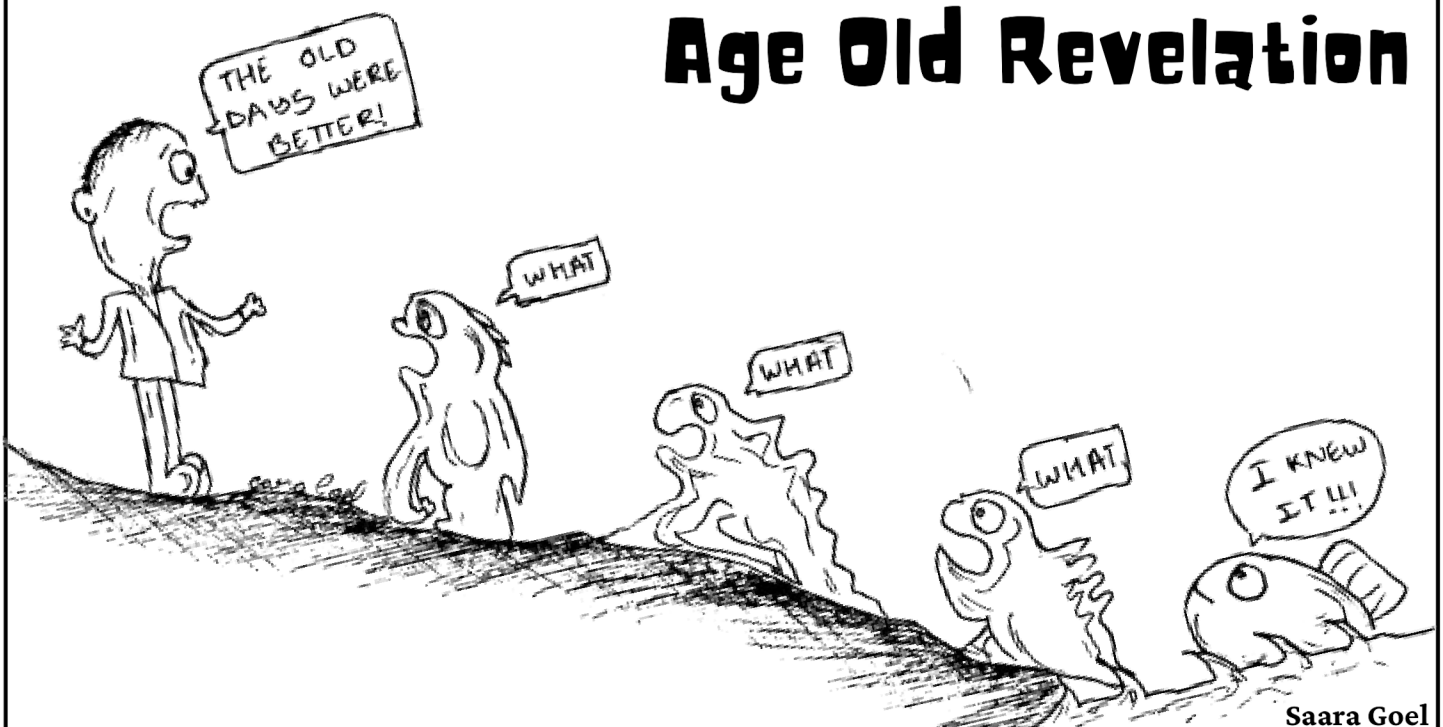
This is the species that the Sapiens allegedly wiped out according to the Replacement Theory of Evolution. However, Neanderthals had co-existed with Sapiens somewhere around the Asian terrain, creating a possibility of them choosing interbreeding over the carnage of replacement. The archaeologically backed Interbreeding theory states that Sapiens mated with other species to produce genetically varied offspring who, over centuries, evolved to be the species we are today.

Geneticists, after extracting Neanderthal DNA from fossils, compared it to that of the Modern Sapiens of the Middle East and Europe and discovered traces of (about 1.3%) Neanderthal DNA. The minute differences in DNA in modern human makes it convenient for scientists to cherry-pick data and link certain genes to modern human traits such as skin pigmentation or immunity. In fact, Neanderthal DNA can also be associated to diseases like Graves' disease and rheumatoid arthritis.

However, it is important to recognise that this DNA is as much a part of being HUMAN as the Sapien DNA. Over the generations, it gets shuffled into new arrangements, reducing its percentage in our body. The Neanderthal DNA helps us form a timeline of our existence as a human and reminds us of our true roots and origins.

Akshita Goyal and Karen Sahdev

## Age Old Revelation



Saara Goel



# THE UNKNOWN CAUSE OF SCHIZOPHRENIA

In the world of neuroscience, we often attribute certain phenomena to isolated regions of the brain overlooking the complexity of the human brain. However, this is almost like trying to understand a symphony by listening to a single note or instrument. As we look deeper, we find that the brain's interconnectedness is what makes it impossible to pinpoint a single isolated region for a certain action, feeling, or behaviour. For example, after understanding the occipital lobe and its connection to the visual aspect of the brain, we immediately thought that the symptoms of visual hallucinations in this disorder were caused by damage to this part of the brain. Schizophrenia is a serious mental disorder in which people interpret reality abnormally and may experience a combination of hallucinations, delusions, and extremely disordered thinking. It is a natural inclination, after all, to seek a single, neatly tied-up explanation for the complex behavioural disorder. On further research, however, we found out that our explanation for the cause of schizophrenia was an oversimplification of the actual reasons and mechanisms behind this disorder.

While studies show that there is increased unusual activity in the occipital lobe or visual association cortex during a hallucination, there are many other neural factors to consider. For instance, a device electroretinogram (a diagnostic test that measures the electrical activity of the retina in response to light) revealed retinal ganglion cell (RCG) dysfunction in schizophrenia. Patients show retinal abnormalities that lower the quality of the images in the brain. Moreover, impaired photoreceptors have been linked to psychosis one of the many symptoms of the disorder. It has been found that the patients have delayed output of action potential in their RCGs, leading to visual hallucinations. Increases in the brain's dopamine levels have also been tied to psychosis.

Schizophrenia is not solely a consequence of neural abnormalities; environmental factors also play a substantial role in its development. Birth complications during pregnancy have been identified as a potential risk factor. Studies have associated emergency cesarean sections, bleeding during pregnancy, low birth weight, and the use of forceps with an increased susceptibility to schizophrenia. Furthermore, exposure to infectious agents like influenza and toxoplasmosis during pregnancy and conception has been linked to a later disorder risk.

Schizophrenia also shows a genetic link, where if a twin develops schizophrenia, the other twin has a 1 in 2 chance of developing it, too. This is true even if they're raised separately. An environmental risk factor can be early trauma. Studies have reported strong evidence that childhood adversity ( trigger warning ) (defined as sexual abuse, physical abuse, emotional/psychological abuse, neglect, parental death, bullying, unstable home life, living in poverty, or exposure to racism) and trauma were associated with increased risk and can trigger schizophrenia.

While neuroscience does not satiate our intellectual curiosity, it does inspire our minds to seek greater things. The complex interplay of neurological and environmental elements that characterises the research of schizophrenia serves as an evidence of the complexity of the human brain.

Syna Gupta & Delishah Mirza





# NEXT IRON GLASS MAN SUIT

Let's say you want to make a helmet, armour, or medical instruments. You will want something lightweight, and strong, but less dense, all at the same time. It is in such a situation that we realise the importance of measuring specific strength: the strength of the material (force per unit area at deformation) divided by its density. Iron, one of the stronger and more common materials known to mankind, can take seven tons of pressure per square centimetre, but it is also very dense and heavy. Today, it is aerodynamically impossible to create a suit of iron that would allow you to fly.

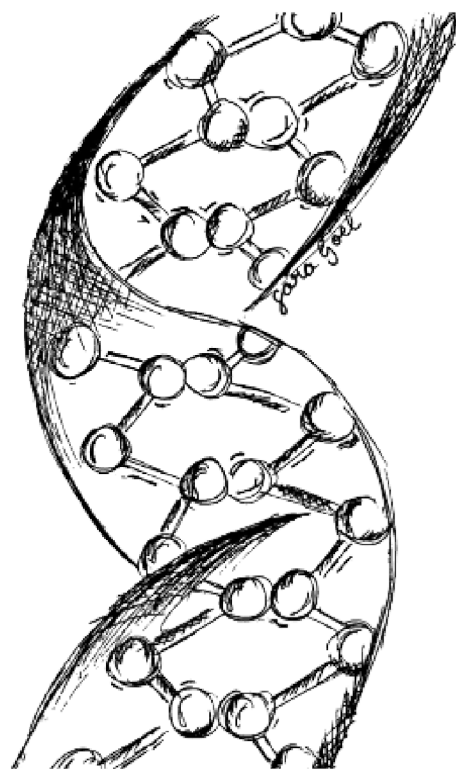
Glass has characteristically been identified as one of the weaker materials. From broken wine glasses to shattered windowpanes from a burglary, glass is usually the weak point of a building. But this fragility of glass comes from the process of formation. Glass usually shatters because of a flaw—such as a crack, scratch, or missing atoms in its structure. A flawless cubic centimetre (1cm ) of glass<sup>3</sup> can withstand 10 tons of pressure, which is three times the Oceangate Titan submarine that had gone to view the Titanic this summer.

It is almost impossible to create a flawless piece as described above, unless it is as thin as a micrometre. However, if you can create a large piece of flawless glass, as its density is much lower than any metal or ceramic, it will be strong and lightweight, perfect for creating a suit similar to the suit worn by Tony Stark.

Columbia Engineering, in collaboration with Brookhaven's Centre for Functional Nanomaterials, coated DNA with a few hundred atoms of thick glass. The DNA skeleton reinforced the thin, flawless coating of glass, which resulted in not only a durable material but also one with extremely low density, resembling a building with DNA serving as the pillars.

The resultant glass nanolattice structures are four times higher in strength but five times lower in density than steel, a combination that has never been achieved before. Who would have thought that it would be glass that would be the game-changer for countless industries in the future?

Keya Aggarwal



## RECOMMENDATIONS

### Books:

1. 21 lessons for the 21st century **by Yuval Noah Harari**
2. Psuedoscience : A very short introduction **by Micheal**
3. An Immense World **by Ed Yong**
4. Sustainable Energy – without the hot air **by David MacKay**
5. Lady Sapiens: Breaking Stereotypes About Prehistoric Women **by Jennifer Kerner**

### Movies:

1. My Octopus Teacher
2. Space Ship Earth
3. Guardians of the Galaxy vol 3

*The Delphic edboard considers it imperative to mention **Elemental** for its attempt to show the relationship of the contrasting elements(literally) of nature*



# The Rainbow of the School: Mr. Parmar

There are people who are said to be born with a silver spoon, but Mr VPS Parmar was born with a pen, a notebook, and very wobbly handwriting! He may have been in the physics department for over 28 years, but I certainly believe he has been shocking Welhamites with his papers for longer. In this interview, he shall answer some of the favourite questions posed by us.

To start off with the question of utmost importance: *What is the inspiration for the designs of your shirts?* Mr Parmar has confessed that other than reading physics books and making physics papers, he spends some time online, in fact, a lot of time, researching. He thinks the 7-day colour rule that most teachers follow does not do justice to the infinite colours in our lives. So, his shirts represent those iridescent hues to brighten our day.

*Would you give bad marks or good marks to someone solving physics numericals on the wall?* Sir responded to our next question with his beautiful philosophy. He claimed that while he would commend the student for her efforts, and make her the subject of a couple of jokes in class, later he would simply convince her against vandalism. He thinks explaining why their actions are wrong is enough to guide most children. Hence, in his long, illustrious career, he has never given a bad mark.

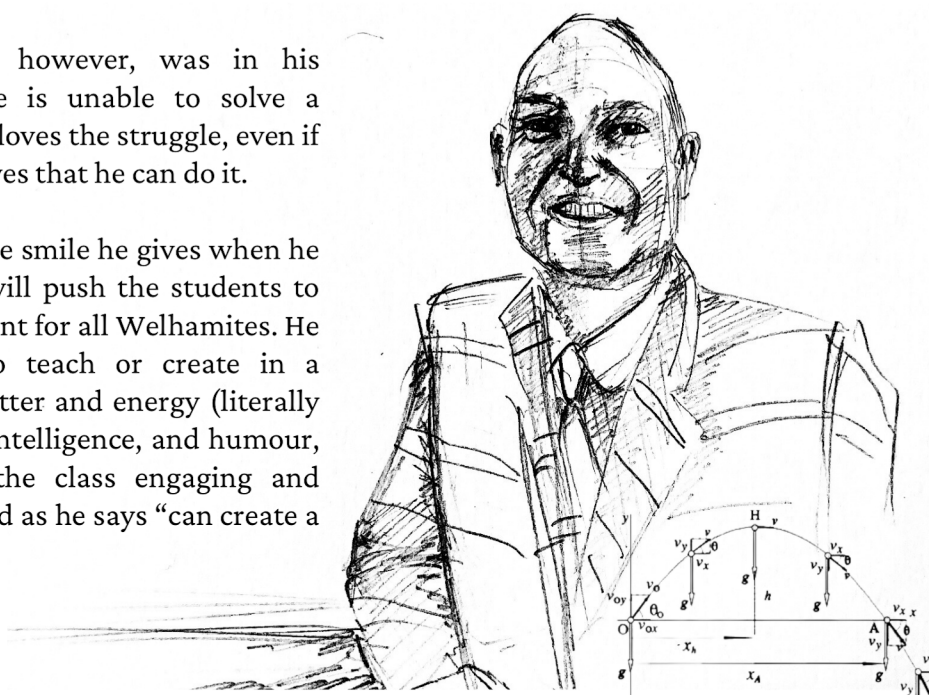
A junior (we wonder which batch) might have tried to crack a joke in her answer sheet by responding to the question, "Define Newton's law" by claiming that it has already been defined and it was simply not necessary to do it again. On being asked, *'What is your personal favourite physics joke'*, we were confronted with the truth of the universe. His answer, 'Physics is not a joke' is perhaps true for all Welhamites who face this fact before answering his exam paper.

Having mentioned exams, it is imperative to note that Mr Parmar spent two months making the PreSc Physics Paper, and apparently, most of it was spent making the drawings on Coral Draw. His paper this time, containing a wild repertoire of questions- including bird defence, colliding car accidents and insects in a hemispherical bowl- inspired us to find the applications of physics in our daily lives in anticipation of his papers.

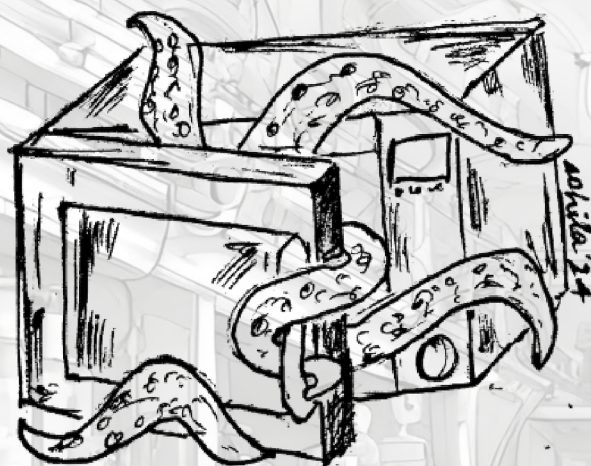
The most inspirational answer, however, was in his confession of how, whenever he is unable to solve a question, he absolutely loves it. He loves the struggle, even if it is for 2-12 hours because he believes that he can do it.

From the nodding of his head to the smile he gives when he poses a question that he knows will push the students to think, Mr Parmar has been a constant for all Welhamites. He believes that it is impossible to teach or create in a classroom, without the correct matter and energy (literally and figuratively). His knowledge, intelligence, and humour, as well as his efforts to keep the class engaging and interactive, are truly marvellous and as he says "can create a miracle."

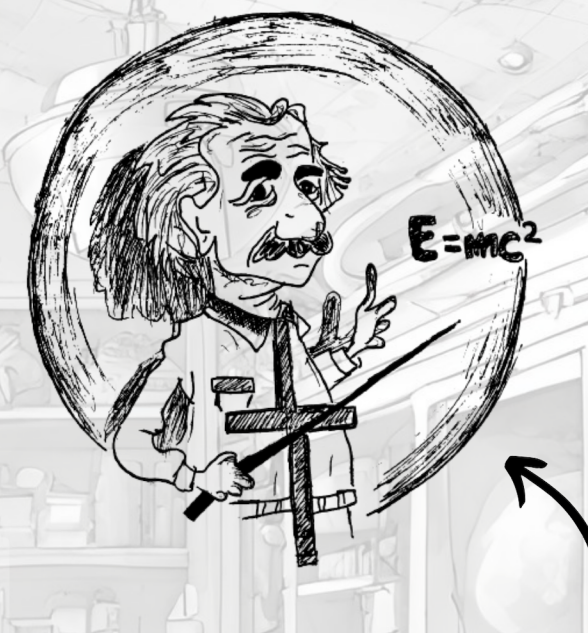
**Vaanya Thapliyal**







Percy Spencer, a self-taught scientist who is believed to have a knack for finding simple solutions to prefabricated problems, encountered an extremely enlightening obstacle: chocolate melting in his pocket. On further observation, he concluded that various items could actually be cooked because of the emission of heat waves from the surrounding medium. Who could have guessed that this oddly random situation would lead to the accidental invention of a very important kitchen appliance—the microwave oven?



# PARADIGM SHIFT: THE PARADOXICAL NATURE OF SCIENCE

Frankenstein, a widely acclaimed novel written by Mary Shelly, was the first work of science-fiction ever written. In 1818, Giovanni Aldini had attempted to reanimate the bodies of executed criminals using electricity. Aldini conducted a public demonstration in which he applied electricity to the corpse of a recently executed man, causing the body's muscles to contract. This inspired Shelly to resurrect the 'creature' the same way. In fact, by describing events about 'resurrection of the dead' and 'transplanting internal organs', this book managed to change the outlook of science by depicting its destructive power and horrifying effects and bringing to light the ethics related to this field.



'A Day in the Life,' a renowned song by the English rock band 'The Beatles'—featured in their 1967 album, Sgt. Pepper's Lonely Hearts Club Band—is proven to hold a peculiar significance. The middle section of the song contained a frequency of about 14 kilohertz, making the piece adequately musical only for dogs. So the next time you play this undetectable sound, beware of your pet madly singing to its own Beatles song.



J. Robert Oppenheimer, after creating one of the most death-dealing and lethal atomic bombs ( and even after putting his entire drudgery into execution ), exclaimed to be politically unsettled and rather ethically concerned after perceiving the birth of a 'consequential calamity'. Someone perhaps should have advised the 'Father of the Atomic Bomb' to consider the consequences of his actions and get his priorities straight.



Albert Einstein held complex and evolving religious beliefs throughout his life. While he often expressed scepticism towards traditional religion, he simultaneously harboured a deep-seated belief in a higher power or cosmic order but refused to anthropomorphise it. While he admired the moral teachings of religion but couldn't reconcile them with the harsh realities of the world. On several occasions he has criticised the “fanatical atheists whose intolerance is of the same kind as the intolerance of the religious fanatics”

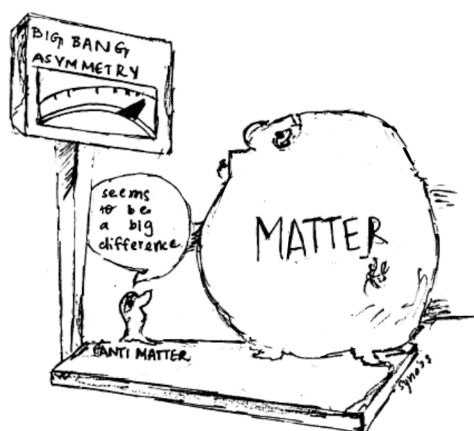


# THE ASYMMETRICAL UNIVERSE

The universe has various forms of matter in the form of planets, stars, and galaxies. Some parts of the universe, like a snowflake, have symmetry, not in the mathematical aspect, but that every particle has an opposite companion, an anti-particle. This simple yet crucial discovery was proposed by physicist Paul Dirac through his "Dirac equation of symmetry."

Dirac's equation proposed that matter and anti-matter should be in a 1:1 ratio. If this were accurate, then seconds after the Big Bang, anti-matter and matter would have been annihilated in the form of radiation, which would contradict the existence of planets, galaxies, and even humans. Despite various theories proposed to explain this imbalance, it remains one of the biggest enigmas in physics.

The asymmetry in the universe is believed to be caused by the violation of CP symmetry. CP symmetry includes charge conjugation and parity. Charge conjugation changes particles into their anti-particles by reversing the charge of all forces, while parity refers to the symmetry of a particle under mirror reflection. By acting like a mirror for particles and antiparticles, CP symmetry shows that there is no observable difference between them.



For instance, flipping a coin with an equal probability of producing heads or tails is an example of CP symmetry. However, if the coin had a slightly higher chance of landing on tails, it would represent a violation of CP symmetry. The decay of kaon (atoms' sub-particle) into its particles and anti-particles is like flipping this coin. The rate of production of one particle was more than the other due to the violation of CP symmetry. These particles were leptons (for example an electron) which are the universe's basic building blocks. As a result of this imbalance, more leptons combined with neutrons, increasing the amount of matter. The violation of this symmetry demonstrated that the laws of physics behave differently for matter and anti-matter.

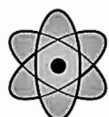
CP violation is of profound relevance to physicists as it allows them to make a distinction between matter and anti-matter. Matter and anti-matter interaction would annihilate each other and leave pure energy behind. Hence, the very existence of planets, stars, galaxies, hence even humans is the asymmetry in the universe.

**Yashodhara Choudhary**

## JUST IN

**Moungi G. Bawendi, Louis E. Brus, and Alexei I. Ekimov** received the 2023 Nobel Prize in Chemistry for discovering quantum dots, which enables engineers to create screens that use less energy while displaying a broader and more vibrant spectrum of colours. The Nobel Prize was not awarded merely for improving television quality as quantum dots also find applications in microscopic biological imaging, targeted therapy, and real-time monitoring of biological processes.

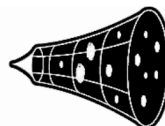
**Pierre Agostini, Ferenc Krausz, and Anne L'Huillier** found a way out of the chaos of attosecond physics and went on to win the Nobel prize. An attosecond is equal to  $1 \times 10^{-18}$  of a second which is the natural timescale of electron motion in atoms. Attosecond physics helps solve the challenge of achieving real-time control of the electron motion in matter. An attosecond is to one second as one second is to the age of the universe.



ATTOSECOND  
1/1,000,000,000,000,000,000  
SECOND



HEARTBEAT  
1 SECOND



AGE OF THE UNIVERSE  
1,000,000,000,000,000,000  
SECONDS



# Escaping a Black Hole

Do you recall the law of conservation of energy? According to this law, energy cannot be created or destroyed; it can only change from one form to another. Well, turns out that this law is missing something important. The phenomena of particle annihilation and pair production play a role in creating energy and mass, seemingly violating it. This phenomenon occurs due to the interaction of matter and antimatter. Antimatter is a type of matter which has properties opposite to matter. Take, for instance, the positron, an antimatter counterpart of the electron, with equal mass but an opposite charge, +1. When a positron and an electron collide, a fascinating phenomenon occurs where all of their mass turns into energy. It's like they vanish as particles and turn into energy waves.

This process is known as particle annihilation. Although these particles seem to defy convention, they ultimately tie back to a fundamental truth- the total sum of mass and energy in the universe remains constant. This energy can be calculated using Einstein's famous theory of relativity,  $E=mc^2$ . In the case of pair production, a photon, a minute packet of electromagnetic radiation, splits into two parts – an electron and a positron.

According to classical physics, once something goes into the black hole, it should be lost forever. However, according to Stephen Hawking, black holes release matter in the form of black-body thermal radiation. Consider a photon at the event horizon (the boundary defining the region of space around a black hole from which nothing can escape). It undergoes pair creation, disintegrating into an electron and a positron - called virtual particles. While these virtual particles are constantly created, near the event horizon one of the particles can escape before it is destroyed. This is because the gravitational field stretches the spacetime between the particles such that while one particle (matter) is inside the event horizon, the other is outside (antimatter). Hawking radiation is the emission of antimatter by a black hole. The amount of Hawking radiation emitted by a black hole depends on its mass and temperature. Smaller or hotter black holes emit more Hawking radiation than larger or cooler black holes.

So, when pair production and annihilation team up, they might help a particle break free from the black hole's grasp. This leaves us with an intriguing question: can this help mankind touch the edges of the black hole without being sucked in?

Kaavyaa Patel & Aaruni Garg



## ZONED OUT

If you think about it, you truly never touch anything. Due to electron repulsion, what you experience is a large number of atoms just interacting with each other through their electrostatic fields. All electrons usually maintain a distance of  $10^{-8}$  meters.



# Labcoats vs Eco-lectuals:

## If a Science vs EVS Conversation was Honest

### Science-

Before I start, please forgive me for endorsing the greatest factual error- that EVS truly is a science.

Dear delusional EVS students who still think that their tote bags will save the environment, I am sorry to inform you that spreading paper pamphlets about cutting trees will not aid the earth's ever-growing wound. As sad as it is, good intentions alone cannot save our planet but I'll tell you what really can- using the laws of physics and chemistry to make effective *innovation* (a term you may not really understand). If EVS is truly superior to sciences, it must be credited to the lack of nature walks in our subjects- there is no factor more significant to education than bird watching.

We, science students, are well aware of the terms and conditions that come with carrying those 3 extra books in our bag every day. But at least we don't have to highlight every word we read. You may feel like you're above us with your free classes, mid-day naps, and a single flimsy textbook, but let me tell you that all this sleep won't save you from your future struggle of getting electrocuted while fixing a small bulb. And yes, we congratulate ourselves on passing exams, you would too if you achieved anything besides growing mushrooms in the UV room.

You may have already seen this coming- JOB OPPORTUNITIES! While you study a solar heater, please know that you are studying a science student's invention. Please write me a letter when you finally are employed as a professional tree hugger. (Sorry you may not be able to afford a phone!) While I am busy 'wasting' my time making millions of dollars, you can definitely assist me in printing my documents on handmade paper.

Shrestha Dube



### EVS-

Dear science students, first let me congratulate you on your brave choice of subject. It takes a special kind of person to voluntarily sign up for sleepless nights, confusion, and caffeine-induced tremors, all in the name of 'safety', only to become a fashion designer in the future. You surely have an oddly massive ego for someone who is learning the intricate detail of a screw gauge. You truly have obtained an invaluable skill of measuring the diameter of a hair strand.

Now, please spare us the condescension. We are well aware that you envy our very existence (especially during exam season). We understand that it must be immensely frustrating to see us with our manageable workload and a good night's sleep, but you **chose** science, thinking that you could be the next Einstein but ended up drowning in a sea of formulas. While you are busy congratulating yourselves on passing the exam, we get A\*s in our report cards. But it is okay, at least now you know what compounds soaps and detergents are made of (except according to your grades, you don't).

My counterpart might come up with the "it opens up job opportunities" argument – the classic defence mechanism of the science student. But while you attempt to crack JEE for the third time, why not become a professional sleeper instead? At least you would be able to make your "groundbreaking" invention in your dreams. (You even possess the extra knowledge of what the brain secretes for a good night's sleep, just perfect for the job!) After all, it's not about the number of subjects you study, it's about the impact you make. And in that department, I think it's safe to say, we EVS students are light years ahead.

Sharanya Goel



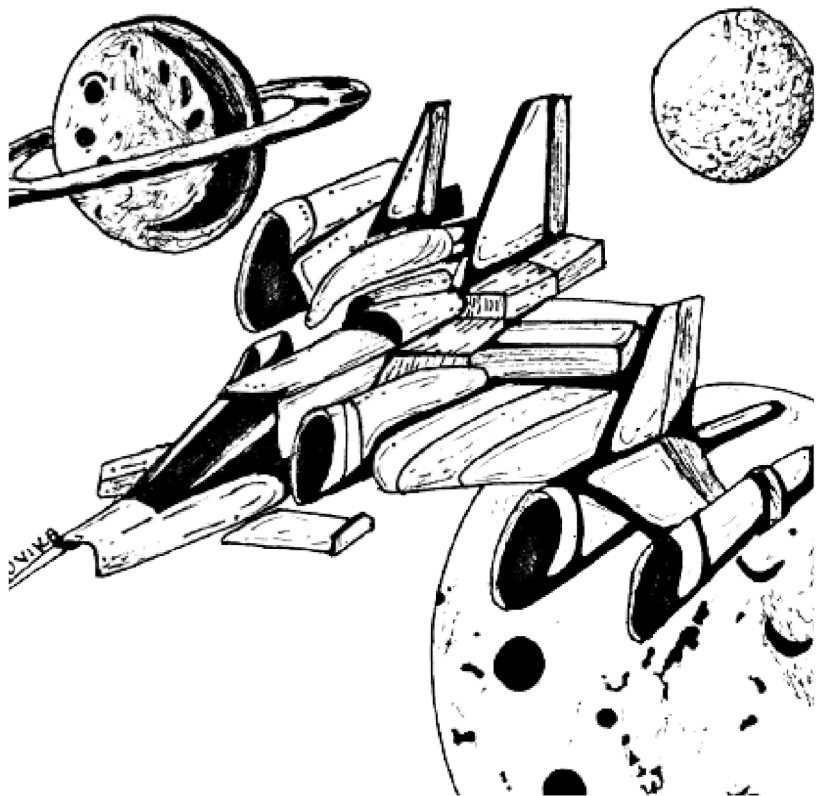
**Disclaimer:** This debate should be taken in light vain and is not intended to offend anyone.

# Wrapping Paper to Sunshields

Following the invention of paper in 600 AD and the succeeding development of origami in China and Japan, origami has become a form of art that is well-known across the globe. Also known as '*Orikata*,' originating from the words '*oru*' (to fold) and '*kami*' (paper) in Japanese, this craft was mostly used for ceremonies such as the Shinto rituals in Japan.

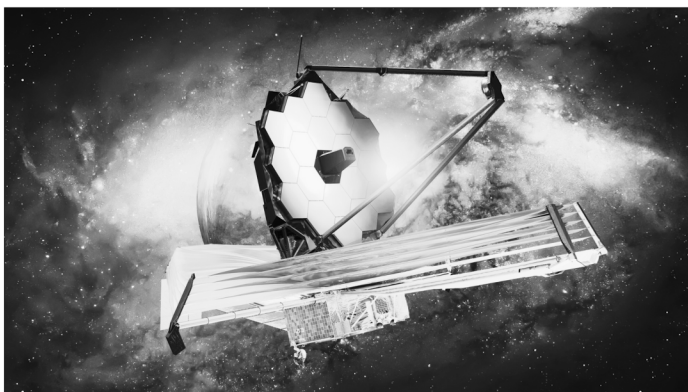
Now after centuries of its inception, origami proves to be more than a way of entertainment and creativity. As humanity advances technologically, exploring beyond the limitations of our atmosphere, origami helps scientists deploy more aerospace equipment in a convenient and compact way. Due to the limited carrying capacity of spacecraft sent to space, the equipment and machinery must be lightweight and extremely efficient in their use. Origami serves as the perfect solution by giving scientists the best of both worlds.

The most unexpected use of origami was perhaps in the James Webb Space Telescope, which applies its principles and techniques to mathematically fit the mirrors and sun shields in the narrow spacecraft and open them once in space. The Starshade, a space-based telescope, is another one of NASA's missions that was inspired by the principles of origami to overcome the challenge of taking pictures of planets orbiting stars away from the Sun due to the obstructive starlight. However, this flower-shaped Starshade would block the starlight while still allowing light from the orbiting planets to reach the telescope, facilitating it in taking clear pictures of the exoplanets. Origami, not only finds its application in space exploration but in several aspects of human existence from heart stents, self assembling robots to pizza boxes.



This craft is a testimony to the adaptability and flexibility of the human mind that can apply a technique ideally used to make toys and wrapping presents to aid scientific and technological advancements. The art of origami teaches us that looking back at the past for inspiration and modifying and updating outdated methodology can help us move forward to create an innovative future.

**Prisha Jain**



## James Webb Space Telescope

This high-resolution and high-sensitivity telescope uses infrared technology to view objects that are too old, distant, or faint for the Hubble Space Telescope. With its 10 picture sensors, it can peer through cosmic dust, study the atmospheres of exoplanets, and capture light from the earliest galaxies that formed after the Big Bang.

# STEM CELLS AND MALIGNANCY

Think of a future where our bodies can heal themselves, mending even the most fatal diseases without relying on conventional drugs. This is a reality of stem cells, specialised cells that can change into different cell types, making them important for tissue repair and regeneration in the body. Stem cells are like the body's raw material from which specialised cells are produced with specific functions for each organ.

Stem cells play an important role in disease prevention and cure. At various stem cell institutes, skin cells from a patient with a disease are taken and converted to stem cells. These stem cells are differentiated into disease cells which are observed in order to study the disease's growth, development and progression. Likewise, in stem cell therapy, the cells are manipulated to specialize the specific target cells like blood cells, heart muscle cells, etc. These specialised cells then could be implanted into the person to help cure the disease.

However, these cells might also be responsible for diseases like cancer. Modern research pinpoints specific stem cell involvement in developing various cancers from leukemia to melanoma.

This is because stem cells normally survive longer than ordinary cells, increasing the chances of accumulating genetic mutation. According to the Harvard Stem Cell Institute, it might only take a few mutations for the cell to lose its ability to renew and become cancerous. Additionally, stem cells are less specialized than normal cells, meaning they have fewer safeguards in place to prevent cancer development. Hence, the cancer incidence rate for stem cells is 10 times higher than the cancer incidence rate for normal cells. This is a matter of great concern for scientists working on stem cell based therapies.



Sukhmeet Kaur

## In a Gist - Before the coffee gets cold

If you could go back, who would you want to meet?



'Before the Coffee Gets Cold' is a magical realism style of fiction by Toshikazu Kawaguchi which explores the intricate details of time travel through a café that allows the customer to visit the past under certain conditions. There is only one seat in the café that facilitates time travel, which too is only available when the ghost who usually occupies it goes for a washroom break. Once the customer is in the past, they are not allowed to leave the seat and the only people they can visit are those who have visited the café. An interesting aspect of these rules is that whatever happens in the past, the present won't change, solidifying the universality of time. Most importantly, the customer has to return to the present before their cup of coffee goes cold (which takes about an hour).

Through the book, we explore the visits of four customers, each bittersweet due to both, the comfort and renewed sense of loss their visit involved. Through them, the author delivers an undeniable message: the past may be immutable, but the future remains full of possibilities.

Vishvaney Agarwal



# Beyond the Binary

It is a well-known fact that the question of gender identity boils down to more than two outcomes. Gender identity refers to someone's internal identification of their gender. It can be the same or different from one's biological sex.

An enormous factor that shapes gender identity is the early hormone environment exerted on the fetus. Evidence backs the fact that a person's gender identity develops due to antenatal exposure to testosterone. This is drawn from basic research in animals that involved the manipulation of hormones during early fetal development. It is impossible to ensure that the person's physical anatomy would align with their perception of gender. This is because the hormones responsible for the anatomical development of a fetus act earlier than the hormones responsible for the development of its neurological cells. Hence, it only makes sense that there is a possibility for the brain to develop a different gender identity than its physical one. Certain biological conditions during fetal development could further affect the person's gender identity. For example, the Complete Androgen Insensitivity Syndrome (CAIS) is a condition in which a male embryo's cells barely respond to the male hormones.

Genetically too, sex and gender can be more complicated than they seem. One might assume that it is only the presence or absence of the Y chromosome that affects the gender of the person. However, this is not the case for some people: their sex chromosomes say one thing, but their gonads (ovaries or testes) or sexual anatomy say another. Such a person is intersex or has DSD (differences or disorders of sex development). Some researchers now say that as many as 1 person in 100 has some form of DSD.

Moreover, one part of your body may have an entirely different identity than the other. New technologies in DNA sequencing and cell biology reveal that almost everyone is, to varying degrees, a patchwork of genetically distinct cells, some with a sex that might not match that of the rest of their body.

Even the concepts of "male" and "female" do not always line up the way they are supposed to. The difference in sex is brought about by the SRY gene (sex-determining region Y gene) located on the Y chromosome. It makes the proto-gonads turn into testes that secrete male hormones such as testosterone. Without this gene estrogen, the female hormone, is secreted. However, this gene can be missing or dysfunctional which could possibly lead to the person's gender identity deviating from their physical anatomy. We guess sometimes XX and XY chromosomes simply don't tell the entire story.

Ruhani Arora and Rysa Deoli

## MYTH BUSTERS

**MYTH:** Creative or emotional people are "right brained" and logical or analytical people are "left brained".

**REALITY:** Those Instagram reels in your feed that test whether you are left-brained or right-brained are just trying to fool you for your likes and views.

**REASONS:** There is no evidence that people have a dominant brain hemisphere. A study looked at MRI scans of over 1,000 people and found that both hemispheres are equally active, regardless of the task that is being performed. Moreover, while there are specific task allocations between the two hemispheres, they do not work in isolation and actively communicate with each other.



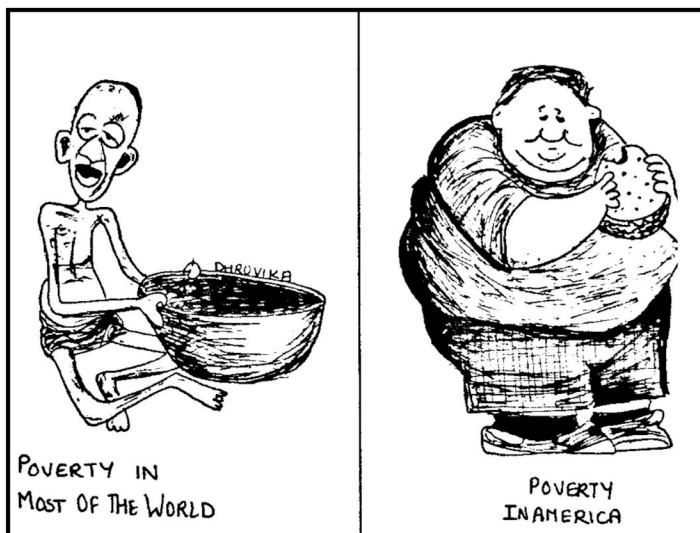
# HUNGER & Obesity

Hunger and food consumption is often not a choice but a biological phenomenon. Ghrelin and leptin are two of the many hormones that control your hunger. Ghrelin builds up your appetite (orexigenic) and induces hunger, and leptin does the contrary (anorexigenic). The subjectivity of metabolisms is due to the variability and imbalance of orexigenic and anorexigenic hormones. Due to them, nutrient deficiency has a varying reaction in different people. As hormonal imbalances are sometimes genetic, so are conditions like metabolic diseases and obesity.

In the privileged bubble of ours, we often do not know what hunger looks like. Today, if you were to picture a poverty-stricken household, it is very likely that you think of sickly, skinny people with protruding bones and visible ribs. This is the image that conventional media portrays. In the world of fast-food chains, we fail to realise that obesity too often arises from these same households. In fact, in developed countries, obesity rates are often higher in low-income communities.

The Bronx Paradox addresses obesity within a paradoxical branch of the malnutrition umbrella, where despite overabundant intake of calories and fats, the consumer is devoid of nutrition. This is due to the economic state of the people with food insecurity where they only have access to the cheapest foods that have lesser nutritional value. This food is merely empty calories, displaying the severity and complexity of the global food insecurity issue. This grey area of the coexistence of obesity and malnourishment grows parallelly with the rise in the consumption of empty-calorie foods. Preventing malnourishment is not just feeding empty stomachs, but feeding them with the right food.

Maanya Kohli



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You get all the money and both the cars? How is that FAIR?

