

VERDURE

The background of the cover is a monochromatic teal and blue abstract painting. It depicts a landscape with a large, dark, gnarled tree trunk in the foreground, its branches reaching upwards. In the background, there is a building with a prominent chimney or tower. The overall style is painterly and textured, with various shades of teal, blue, and white.

SECOND EDITION, 2018

THE DEPARTMENT OF BIOLOGICAL SCIENCES

ABOUT THE COVER

The cover of Verdure exhibits the theme “The Heart and The Brain”. There can be multiple levels of interpretation of the cover, but only when all the planes are coalesced, the true meaning is revealed. The most apparent portion is the heart, the blood pump of our body. On the heart we can see the blood vessels, one of which looks like a neuron, signifying the brain or knowledge. The overall tone of the image signifies an ethereal plane, like a view of the ever-expanding universe. Unifying these metaphorical ideas, we get the actual meaning.

The cover tries to show that knowledge is limitless. The heart here is shown to be a pump of intelligence. More the intelligence and understanding spreads, more we realize how little we know, and how deep, vast and complex the world around us is, just like the unfathomable universe.

Cover designed by- **Ishneet Kaur**, Second Year

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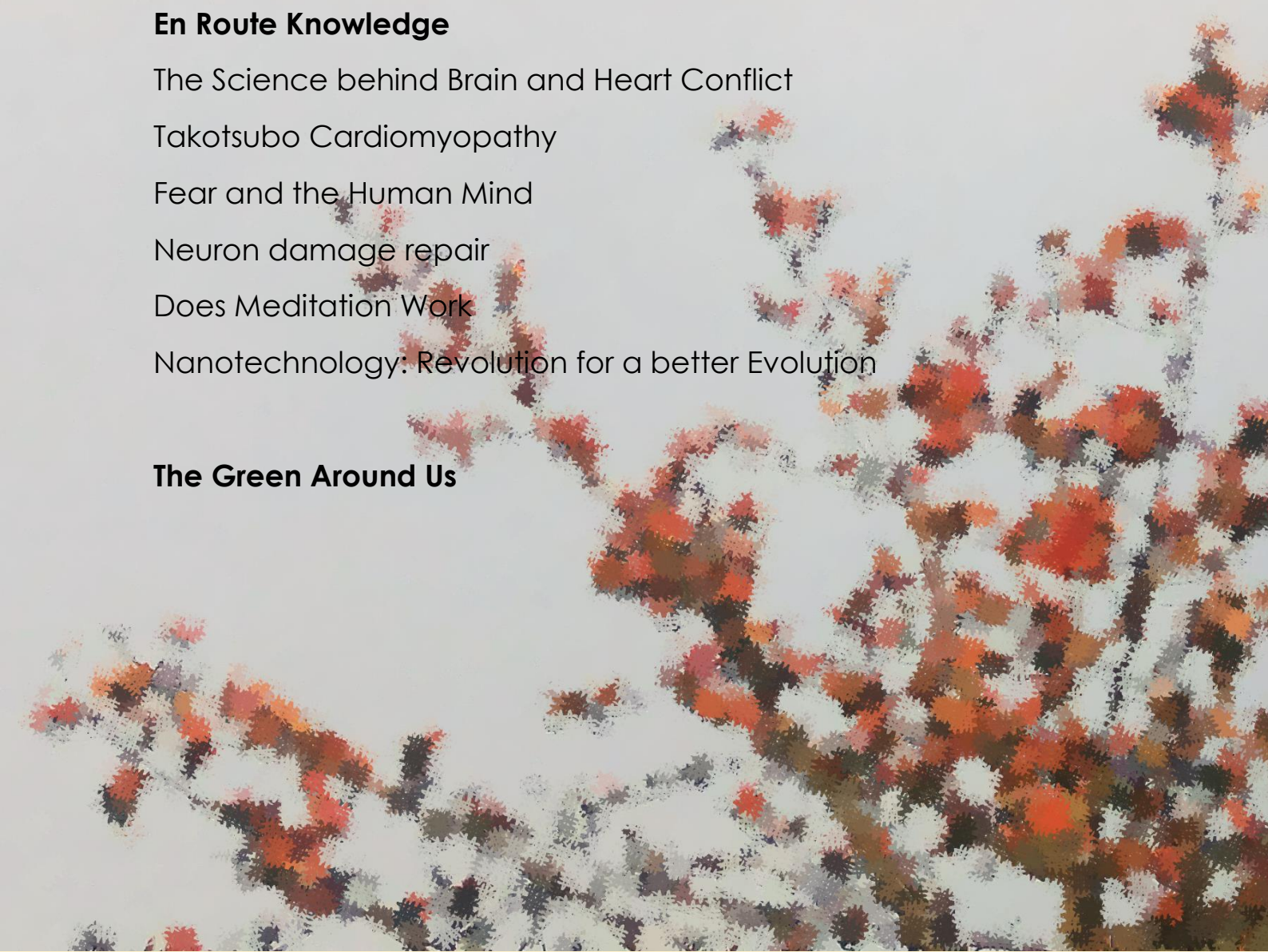
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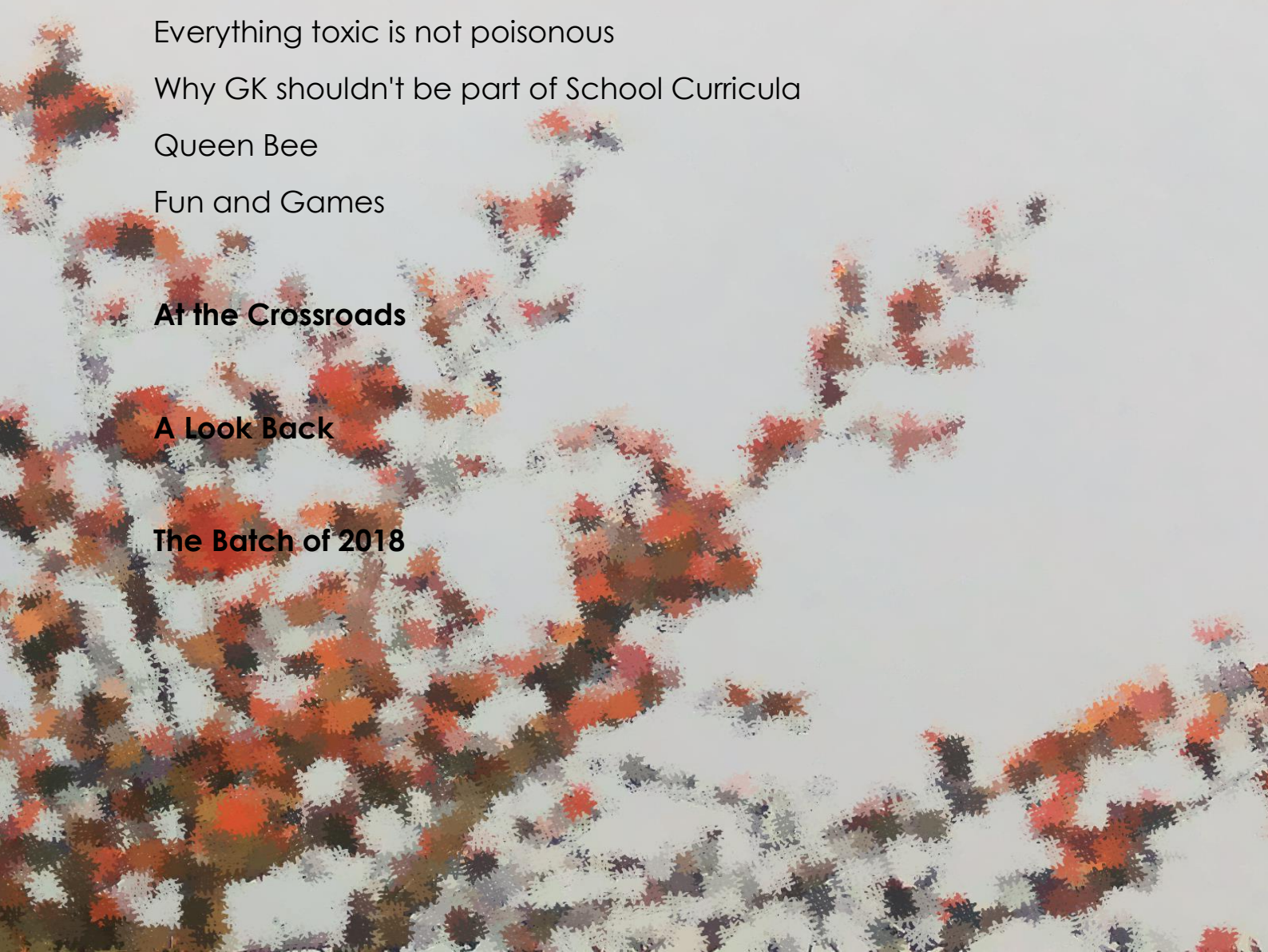
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Message from Principal's Desk



It gives me great pleasure to see that the Department of Biological Sciences is releasing the second edition of their annual magazine, Verdure. Biological Sciences has grown beautifully since its birth in 2005 and continues to maintain its uniqueness.

The best thing about this course is that it is not limited by any boundaries. This gives the students the advantage of being able to freely explore the vast sea of opportunities that lies ahead.

I would also like to congratulate the faculty and students of Biological Sciences for putting in their hard work and taking their society Chrysalis forward and for conducting their annual fest Koshika.

I wish the students all the very best for their future and hope that they shine wherever they go and make Sri Venkateswara College proud.

Message from Professor Satish C Bhatla, Member Governing Body



The pursuit of scientific endeavour is noble and life science is particularly special. It amalgamates knowledge from different backgrounds into one. Life science has always drawn knowledge seekers from different backgrounds. The prodigious architect and painter- Leonardo da Vinci gained formal training in human anatomy and biomechanics. The brilliant chemist, Linus Pauling, who elucidated the nature of chemical bond and founded quantum

chemistry, subsequently sought to study biomolecules. Sir J. C. Bose, who attained his formal education in physics, also contributed immensely in understanding plant movements. At the time of its inception in 2005, the Biological Science Society of Sri Venkateswara College was aptly named 'Chrysalis' as one can see now that like the larvae of a moth or butterfly, over the last 12 years it has come out of shell (of initial struggle) and has metamorphosed. The Society has truly merged with the lush green world ('Verdure') traversing the path of success. I congratulate all the past and present enthusiasts for this success and hope that through multiple approaches, the Society will be able to send right message across about the significance of education in biological sciences.

With best wishes

Professor Satish C Bhatla

March 12, 2018

Member, Governing Body (SVC)

Department of Botany

University of Delhi

Delhi

Message from Professor K S Rao, Head, Department of Botany, Delhi University



The Department of Biological Sciences at Sri Venkateswara College stands true to the words that a great visionary had once said.

“In essence, science is a perpetual search for an intelligent and integrated comprehension of the world we live in”

-C.B. Van Neil

The Biological Sciences undergraduate programme at Sri Venkateswara College is an amalgam of the basic sciences blended with an exposure to state-of-the-art science and technology. It takes vision, courage, grit and conviction to run a stand-alone course like this one. For this I would like to congratulate Dr. Hemalatha Reddy, Principal, Sri Venkateswara College for running this innovative course, which was introduced in the year 2005. I am also immensely pleased to know that the students graduating from this course are getting suitable placements. It gives me immense pleasure to congratulate the Biological Sciences Society – ‘Chrysalis’ for coming up with the second edition of their annual magazine ‘Verdure-2018’. I also congratulate the faculty members and students who have been involved in the conceptualization and bringing together the magazine.

My best wishes,

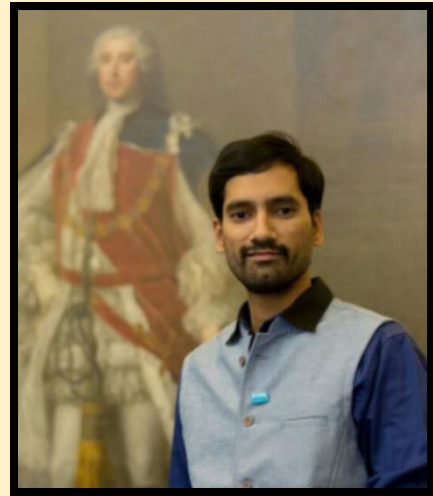
A handwritten signature in blue ink, consisting of a long horizontal stroke followed by a small loop at the end.

Prof. K. S. Rao
Head, Department of Botany,
University of Delhi, Delhi -7

Message from the Co-ordinator

It is extremely heartening and gives me immense pleasure to introduce the second edition of the annual magazine, 'Verdure' 2018. This magazine helps record the curricular and extra-curricular journey of the course and provides an opportunity to the students to showcase their talent and explore their creative potential. Alongside academic and curricular inputs, co-curricular and extra-curricular activities help shape the overall personality of the student.

This course was initiated and made it possible since 2005 by the founder member Prof. K. Muralidhar (Retd. Professor from the Department of Zoology, DU), JC Bose Fellow, Jawaharlal Nehru Chair at Faculty of Science, University of Hyderabad, Telangana alongside then Principal Dr. A Sankara Reddy, Late Dr Sarat Chandran first Coordinator, Biological Sciences and Dr. K V Giri (Rtd. Associate Professor Department of Zoology, SVC).



This course has seen all its shades during the transformation of different formats of education systems in DU. The visionary leadership of our Principal Dr. P. Hemalatha Reddy helped to withstand this course from all the odds after a year break in 2013. The formation of the Society which was a long drawn cherished dream which has incepted last year with the support of the Principal and our fellow teachers alongside the last year pass out students.

Therefore, I congratulate and appreciate all the efforts put forward by the committee of teachers and students from the editorial board for the second edition of 'Verdure'. It unleashes a wide spectrum of creative skills ranging from writing to editing and even in designing the magazine. This initiation would form a fulcrum of academic interaction among the students. I wish all the best to the students for their endeavours.

Dr. Kameshwar Sharma Yadavilli

Coordinator

Biological Sciences

Message from the Editor(s)

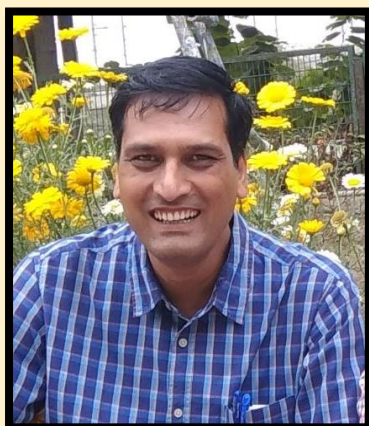
It is a matter of immense pleasure to present the second edition of "VERDURE", the annual magazine of Biological sciences for the academic year 2017-18. The magazine represents the creative side of our students that remains masked in the daily curriculum of lectures and labs. VERDURE is a very difficult attempt to support the urge to bring out that creativity, the talent before we leave it suppressed for some other time.

True to its name as you will see, the pages of VERDURE are bubbling with life, each page a different shade of green, each page full of freshness that shows the healthy growth that Biological Sciences is undergoing.

The editorial team of VERDURE has proved again that " you don't fail if you are surrounded by challenges, you can if you don't take them head on". This magazine has been a challenging task for our young editors and they have left no stones unturned to make it a success, with invaluable inputs from their fellow students in the form of creative illustrations, interesting articles and informative contents.

As you go through the pages of VERDURE you will realize the diversity of smart, creative and inspired students that has been a mark of Biological Sciences for years.

Happy Reading!



Dr. Rajendra Phartyal,
Department of Zoology



Dr. Aditi Kothari Chhajer,
Department of Botany



Dr. Perumal Jayaraj,
Department of Zoology

Message from The Editorial Heads

“To write is human, to edit is divine.”

-Stephen King



After burning the midnight oil a few too many times, we are extremely proud to present to you the Second Edition of **Verdure**. As they say, that life is not a bed of roses, it is full of thorns, so was the journey towards the successful completion of this magazine. Editing this magazine was not an easy job, however, during the process we learnt a lot of valuable lessons that have strengthened our mettle.

Having spent numerous hours agreeing and disagreeing and going through a lot of ups and downs, missed deadlines, we are glad that we got

this opportunity and that we were able to shape this magazine to its true potential.

We would like to thank our course coordinator, and all the teachers for always being there for us and supporting us at every time of need.

We would also like to thank the entire Editing and Creative team of Beta Sigma, for being so cooperative and hardworking.

We all had a lot of fun working together. We hope that you enjoy reading this magazine as much as we did creating it.

Thank you

Dilsher Singh Kulaar & Purna Sabharwal
Editorial Heads

CHRYSALIS

The Society of Biological Sciences

I have been asked to pen down my experience in Chrysalis but honestly if writing was my calling I would have been a part of Editorial Board. Jokes apart it's not an easy task at all. It may seem luring and adventurous at one point of time but with every passing minute it gets engraved in you and your every action reflects that. I would like to use this opportunity to thank all the members of Chrysalis and Verdure for immense co-operation and team spirit. This would have been impossible if not for these amazing people and their support.

Lovika Rajpal
President
Chrysalis

Meet the team



Beta Sigma

The Editorial Team

Editorial Heads

Prerna Sabharwal

Dilsher Singh Kulaar

Editors

Prateek Yadav

Rashween Singh

Pragya Shaklya

The Creative Team

Creative Head

Ishneet Kaur

Members

Akanksha Yadav

Jayant

Uzma Ansari



En Route Knowledge

This section comprises of articles submitted by the students of Biological Sciences, which are in line with the theme 'The Heart and The Brain'.

The Science behind Brain and Heart Conflict

- Harshdeep Kaur, Third Year

Everyone has faced, at one time or another, the dilemma of choosing between heart and brain. We often say, 'My brain tells me one thing but my heart tells me another'. Or perhaps, we have felt our heart telling something is off, even when the brain couldn't spot anything. Can the heart really speak?

The heart is in a constant two-way dialogue with the brain. In fact, the heart and cardiovascular system are sending far more signals to the brain than the brain is sending to the heart. What's really fascinating is that the heart contains a little brain in its own right. Yes, the human heart, in addition to its other functions, actually possesses a heart-brain composed of about 40,000 neurons that can sense, feel, learn, remember and make decisions independent of the cranial brain.

Recent work in the relatively new field of neurocardiology has firmly established that the heart is a sensory organ and an information encoding and processing centre, with an extensive intrinsic nervous system that is sufficiently sophisticated to qualify as a heart-brain. The afferent (flowing to the brain) parasympathetic information travels from the heart to the brain through the vagus nerve, first, to the medulla and then to the subcortical and cortical areas. Vagus nerve is the information highway between these brains. 70-80% nerve relay go up, not down. Emotions are processed in the limbic region of the head-brain, but if we look into the bigger picture, the signals are coming from the heart via vagus.

Research has shown that the heart communicates to the brain in four major ways- Neurologically (through the transmission of nerve impulses), biochemically (via hormones and neurotransmitters), biophysically (through pressure waves) and energetically (through electromagnetic field interactions). One important way the heart can speak to and influence the brain is when the heart is coherent- generating a stable, sine- wavelike pattern in its rhythms. The heart rhythm coherence hypothesis postulates that the pattern and the stability of beat-to-beat changes in heart rate encodes information over macroscopic time scales that can influence cognitive performance and emotional experience.



Many a times, both the brains might not be aligned on an issue and one overrides another. It is a neural network and the more it is used the more it grows. However, we often fail to understand the Heart-brain. It is simply because the language centres exist in our Head-brain, and not in the heart-brain. Hence, we may fail to listen to the heart and throw ourselves into something that we feel deeply wrong about. This clash creates stress.

We need to learn how to master these massive neural networks, learn to listen and interpret what each of the brains is saying so that we can get to the point of *wiser* decision making.

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Takotsubo Cardiomyopathy

The enigma of a broken heart.

- Dilsher Singh Kulaar, Third Year

'The heart was made to be broken.', Oscar Wilde had said, and rightfully so, it seems.

Most of us, if not all, have at some stage in life experienced what we like to call a 'broken heart'. Loss of a loved one, breaking up with a partner, separation, death of a pet, etc have often led to days full of grief. At times like these, all will to live is lost, and no matter how many distractions there may be, the mind always tends to wander off towards an inescapable dark path.

However, falling into the abyss of despair has given birth to innumerable poetic masterpieces, uncountable musicians and movie directors have drawn inspiration from heartbreaks, several writers have reached the epitome of success after expressing their sadness. But that most certainly does not mean that one should look forward to an emotional misery, because melancholy may unleash your inner artist, or may give you newfound perception for looking at things, but at the same time it can damage your heart, *literally*.

Now, we all do know that heartbreaks are associated with depression and tend to take a toll on the mental health, but we've never really believed that our heart could physically be affected by extreme sadness, right? Well, it seems we have been believing wrong. Takotsubo cardiomyopathy, also known as the broken-heart syndrome or stress-induced cardiomyopathy, is a temporary condition where your heart muscle becomes suddenly weakened or 'stunned'.

It is a transient cardiac syndrome that involves left ventricular apical akinesis and mimics acute coronary syndrome (ACS). Patients often present with chest pain, have ST-segment elevation on electrocardiography (ECG), and have elevated cardiac enzyme levels consistent with myocardial infarction (MI).

Takotsubo cardiomyopathy was first reported in Japan in 1990 by Sato et al. The word 'takotsubo' means 'octopus pot' in Japanese, as the left ventricle of the heart changes into a similar shape as the pot - developing a narrow neck and a round bottom. The condition can develop at any age, but typically affects more women than men.

The precise cause isn't known, but experts think that surging stress hormones (for example, adrenaline) essentially "stun" the heart, triggering changes in heart muscle cells or coronary blood vessels (or both) that prevent the left ventricle from contracting effectively. About 75 per cent of people diagnosed with takotsubo cardiomyopathy have recently experienced either a significant

emotional experience or physical stress. Researchers suspect that older women are more vulnerable because of reduced levels of oestrogen after menopause.

In studies with rats whose ovaries had been removed, the ones given oestrogen while under stress had less left-ventricle dysfunction and higher levels of certain heart-protective substances.

Examples of emotional stress include grief from the death of a loved one, fear of public speaking, arguing with a spouse, relationship disagreements, betrayal, and financial problems. Acute asthma, surgery, chemotherapy, and stroke are examples of physical stress. In a few cases, the stress may be a happy event, such as a wedding, winning a jackpot, a sporting triumph, or a birthday.

Sudden shock can also produce the kind of stress associated with broken heart syndrome. Doctors and scientists have pointed out that is not unusual to see couples married for a long time who die within days, weeks, or a few months of each other. There are also cases of parents bereaved at the death of a child, who follow soon after them. Recently, many wondered if actress Debbie Reynolds—who died the day after her daughter, Carrie Fisher—may have died of a broken heart.

The typical presentation of takotsubo cardiomyopathy is a sudden onset of chest pain associated with ECG changes mimicking a myocardial infarction of the anterior wall. The other main symptoms of takotsubo cardiomyopathy are breathlessness or collapsing, similar to a heart attack.

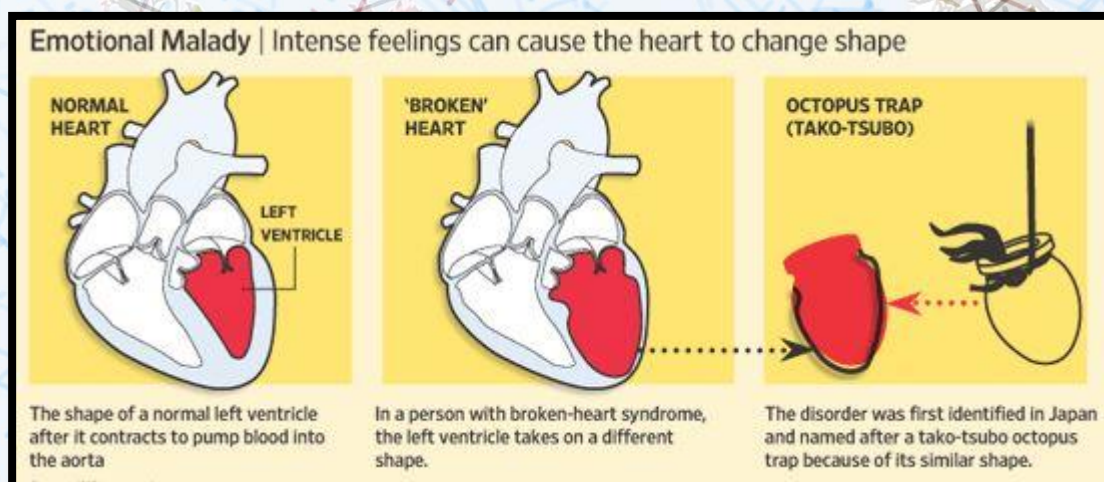


Figure 1 Source: <https://syndromespedia.com/takotsubo-syndrome.html>

In some cases, people may also suffer palpitations, nausea and vomiting. Rarely reported complications include arrhythmias (abnormal heart rhythms), obstruction of blood flow from the left ventricle, and rupture of the ventricle wall.

The good news is that the broken heart syndrome is usually treated with various heart medications and most people recover. There are no evidence-based guidelines for treating takotsubo cardiomyopathy. Clinicians usually recommend standard heart failure medications such as beta blockers, ACE inhibitors,

and diuretics (water pills). They may give aspirin to patients who also have atherosclerosis (plaque build-up in the arterial walls).

Although there's little evidence on long-term therapy, beta blockers (or combined alpha and beta blockers) may be continued indefinitely to help prevent recurrence by reducing the effects of adrenaline and other stress hormones. It's also important to alleviate any physical or emotional stress that may have played a role in triggering the disorder.

Most of the abnormalities in systolic function and ventricle wall movement clear up in one to four weeks, and most patients recover fully within two months. Death is rare, but heart failure occurs in about 20% of patients. It's treated with diuretics, agents that improve heart muscle contraction, and other therapies.

So, the next time your crush rejects your proposal or you break up with your partner, try not to delve too much into the folds of anguish, because your 'heartache' may actually harm your heart!

So eat healthy, stay fit and be stress-free.

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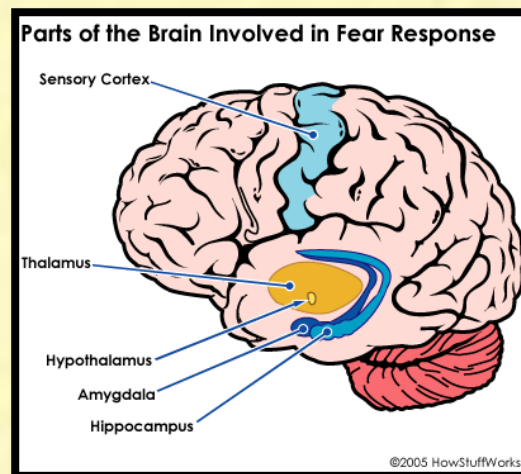
Fear and the Human Mind

-Pallavi Joshi, Third Year

Be it on the night before an important exam, on a terrifying roller coaster ride or simply while talking to your crush - all of us have felt fear at some point in our lives. Perhaps one of the most important emotions, fear plays a crucial role in increasing the survivability of an individual. Having evolved in most organisms as a mechanism of defence, it governs the actions of the body in situations of crises that require quick response.

The limbic system is the part of the brain that is involved in the perception and processing of fear and other emotions such as anger and love. Depending on how threatening the stimulus is, two pathways that can be triggered by it are - the High Road and the Low Road. In the High Road pathway, the sensory information (visual, auditory, etc.) received by the thalamus is sent to the sensory cortex, which in turn reroutes the information to the hippocampus.

At the hippocampus, the memory of the current event is stored and any memory of a similar event is recollected. Then amygdala, the brain's emotional center separates threatening situations from non-threatening ones and makes long-term memories and associations of the threatening situations. The information of the threat is ultimately relayed to the hypothalamus, which on receipt triggers the fight, flight or freeze response, via hormonal signals or through the action of the sympathetic nervous system.



The Low Road, on the other hand, involves message transfer directly from the thalamus to the amygdala and the hypothalamus. Since, the Low Road is the faster route, in many threatening situations, the initial reaction of the body is to freeze with fright and only later analyze and assess fully the situation that triggered it.

The brain receives and stores multiple sensory inputs from the stimuli that initiate a fear response. For this reason, encountering even a single detail related to the initial stimuli can trigger a full-fledged emotional response from memories of a past event of similar nature. This is especially evident in patients of Post-Traumatic Stress Disorder (PTSD) and victims of childhood physical trauma or sexual abuse.

For example, for a victim of sexual abuse, something as simple as the design of the clothes that the perpetrator wore at the time of the incident, can act as a trigger for a recurrent stress response. This behaviour of associating a neutral stimulus

(one that does not cause any direct harm) to an aversive event, in order to predict and prevent similar future events is called fear conditioning. Perhaps the most famous example of this phenomenon was the Little Albert experiment conducted at John Hopkins University in 1919 by the famous behaviourist John B. Watson and Rosalie Rayner. This psychology study involved exposing a 9-month old boy named Albert to harmless white furry rats and recording his behavioural responses.



Albert approached the animals without fear, but when the presenting of animals was accompanied by loud banging noises made by a hammer, the little boy got stressed and started crying. The loud noise acted as the aversive stimulus, and over time Albert started associating the harmless rats with it. As the long study proceeded, Albert's association of the distressing loud noise to the white creatures became so strong that he began associating the colour white with danger and the presence of the neutral stimulus (the white rats) was enough to

elicit the same fear response from him as the loud banging of the hammer.

Fear conditioning has been observed in many animals such as rats and dogs. However, the concept of fear in humans is different than that in animals. While for animals, fear can just be part of a survival mechanism, for humans the meaning of fear may not be restricted just to an aid to survival. It may have a wide spectrum of interpretation and may differ from individual to individual as in the case of phobias.

In the present day life, we have become conditioned to many fears. These may be in the form of failure to succeed, inability to achieve a goal or not being accepted by the society we are a part of. We let imaginary and potentiating fears dictate our lives, forgetting that there are many other emotions to choose from.

Long-term or chronic fear can impair the proper functioning and cause physical and physiological damage to the parts of the brain involved in the fear processing pathway. This can make regulating fear difficult, and as a result the individual may be in a state of perpetual anxiety most of the times, which can in turn have a negative impact on other physiological functions of the body.

Though, the emotion of fear evolved to help us evade danger, sometimes we must evade it before it itself becomes the danger.

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NBRC's team of scientists discovers how damaged neurons can be repaired

-Dilsher Singh Kulaar, Third Year

In a latest finding, a team of researchers from the National Brain Research Centre, Gurugram have been able to experimentally demonstrate how neurons that have been injured or damaged can be functionally restored by the fusion of severed axons. *Caenorhabditis elegans*, a non-parasitic round worm, was the model organism used by them to study neuronal response to injury. The results were published in the Proceedings of the National Academy of Sciences.

Neurons, which are electrically excitable cells, that receive, process and transmit information throughout the body, are the primary components of the central nervous system (which includes the brain and the spinal cord) and the peripheral nervous system (comprising the autonomic nervous system and the somatic nervous system). The information that they exchange can be in the form of electrical and chemical signals. The signals between neurons occur via specialised connections called synapses. Damage to neurons can lead to loss of some vital functions such as motor ability, sense of smell, vision, etc. Neuronal repair is thus a very essential and sensitive area of research, findings in which can pave the way for its applications in human nerve cell damage cases.

The research team, which was led by Dr Anindya Ghosh-Roy from NBRC, also included scientists from Tata Institute of Fundamental Research, Mumbai and Bruker India Scientific Pvt Limited. They showed how the touch sensation of *C. elegans* is restored when the proximal part of the axon fuses with the distal part of the axon.

"This is the first detailed cell biological study to show the basis of functional regeneration of damaged neurons in *C. elegans*," says Dr Sandhya Padmanabhan Koushika, from the Department of Biological Sciences at TIFR, Mumbai and one of the authors of the paper.

To study the behavioural consequence of neuronal breakage, the team had to first find a way to cut axonal processes located deep inside the worm's body. They used two femtosecond lasers simultaneously, one to locate and the other to cut the neurons of their interest. The team felt that it was important to study neuronal regeneration at the functional level, because the significance of regrowth lies in its behavioural recovery.

Functional regeneration after nervous system injury requires transected axons to reconnect with their original target tissue. Axonal fusion, a spontaneous regenerative mechanism identified in several species, provides an efficient means of achieving target reconnection, as a re-growing axon is able to contact and fuse with its own separated axon fragment, thereby re-establishing the original axonal tract. Regrowth of the proximal axons without fusing with the distal axon will not result in functional recovery, they found. "There is no fusion, there is no functional recovery," Dr Ghosh-Roy says.

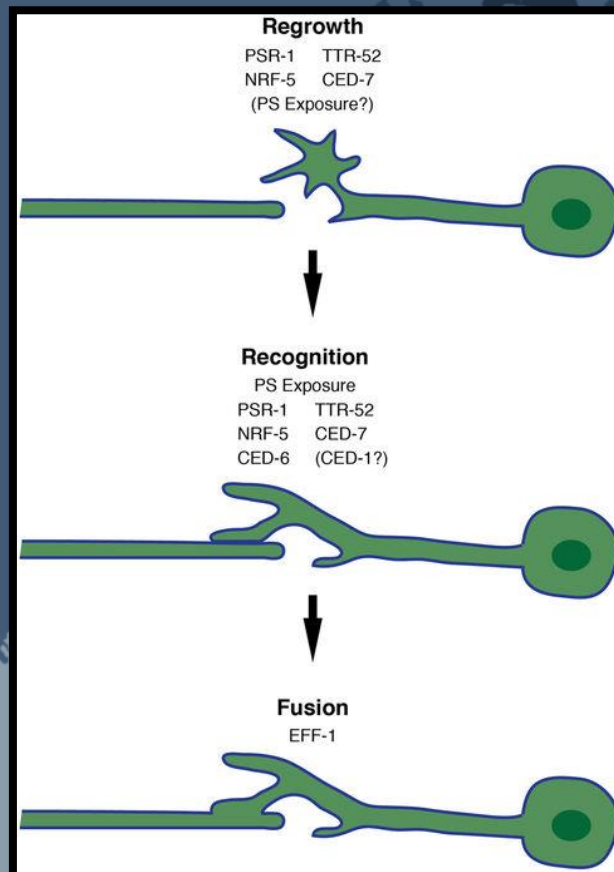


Figure 2 Source: <https://www.nature.com/articles/nature14102>

The researchers genetically proved that three molecules; ced-7, psr-1 and eff-1, are essential for fusion. "In this study we showed that mutants lacking any of these three molecules show normal axon growth but fusion of the axons is perturbed. As a result, the touch sensation is not restored," says Atrayee Basu, a graduate student from NBRC and the first author of the paper. They discovered that let-7 miRNA inhibits functional restoration via Epithelial Fusion Failure-1 (EFF-1) - mediated axonal self-fusion by reducing ced-7 expression. Loss of let-7 miRNA promotes functional restoration in both larval and adult stages. In the L4 stage, loss of let-7 increases fusion events by increasing the mRNA level of one of the cell-recognition molecules, CED-7. In humans, the ability to regenerate neurons gets reduced with age. Now, these researchers have made similar observations in worms. They found that in older worms, even when fusion takes place, the functional restoration does not happen. It could be because the fusion is not

complete and the cytoplasmic continuity is lacking, as the ability to establish cytoplasmic continuity between the proximal and distal ends declines with age.

The researchers used synaptic vesicles that travel from one end of the axon to the other to see if incomplete fusion prevents the vesicle movement or reduces the number of vesicles travelling across the point of fusion to the distal axon. “In larval stage we could see the synaptic vesicle movement into the distal portion from the proximal [after travelling across the point of fusion] confirming cytoplasmic continuity. But in adults, due to ageing, there are fewer vesicles moving, very few axons show connection between the distal and proximal injured parts and there is less vesicle movement in the axons that appear to be fused. So, the cytoplasmic continuity is compromised in the adult stage,” says Dr Koushika.

However, the loss of let-7 overcomes this barrier by promoting axonal transport and enrichment of the EFF-1 fusogen at the growing tip of cut processes. The researchers carried out experiments to find out why despite fusion the cytoplasmic continuity is compromised in adult stage. They found that the amount of eff-1 protein at the tip of the growing axon is high in the larval stage. But in adult worms, the eff-1 enrichment is reduced. In let-7 mutants, the amount of eff-1 protein at the tip of the axons in adult worms is high. The elevated levels of eff-1 protein at the axon tips in adults improve the cytoplasmic continuity.

The researchers felt that although it is not clear whether axonal fusion would help recover the lost function after large injury, which breaks many axons in our nerve bundles, this phenomenon might come into action after spontaneous breakage of axonal process during day-to-day stress induced injury. According to Dr Ghosh-Roy, axon fusion process might be very crucial in the maintenance of neuronal integrity throughout the life span of an organism. The finding that this process can be genetically improved raises hopes for treating nerve injuries in humans in future.

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Does Meditation really work?

- Prateek Yadav, Second Year

Can we cleave ourselves from the desperate, automated need to clamp our hands around our smart phones, from fidgeting for the latest buzz that we could indulge in?

Going by the Gurus of eastern philosophy and regular practitioners of meditation, yes we can.

There are various established schools of thoughts regarding meditation. Of those, Mindfulness meditation has been the subject of sustained scientific inquiry for the longest. At its core, mindfulness meditation involves paying attention—without scrutiny—to the present, moment-to-moment sensations. Often, it's the subtle motion of the breath that is observed while the practitioner is in a relaxed, resting position without letting the observation interrupting the motion. It is now becoming commoner for physicians, therapists, psychiatrists et al. to recommend meditation to their patients. (Investigators at Benson-Henry Institute for Mind Body Medicine at Massachusetts General Hospital and at Beth Israel Deaconess Medical Centre found that meditation's relaxation effects may relieve the chronic condition, Irritable Bowel Syndrome at least in the short term). With meditation, yoga programs galore all over the world and even countries such as India and Nepal serving as their hubs, it's now commonly supposed that meditation decreases anxiety and stress.

But, what does Science have to say on this?

At the outset we must realize that studies on meditation are sadly, marred by biases on the part of researchers who themselves are its long time practitioners and proponents as well as many findings haven't really been drawn to their conclusions. We must be wary of a palpable want of the researchers and the popular media of meditation being an all-out cure to the drudgeries of modern rat-race that's characterized by a lack of work-life balance. Many of the studies done on meditation fail on the account of confirmation bias—researchers simply found what they sought for.

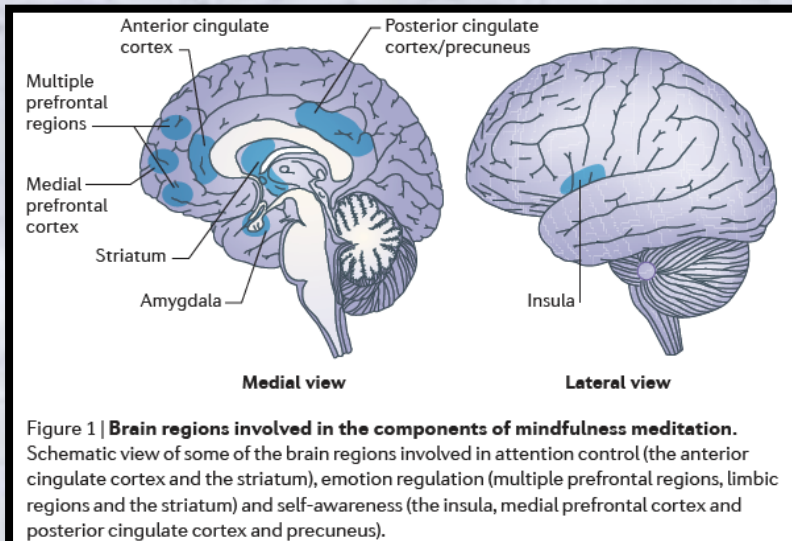
A study of meditation would be in the want if we do not consider the common denominator of all schools of meditation—silence.

In his 19th century wisdom, Sherlock Holmes once acknowledged Dr. Watson, "You have a grand gift for silence, Watson. It makes you quite invaluable as a companion".

Interestingly, it took long for scientists to realize the gift of silence. Earlier, scientists had treated silence as a mere form of nothingness to be used as control in experiments that studied the effects of sounds, music for instance. Only

recently have they begun to actively research on the effects of silence on brain physiology.

In 2013, it was found that 2 hours of silence promoted cell development in the hippocampus of adult mice which is the region that's associated with long term memory. These cells actually grew to become well-functioning neurons.



A few recent studies seem to suggest that brain structures supporting self-referential processing might be affected by mindfulness meditation.

Self-referential thinking is the cognitive process of relating information, often from the external world, to the self.

The general consensus says that the default mode network (DMN) is involved in self-referential processing. This network comprises of midline structures of the brain, such as areas of the medial PFC, posterior cingulate cortex (PCC), anterior precuneus and inferior parietal lobule. These structures show high activity during rest, mind wandering and conditions of stimulus-independent thought and have been suggested to support diverse mechanisms by which an individual can 'project' themselves into another perspective. fMRI studies have investigated activity in the DMN in association with mindfulness practice. Regions of the DMN (the medial PFC and PCC) showed relatively little activity in meditators compared to controls across different types of meditation, which has been interpreted as indicating diminished self-referential processing.

A study in 2014 found an increase of cortical thickness in the right insular lobe and somatosensory cortex of meditation-naïve participants after the MBSR (Mindfulness Based Stress Reduction) training, as well a significant after-training reduction of several psychological indices related to worry, state anxiety, depression and alexithymia.

Meditation has become one of those fields that has attracted much attention and fuelled scientific research due to the sheer positive, empirical evidence for it. Weeding out the early studies due to incorrect methodology and confirmation biases, we can say that research into this discipline is still in its infancy. That many eastern philosophies have independently cultured various, sister meditation practices that have flourished over thousand or more years serves a very compelling and intriguing case for its efficacy. It remains to be seen how exactly does it affect our neurophysiology and we couldn't be more stoked.

NANOTECHNOLOGY: Revolution for a better Evolution

- Rashween Singh, Second Year

Who would have thought “There's Plenty of Room at the Bottom”; a lecture by the American physicist Richard Feynman could be an indication for the development of a new field?

Who would have thought that something, completely unknown to us then, would become an integral part of our lives now?

Well, whatever may have been the cause and whoever may have been the mastermind, nanotechnology has indeed been helpful to us in many aspects and is still raising the bars of making lives beautiful, worthy and easy to live.

A Nobel Prize winning discovery has accelerated the interests of many in the field of nano-scales. The discovery was the invention of scanning tunneling microscope in 1981 by Binig and Rohrer. This breakthrough instrument allowed the measurement and manipulation of individual atoms on a surface.

Indeed its magic is glorifying to an extent beyond the reach of our eyes, be it the deposition of Cadmium selenide nanocrystals on plastic sheets to form flexible electronic circuits; the use of silicate nanoparticles to provide a barrier to gasses or moisture in a plastic film used for packaging to reduce the possibly of food spoiling; production of edge-halogenated graphene nanoplatelets that have good catalytic properties; or be it the development of a solar cell using graphene coated with zinc oxide nanowires to allow the production of low cost flexible solar cells at high enough efficiency.

In an experiment to demonstrate the benefits of nanotechnology for heart, the nanoparticle mediated cell-selective delivery of statins to vascular endothelium was carried out. It was then concluded that this method proved to significantly enhance the recovery of blood perfusion to the ischemic limb, increased angiogenesis and arteriogenesis, and promoted expression of the protein kinase Akt, endothelial nitric oxide synthase (eNOS), and angiogenic growth factors.

Till date, nanotechnology is diversifying and is being used in completely unrelated fields. The benefits have been far reaching with minimal complaints or side effects. It will hence not be surprising if nanotechnology takes over the traditional scientific methods, which can lead to a better future and a better world.

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The Green Around Us

- Prateek Yadav, Second Year

This section talks about the flora found in the campus of Sri Venkateswara College.

"Trees are the poems that the earth writes upon the sky."

-Kahlil Gibran

Trees stand tall like the lighthouse that peers over the rumbling ocean, stoic—as if in stern opposition—and ready to come to the aid of a wandering, worn out seafarer.

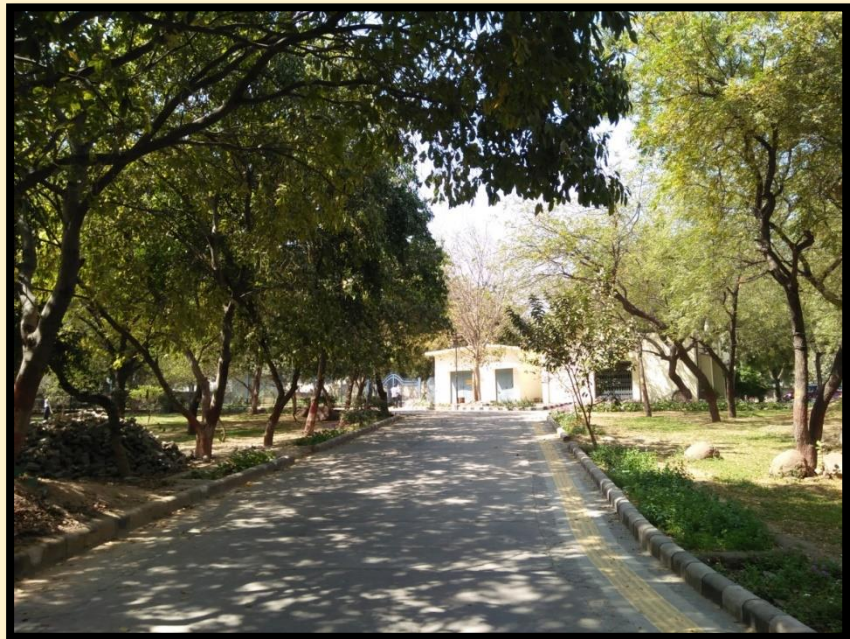
They stand there, symbols of a silent attestation of the ills they have witnessed, the joy they have shaded and the storms weathered.

Thoreau, with his characteristic eloquence, enunciated in his famous essay on walking:

I think I cannot preserve my health and spirits, unless I spend four hours a day at least and it is commonly more than that—sauntering through the woods and over the hills and fields, absolutely free from all the worldly engagements.

Thoreau understood and moreover, relished the significance of the woods, that how rejuvenating a saunter amongst the trees with the sunlight filtering through from above the leaves as one hears only the shuffle of his feet and the rustle of the leaves can be.

In the gardens next to the Principal's residence, there can be seen students hunched over a lappy exchanging ideas with gesticulation while Babblers restlessly chirp and flutter about like naughty kids in the background on Jamun (*Syzygium cumini*) and Bel (*Aegle marmelos*) trees.



As students of Venky, the entrance avenue is going to be entrenched in our minds long after we leave the college.

Every day, upon entering the college, I perform the same drill: whip out the wallet, pull out the ID card—at this point I assume the guard finding my drill legit, nods— shove the ID card back into the wallet, fold it close, slide it back in my pocket and when I return my gaze up I see I've already marched in and I'm greeted by a short avenue of False Ashok (*Polyalthia longifolia*)—their

leaves washed recently, glisten with a morning glow—that's crisscrossed by banners celebrating that day's departmental fest.



False Ashok is called as such because of its resemblance to Ashok tree (*Saraca indica*) which holds reverence in Hindu traditions and customs. The tree, however, has its own perks: it is adept at alleviating noise pollution making it the pragmatic choice for a tree species to be planted in a happening campus such as Venky's.

Further ahead, in front of the foyer is the large looming cotton silk (*Bombyx ciba*) tree which these days, having shed its foliage is a spookily crooked, dirty brown skeleton with the branches thinned at the ends and blending into the background from afar but like the rest of the year, it's decorated with posters, banners boasting of the day's festivities.

Front lawn, in all its green glory moonlights as a grand grassy study especially prior to the opening hours of the library. In the centre, is the cluster fig tree (*Ficus racemosa*) also known as Gular tree in Hindi under whose shade students can be found bantering, brainstorming and blithering.

On its edges we have Fish palm, Amaltas, Chinaberry, Gulmohar. On the edge neighboring the botanical garden we also have Bamboo and Bargad.



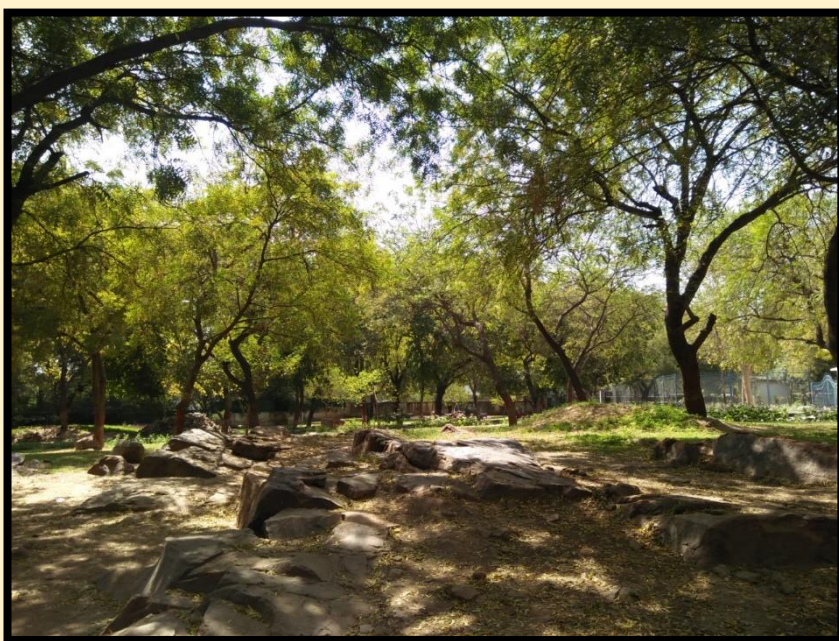


Venky is home to a whopping 400 trees of 55 distinct species. Out of these, Neem (*Azadirachta indica*) is sort of ubiquitous in the campus reaching over 100 in numbers followed by False Ashok (*Polyalthia longifolia*). Neem boasts of a frequent occurrence—playground, rock garden, front lawns, canteen, hostel.

The botanical garden or the nursery exhibits many species: Drumstick tree, Jamun, Sheesham, Amaltas, Bel, kadhi patta, papaya, Spinach, potato, *Brassica* spp., Guava, Pomegranate, Gulmohar, Palash, Peepal, False Ashok.

The rock gardens, another hanging point for students, has rocks lazily yet enchantingly spread out like mermaids cooing for attention under the protection of Neem trees

that are at the edges as well inside. Aside from Neem, there are Shagun, Jamun, Sheesham, Bel. As one travels toward the gardens from front lawns, we see the road is flanked on either side by series of alternating Jamun and Bel trees.



In the canteen Balam Kheera (*Kigelia pinnata*) stands tall, taking in the chatter and the metallic clunk of the plates. Other species include bottle brush tree (*Callistemon viminalis*), Peepal, Kachnar (*Bauhinia variegata*), Kadamb (*Neolamarckia cadamba*).

Behind the stage in the playground are two

special trees belonging the same species: Bahera (*Terminalia bellirica*). Interestingly, it's believed that sitting under their shade brings bad omen as its where demons reside. But, bahera's fruit finds usage in forming *Triphala*, a popular ayurvedic *rasayana* that's used to boost immunity and digestion. The ground is bordered by mostly Neem but others such as Kathal, Jamun, Shahtoot and Gulmohar.

It cannot be too poetic to state that trees emote. Surely, not in the animatedly twisty Jim Carrey-esque way rather in a reflective, supportive manner. They act as diffusers of sorrow and melancholy; harbors of joy and effervescence; illuminators of thought and cogitation.

Acknowledgements - Dr. Amit Vashishtha, Sanjay Kumar (gardener)



GETTING CANDID

THE INTERVIEW SECTION OF VERDURE

Can stem cells cure Autism?

- Sanskriti Sharma, Second Year

According to the **Autism Science Foundation**, Autism Spectrum Disorder (ASD) is a brain-based developmental disorder characterized by social-communication challenges and restricted repetitive behaviors, activities and interests. The learning, thinking, and problem-solving abilities of people with ASD can range from gifted to severely challenged. Such challenges include repetitive motor behaviors (hand flapping, body rocking), insistence on sameness, resistance to change and in some cases, aggression or self-injury. Many individuals with an autism spectrum disorder have significant cognitive impairments, although some have typical or even above average IQs. 30-50% of people with autism also experience seizures.

Autism is about 4.5 times more likely to affect boys than girls, and is found in all racial, ethnic, and social groups. Experts are still uncertain about all the causes of autism. In all likelihood, there are multiple causes – rather than just one. It appears to be that a number of different circumstances — including environmental, biologic, and genetic factors – set the stage for autism and make a child more likely to have the disorder.

There is reason to believe that genes play a major role in the development of autism. It has been found that identical twins are more likely to both be affected than twins who are fraternal (not genetically identical). In a family with one autistic child, the chance of having another child with autism is about 5 percent – or one in 20 – much higher than in the normal population.

Another contributing factor, is the pace and efficiency of brain development in infants. In children with ASD, the brain tends to grow too fast during early childhood, especially during the first three years of life. This reduces the efficiency of the brain's 'pruning' mechanism wherein important neural connections are reinforced and the redundant ones, terminated. Other possible causes include prolonged exposure to heavy metals, prenatal folic acid deficiency and prenatal exposure to electromagnetic radiation.

Currently, there is no 'cure' for Autism. Different interventions or treatment methods rely mainly on ameliorating the various manifestations of this disorder. As these vary for every child, the therapies have to be highly specialized and structured.

Dr. Geeta Shroff, MD, the leading scientist at Nutech MediWorld in Delhi has patented the use of stem cell technology to treat incurable diseases such as

diabetes, cerebral palsy and autism. She has published a paper on the same, titled 'Human Embryonic Stem Cells in the Treatment of Autism: A Case Series'

The technology utilizes human embryonic stem cells that are isolated, cultured, processed and stored in a ready-to-use form for clinical application. The use of embryonic stem cells can cause ethical concerns among contemporaries but Dr. Shroff created the stem cell line using a single, spare, pre-implanted fertilized egg from a regular IVF cycle. They have a shelf-life of 6 months and can be administered through simple IV or intramuscular injections.



My interview with the mother of an autistic child receiving stem cell therapy and the doctor delivering the treatment at nutech mediworld -

Interviewing the patient's mother –

Q. When did you first notice the symptoms of Autism in your daughter?

Ans: Right from birth, every milestone was delayed. She couldn't speak till she was two and a half. So we moved to India from the U.S. because we thought that coming back to India and being with our family would make it easier for her to learn the language. Till she was five years old she was very social and outgoing but academics wise, she was on the lower side. So we went back to the U.S. to get her evaluated that was when we found out that she was on the autistic spectrum. We went on taking her to therapies, wherever we could find it. Any new treatment that we could find, we tried it. After five and a half years, she started calling me mom.

Q. What changes have you observed now that the therapy has been completed?

Ans. It is still at an early stage since her therapy finished just two days back. Now she is at a point where she can communicate her daily needs even though she still has temper tantrums. She has a very strong personality; she wants things to be done her way. At first she was very uncooperative but gradually she started listening to her therapist. She's now able to connect dots and jump around three to four steps. She is calmer and tries to form more words. Slowly but surely, we see her basic functions improving. She makes an effort to talk to us and as a mother, it makes me very happy.

Interviewing the patient's doctor -

Q. How exactly can mental disabilities be cured by Stem cell therapy?

Ans. Human embryonic stem cells are 'pluripotent', which means that these cells divide and can form all other cell types in the human body except the cells of the placenta. So, theoretically speaking, they have the potential to turn themselves into any type of cell. These stem cells have the ability to turn even into neurons, so they improve the blood circulation in the brain and stimulate the formation of new neural connections. Stem cells are also seen to alleviate one of the main causes of autism – neuro-inflammation. Ultimately they can improve the patient's speech, motor functions and even their mood. In autism, though we can't cure it completely, we've noticed several positive changes like in many other injuries and diseases. For example, in the case of spinal cord injury, once the damage has been done, you can't get it fixed anywhere in the world but with the help of stem cell therapy, people who were paralyzed for life can now walk with the help of crutches.

Q. What about this particular case? What changes have you observed in Nitya?

Ans. When she first came here, she was extremely uncooperative, sometimes even violent. She wouldn't even respond to us. Now, she's much calmer and makes an active effort to listen to us. We still have a long way to go. To explain why this is a long process, we need to understand that these are human embryonic stem cells. After fertilization, it takes nine months for the fetus to mature and even after birth, it is only after two to three years that we start observing various milestones like crawling and speech. So even when patients come here for a three to four weeks' duration, the injected stem

cells and the stem cells that the body is making keep maturing and growing, so the changes can be observed, but slowly.

Q. What are the injection sites for administering the cells in this process?

Ans. Usually we give either intramuscular or intravenous injections. In some cases, we inject them into the cerebrospinal fluid. Stem cells have an inert property called 'homing in'. In the case of intramuscular injections, it gets absorbed into the blood stream and ultimately reaches the target site. We make all the cells in the lab, so there are special cells for each case. So far, we haven't ever observed any complications. Even one ml of stem cells, in liquid form, has about twelve to fifteen million cells. Many of these cells die immediately, so not all of them can reach the target site. The body is also making stem cells but that is not in a sufficient amount or in a targeted way.

Q. How is this therapy perceived in the community?

Ans. People are becoming aware about this therapy. But it's still a very gray area, even for the medical fraternity. Not many people think it will work. Even when they do try it, it's a last resort. First they try everything else. In the beginning, they might be sceptical, but as they start to see the progress, they keep coming back. More medical professionals need to start embracing these new technologies so that more and more people can make use of it.

Upclose with Dr Meenakshi Kuhar



What inspired you to become a teacher? Has it always been what you wanted or your initial career plan was something different?

Though as a student in school you are fascinated by your teachers and as a young schoolgirl you always wish to become like them, after my M Sc I wanted to go for PhD in Biochemistry. But I got this offer of teaching in my own college which at that time I could not refuse. So in July 1990 I joined Sri Venkateswara College as a lecture in Biochemistry, a decision which I never regretted in my life. Then later on I finished my PhD from AIIMS in the year 2006.

What is the best thing about science according to you?

The best thing about science is that it keeps you fascinated for all your life and you never get tired or bored of teaching science. It satisfies or answers one question and raises many more to keep you pondering about nature and its wonders.

What is the most satisfying part of your job?

The most satisfying part of the job of a teacher is to see our students doing well in life, be it any sphere of society. You don't derive as much satisfaction and happiness from your own achievements as you get when you see your students settling well in life and achieving accolades for themselves or for the college. As a teacher you feel it is your achievement.

Is there a specific way to teach science when compared with other subjects?

Science is an experimental subject and the beauty of teaching/learning science lies in correlating an observation, data or concept with a large number of experimental evidences. The subject remains fascinating to teach or learn when you corroborate an observation or a concept/theory with experimental data.

What has been the most interesting project you have ever worked upon?

The most interesting project was "Purification and characterization of cytochrome P-450 from goat liver". This was the first Innovation project awarded to college teachers by University of Delhi in the year 2012. I thoroughly enjoyed working on it partly because of the students' enthusiasm about the project and partly because it was based on protein purification which is one of my favorite subjects.

How have the opportunities for a science student changed in the last 15-20 years?

The opportunities for a science student especially in biological science were never as many as they are now. All science related fields have grown at tremendous rate in the last 15 years or so. A number of institutes and Universities have come up including IITs, AIIMS and IISERs. Especially there has been an exponential growth in the healthcare sector which opens many doors for biological science students be it diagnostics, therapeutics or research in medicine.

What personal/professional advice would you like to give us as we step into the next phase of our lives?

My advice to the students is that be focused towards your goals and enjoy what you like to pursue. Above all, work hard to fulfill your ambitions as there is no substitute for hard work. Never pursue knowledge in a superficial way. The hallmark of a science student is depth of knowledge that defines you and gives you confidence.

Which field of science do you feel has shown the maximum growth? What are your thoughts about it?

Undoubtedly biological sciences have grown at such a pace as no other science has in the last fifteen years or so. And that is not surprising as this is the only area where there is a sea of opportunities lying to be explored by young and fresh minds. In spite of all the developments in vaccines and drug design a lot needs to be done and addressed when we look at the medical science scenario today. Malaria, HIV, cancer, neurological disorders and even the infectious diseases are coming back in a big way in the form of multi-drug resistance. Therefore, even the growth of medicine or healthcare sector has been at a very fast pace, it is still at its exponential stage and a lot needs to be addressed and done in the near future.

How has your experience been with Biological Sciences so far? Any memorable moments to share?

I have been associated with Biological Sciences since the course started in the year 2005 and I have seen it growing and maturing as a course. There were teething problems and still there are ups and downs in the path but when I see the teachers and students involved in the all-round development of this course, working hard to achieve success in spite of all the limitations, all moments become memorable for me.

Thankyou ma'am.

WOR(L)Ds of Wisdom from Ms. Ramaa Sinha



- 1. What has been the life's biggest lesson for you?**
-Never judge a person by appearances. Beauty of the soul shines through the intellect and cultural manner of a genuine person.
- 2. What according to you matters more- being a good person or being a successful one?**
-Does achieving success means you are bad? Can't both go together?
- 3. What does science mean to you?**
-Science as an academic pursuit or as a way of life? As an academic pursuit, it is my passion. As a way of life, it is part and parcel of every individual. One need not be a scientist to be of scientific temperament.
- 4. What inspired you to become a teacher? Has it always been what you wanted or your initial career plan was something different?**
-My love for Biological Sciences made me dream of a career in the research field. But back then, four decades ago, there were very few opportunities. Teaching as a career proved to be an equally exciting alternative. I have enjoyed every moment being a teacher.
- 5. What is the best thing about teaching? And what has been your most memorable teaching experience?**
-teaching to me offers a wholesome satisfaction. One, you keep learning to improve your knowledge. Two, there are no boundaries in this job; no boss and no subordinates; all colleagues whether you are young or old are on the same platform. Three, as teachers you are surrounded ever and always by

youthful energy; that makes us feel forever young. Four, extended learning happens for the teachers and students through organized lectures by eminent scientists and experts; visits to scientific institutes and laboratories are also excursions to biodiversity parks, sanctuaries etc. It adds a lot of value to learning.

As to the second part of the question; memorable teaching experiences have been many to put it all in a small space. I shall just include two- Many a times as one teaches a topic taught several times over, a new thought crosses one's mind. It helps out express a concept differently and sends a thrill through. The spontaneity of the occurrences of the thought comes as a surprise- something that books have not depicted.

Another is the interactive sessions or rather a sort of brainstorming sessions we have with the students while debating a challenging topic.

6. Is there any incident that changed your perspective on life or influenced you to become the person that you are now?

-As we go through life, we try to emulate and imbibe the quality we appreciate and admire in others. We are all a patch work of things we adsorb and absorb. I have believed in this philosophy. No path breaking incident occurred in my life.

7. What, according to you, has been the best accomplishment of your life?

-To be a righteous and a duty conscious person, to value time- one's own and that of others. It is a constant endeavour and not a singular achievement so to say.

8. Apart from Science and teaching, what interests you?

-Music, the melodious kind. All forms of art, including architecture. Reading of course.

9. You have been a great inspiration for so many students and teachers, but who has been your biggest role model?

-I am not sure of whom or how others might have been inspired by me. It is because I know for sure that I have never and will never reach the level that I aspired for admiring my role models: One, my mother, an all-rounder in all fields. And two; My biology teacher during my school days. Whose passion for the subject became ingrained in me.

10. Has the teaching method changed from when you started as a teacher and now? How so?

-It hasn't changed. We continue with the traditional and time-tested chalk and board method. We have only extended and enhanced it with power point presentations, Slide projections, and films as teaching aids.

11. What has been the most interesting project you have worked on?

-A survey conducted by my students, over some years regarding "CONTRACEPTIVE Awareness and Knowledge of Reproductive Health"

among college students. I wished to generate a task force to reach schools and volunteer to impart Sex Education that many don't take seriously. However, this remains a pipe dream as school and college timings do not match. Also, obtaining permission is time consuming.

12. What should the students, who wants to pursue research, should keep in mind?

-Why only research? In any field of pursuit, one has to be dedicated, diligent, passionate about the chosen area of interest, update constantly, practice patience and openness of mind. Above all, be honest and learn to rise up from failures. Never give up. Set your own deadlines.

13. What message would you like to give of all us as that can help us in our personal as well as professional life?

-Life is a journey of surprises. Never be bogged down by the troughs and lows, nor be overtly buoyed by the crest and highs. Be balanced and take life lightly... Face as it comes. But yes, in all certainty do take work, very, very, seriously. All the very best to shine in life.

Thank you Ma'am!

Rendezvous with an Alumnus-

Aashutosh Senger

The Biological Sciences (H) course at Sri Venkateswara College (SVC), University of Delhi played a significant role in making me realise my interest towards environment management and interface between science & public policy. The interdisciplinary approach of this course at SVC enhanced my analytical skills and introduced me to the aspect of looking at an issue from different perspectives. The co-curricular activities at SVC needs a special mention as they equipped me with the soft skills which proved to be of great help in the professional domain.

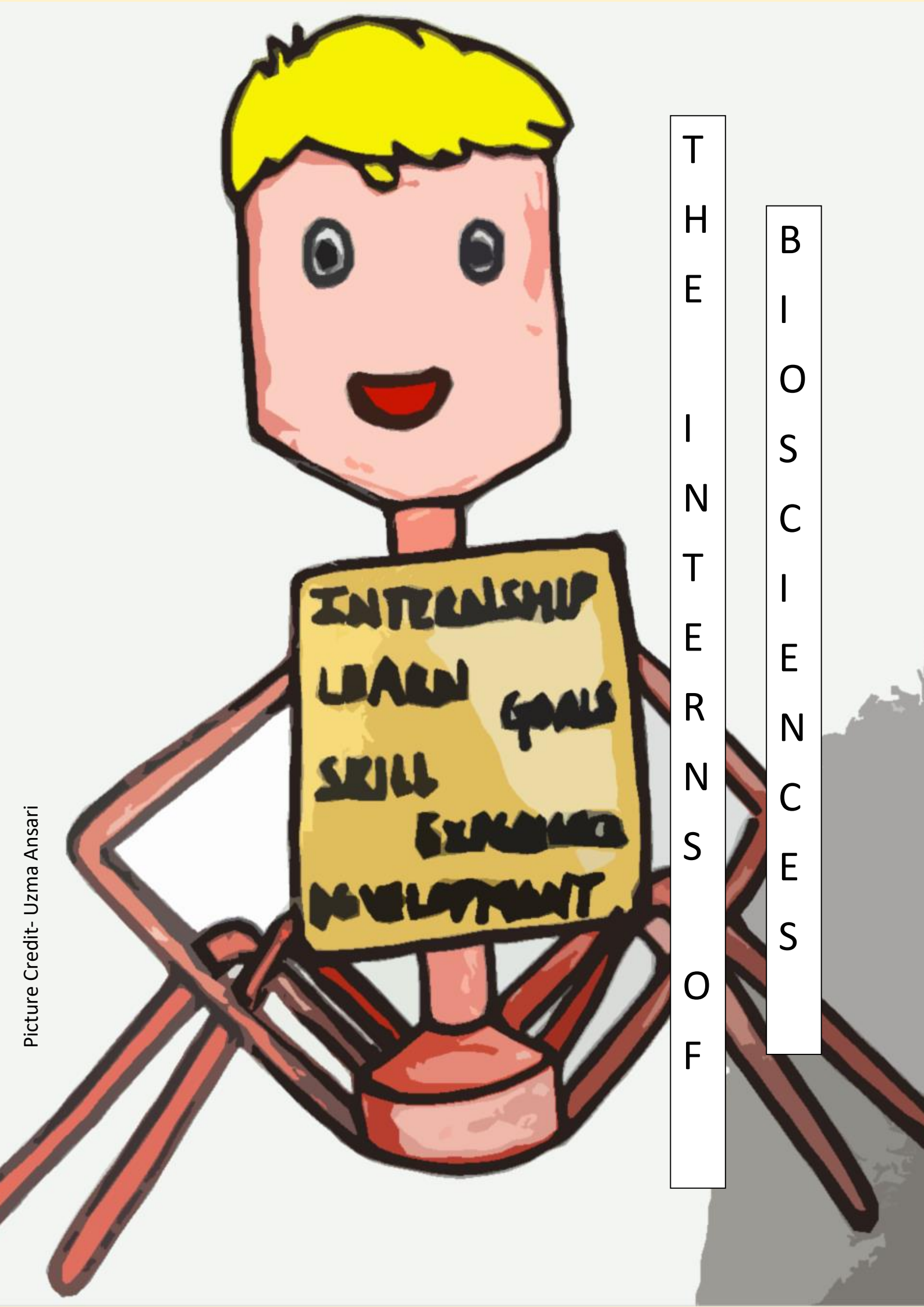


After graduating, I studied a Post Graduate Diploma in Forestry Management (PGDFM) at the Indian Institute of Forest Management (IIFM), Bhopal wherein I specialised in environment management. The knowledge gained while studying at SVC proved to be of benefit as I was able to build a correlation between biological sciences and other subjects at IIFM such as environmental impact assessment, environmental economics, public policy, and climate change.

My major professional work has been in the area of environmental policy and green growth research at The Energy and Resources Institute (TERI), New Delhi. My assignments at TERI included Initiative on Green Growth and Development in India, Program of studies on low carbon development of China & India, and Energy & Environment Goals. Some of the major clients I have had the opportunity to work with are Global Green Growth Institute (GGGI) Korea, Asian Development Bank (ADB), Department for International Development (DFID) United Kingdom and Government of Punjab. I have also served as the Editor of 'TERI Energy & Environment Data Diary and Yearbook (TEDDY)'. As an author, I have contributed to 'Green Growth and Sustainable Development in India' and 'Climate Resilient Green Growth Strategies for Punjab'. I have been a visiting faculty at the International Centre for Environment Audit and Sustainable Development (iCED), Jaipur.

I am currently serving as the Founder of Youth For Earth (YFE), a NGO which aims to empower youth and business community to work towards making our environment cleaner and promote environment protection. YFE hopes to become a common platform for youth and the business community to learn, share, showcase and promote environmental protection and corporate responsibility.

About me: Ashutosh Senger is the Co-founder of Youth For Earth (YFE) and an independent environment policy researcher.



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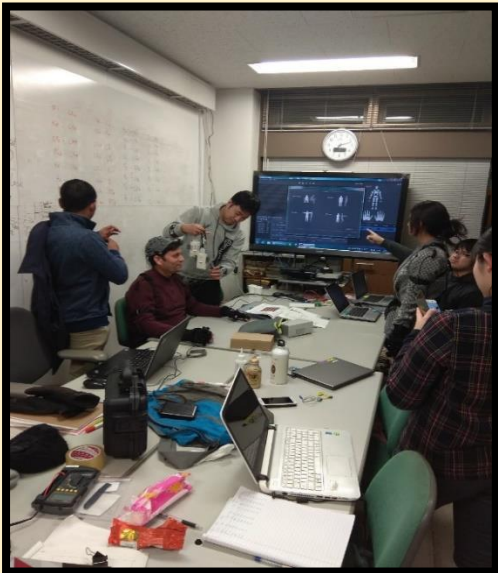
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Picture Credit- Uzma Ansari

The Interns of Biosciences

Pulin

In the 3 years of college life, I did three Internships. These internships taught me so much & enhanced my personality. I found Tembyr Internship from the Internship fair of Kirori Mal College. I took this Internship because I wanted to explore the HR field. This was so fascinating that I probably will pursue HR after graduation. I found Loyelte Internship in the starting of my second year via Placement Cell. The internship was very happening for me and I learnt Merchant and Customer execution. I interacted with a lot of people. The third internship was Preprail. It was a startup of my friend. The whole marketing work was done in the month of June-July in college. It was during the time period when college admissions took place hence I met fresher's. It built my social skills & my confidence level.



Pragya Shaklya

Gandhi ji rightly said, "Be the change you want to see in this world". Small efforts contribute in making tremendous change in the lives of people. I'm very happy to contribute my bit to the society. Interning at Youth for Seva was an amazing experience. I learnt how to organise various cultural activities of the fest, Novoudit. I prepared & taught them activities such as painting, storytelling, Nukkad Natak etc to students. It was a great experience as I got the opportunity to help them build up their confidence & communication skills. This also gave me self-satisfaction & helped me grow as a person.

Riya Vats

I got the opportunity to join the beautiful Eat My News family when I went for the Youth Leadership Conference organised by Eat My News. Working with EMN was really good. Eat My News is an organization that works to form Inspired, Informed and Intelligent humans. I was the member of HR and Talent Management team. It was a 3 months internship. We had the work of promoting EMN at various levels, be it in Internship Fairs, or any fest. We took the interviews of applicants who have applied to be a part of EMN. I was an introvert & a shy person, but after working with EMN it changed me. I improved

my communication skills. Getting tasks every day and completing them on that very day made me a punctual & sincere. I have learnt a lot of patience as well. I am a proud Eatizen and will always work towards making other humans more Inspired, Informed and Intelligent.



Lovlesh

I completed my very first internship at Max Mueller Bhavan, New Delhi. This is also known as Goethe Institute, Federal Republic of Germany's Cultural Institute. Max Mueller Bhavan promotes the study of German language abroad and encourage international cultural exchange. I interned in the library of Max Mueller Bhawan. It is the biggest

library of Goethe Institute's network in South Asia region. I was lucky enough to get paid internship. During my Internship, I supported the library Team in various operations related to selecting, processing and providing information and media on Germany. Additional to this, I did the compilation of Bibliographic lists and media displays. I also helped with the assistance and preparation of visit of school classes to Library and assistance in lending services and guiding users in Library. The best part about doing Internship is that you meet new people and get to know about their life experience and their connection with their workplace. I learned skills such as multitasking, communicating and dealing with ideas and opinions of people. I became more punctual and sincere towards my work. Practical experience teaches you that the books can't and this internship gave me that hands-on experience.



Sanskriti Sharma

Interning with Child Rights and You (CRY) during my winter break was about more than putting 'volunteer work' in my CV. It was a way to use our extensive social media coverage for a good cause. I helped raise funds online for their campaign against Child Trafficking. I'm glad that I could offer my time for something so meaningful.

Ishneet Kaur

I got a golden opportunity to pursue my summer internship at Dr B.R Ambedkar Centre for Biomedical Research, New Delhi. The project evolved around identifying and analysing potent inhibitors against mutant EGFR. It is a receptor which causes mutations & uncontrolled growth of cell leading to cancer. During this tenure, I experienced working in

both wet and dry labs. Dry lab involved use of software's to study interaction sites of model and wet lab included cell culture, to study the effect of potent drugs on HeLa cell lines. Lectures were conducted twice a week by prominent scientists who gave us an insight to researches being conducted across India. This internship was my first experience to real-world research. A wonderful period of learning to handle biggest of instruments to smallest of cell. These 6 weeks were phenomenal, enriched with knowledge, experience, learning and growth as an individual.



Jaya Sowkyada & Akanksha Yadav

It is said that a single moment can change the perspective about how you see the world. It all started with IIT Kanpur workshop which opened the doors to Fukuoka, Japan. We had the opportunity to visit Prof. Hiroaki Wagatsuma's Lab, at Kyutech's School of Life Sciences and Systems Engineering under "Sakura Science Exchange Program" for a period of 10 days (January 7th-16th). We both, along with few Researchers from IIT Kanpur, participated in a practical training on EEG. Being the only biologists in between a team of engineers, the discussions we shared with the team towards EEG and brain were really fascinating and appreciable. We were also introduced to the basics of conducting EEG research, as well as MATLAB for signal analysis. Our project was based on EEG analysis of a game of Rock, paper, and scissors (Yes, it was as much fun as it sounds!). The most important thing that we learned there is that, it doesn't matter how much you know, the only thing that matters is how much you want to know. Our guide professor Wagatsuma made us realise that efforts are always appreciated. We learnt to record EEG data of human brain. Besides this, we also visited a Museum, a Robot



Factory, and Kokura Castle during tour days, and we soon found ourselves mesmerized by the beautiful culture, people, and places.

Harshdeep Kaur

During my second year of BSc(H) Biological Sciences, IASc-INSA-NISA provided me with a golden opportunity to join internship at Dr B. R. A. IRCH, AIIMS, New Delhi under the supervision of Dr Lalit Kumar, Professor and Head, Department of Medical Oncology. My work evolved around investigating the role of PARP-1 and GCS inhibitors in cisplatin-sensitive ovarian cancer cells. Ovarian cancer is the fifth leading cause of cancer-related death in women, therefore, there is a dire need of introducing new and effective drugs which can treat and prevent relapse of cancer in patients.

The feeling that I had after knowing that if my work goes right, it can actually save lives of many patients suffering from cancer, is inexplicable. It motivated me to give my hundred percent. It was great to interact with all the people of the lab, from the scientists to the lab technicians. My experience at AIIMS was phenomenal.

Pallavi

During the summer of 2017, I got the opportunity to intern at the Molecular Genetics Lab at L.V. Prasad Eye Institute, Hyderabad, under the IAS-INSA Summer Research Fellowship Programme. As part of my project to study the involvement of candidate genes in Primary Open Angle and Primary Congenital Glaucoma, I extracted DNA from patient blood samples and then sequenced the specific amplified variations in the genes of my interest. I learnt a variety of important laboratory and experimental techniques such as DNA extraction, Polymerase Chain Reaction (PCR), PCR primer designing, Agarose Gel Electrophoresis, DNA quantification techniques (NanoDrop, Qubit), DNA Sequencing using Sanger sequencing and DNA Sequence Analysis using Chromas software. The best part was perhaps getting the chance to observe eye operations first hand, on my visits to the Operation Theatre to collect patient blood and tissue samples. Though my overall experience was amazing, there were times when the work got monotonous; but then there were always other labs to check out, early morning lectures to attend and the city to explore with my fellow interns.

Muskan Gupta

Visit to Beijing for Internship was the best part of my life. It was my first solo trip. It was a wonderful experience. People were very nice & friendly. Even though they didn't know English that well, they tried to help me in the best way possible from bus tickets to food. They showed a perfect example of humanity over religion and culture. Coming to the internship, I took a 45 days' internship under Prof Xun Suo at China Agricultural University, Beijing. The internship was entirely funded by them. I got to learn many basic techniques like PCR, electrophoresis, cell culture, primer Designing and much more. Collection of oocyst (*E. tenella*) from faeces of chicken, purification of oocyst, transfection of sporozoites in chicken, passing adherent cell, recovery of cells from liquid



nitrogen, DNA/RNA extraction from variety of cells and transfer of foreign piece of DNA into plasmid were also taught in the labs. My major work there was learning the construction of CRISPR/Cas9 plasmid. CRISPR/Cas9 is a nuclease guided by small RNAs, through Watson and Crick base pairing with target DNA. It is representing a system that is markedly easier to design, highly specific, efficient and well suited for highly throughput and multiplexed gene editing for a variety of cell types. Every week I was supposed to give a presentation of what I learned the entire week. This is something that has enhanced my personality. It was an experience that I'll cherish throughout my life.

Liminal spaces

-Prerna Sabharwal, Third Year

"Honor the space between no longer and not yet."

~ Nancy Levin

Does it ever feel weird when you wake up in the middle of the night to go to the bathroom? Or maybe when you decide to go for a late night walk and pass by a deserted playground? Or while walking in an empty parking lot?

A lot of these places are called- Liminal Spaces.

The word 'liminal' comes from a Latin word 'Limen' - which means threshold. Liminal space is transitional. It is the space between 'what was' and 'the next'.

To put it in simple terms, a liminal space is 'the in-between'. It is a curtain that divides here from there. And when you are in a liminal space, a feeling of alienation or wariness sparks. It feels as if everything is there but two inches too far to one side. And your brain is sending you signals to get away from there.

Airports late at night, schools not in session, abandoned buildings, or an almost empty grocery store, all of these places feel apprehensive to even think about. This is because reality feels a bit altered in these spaces due to the reason that we are not supposed to be there during that particular time.

It feels uncanny to us because our brains are hard-wired for our surroundings to be in a particular way - we like things to belong to a certain place and time and when we encounter those places out of the context that our brains have developed for them, our brains are like- GET OUT! ABORT!

Usually, while in college, I see lots of students loitering around the campus, going over their daily routines- that's the image or context that my brain has assigned to college in particular. Needless, one day when I came to college on an off day, it felt a bit odd. Because for my brain the image of an empty college feels wrong and outlandish.

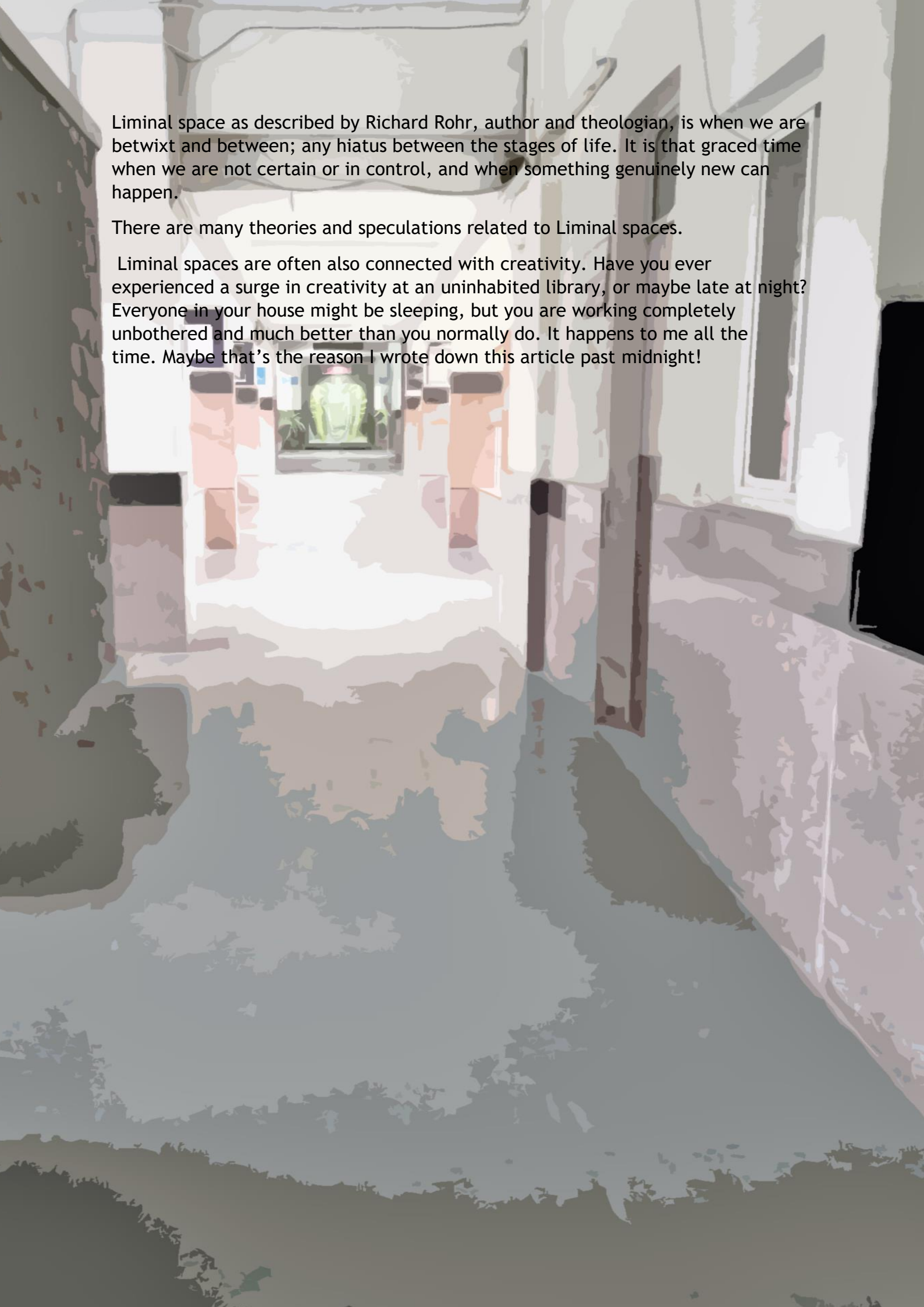
Liminal spaces are often defined as places where the fabric of reality comes loose or as spaces that lie between the known and the unknown. The word liminal first appeared in the field of psychology in 1884, but was introduced in the field of Anthropology in the year 1909 by Arnold Van Gennep.

They are not restricted to a physical presence only. Unknown to us, we all experience the liminal spaces in our lives.

What will I do after college?

Will I get a job?

Will this moment ever pass?

A photograph of a museum hallway. The hallway is brightly lit, with a display case in the center containing a green artifact. The walls are white, and the floor is polished. The perspective is from the end of the hallway, looking down its length.

Liminal space as described by Richard Rohr, author and theologian, is when we are betwixt and between; any hiatus between the stages of life. It is that graced time when we are not certain or in control, and when something genuinely new can happen.

There are many theories and speculations related to Liminal spaces.

Liminal spaces are often also connected with creativity. Have you ever experienced a surge in creativity at an uninhabited library, or maybe late at night? Everyone in your house might be sleeping, but you are working completely unbothered and much better than you normally do. It happens to me all the time. Maybe that's the reason I wrote down this article past midnight!

Everything toxic is not poisonous.

-Prateek Yadav, Second Year

So, you think scientists indulge in frantic pedantry, huh? And you think snakes are poisonous, right?

Well, let me prove you right and then wrong!

When I and my school buddy decided to bunk the school classes post our chemistry practical, I had no idea the follow-up events would act as an apt prologue to a science article years later.

Located in the posh South Delhi, our school is bordered on one side by lush forests—yet to be pillaged by the invasive vilaiti keekar that has had NCR's wild areas under siege—that fall within the premises of Cantonment area. Crossing over the school wall from this side into the forest was our Escape Plan. We were supposed to wade through the flora along the school wall which would lead us to the main road in about 10 minutes, we had surmised. Once on the road, fresh aloo paranthas smoked on tawas, waited for us at a famed Dhaba.

Well, we had surmised wrongly. Along that route, teachers from the Montessori section would have seen two lanky adolescents in the school uniform, scampering through the mud and bushes as if they had invented their own dance form. That a few of them had taught much cuter versions of us years before didn't help our cause—it merely turned our cheeks redder under all that facial hair. So, we decided to take a detour that would add possibly 10 minutes more, again we had surmised.

"Yaar, those aloo paranthas better be darn good", I chortled. Our escapade though lengthy had had us elated. My friend roared back.

Along we went, like two merry bandits who had just had the greatest loot of their lives, laughing, trying to one-up the other in banter.

"Prateek!", He cried out under his breath, "Snake! Oye! Snake!"

"Haha! Dude, please. I'm not falling for that."

"Nooo! Fool, look down. It's there—"

"Stop speaking in hushed tones man! I know you are playing games" I retorted, with a smirk on my face but beginning to get peevisish at his unrelenting pranks.

"Prateek, look! In. Front. Of you."

"WHOOAAAAA!"

That shut me up good.

I was two steps ahead of him and yet, he was the one who spotted it first—long, smooth-scaled, pitch black, this snake's head was pointed right at us.

"Dude, you owe me", He triumphantly proclaimed, still in awe of the magnificent creature that lay in front of us.

A sheepish smile is all I could manage in response.

Having taken another detour to avoid pissing off the snake, we kept wading through the thickets, still wide-eyed, we exchanged nervous chuckles, words of awe and shock as well as fear for what could have happened had I kept on trotting in the way of the snake, merrily.

"It must have been poisonous", he affirmed as he carefully held down a whippy, thorny twig which blocked our path.

Nuh-uh Bro.

Snakes, aren't poisonous. Well, except for one. But we'll get back to that later. When people say poisonous, what they actually mean is venomous.

A rather simple distinction is: if it bites you and you die it's venomous; if you bite it and you die it's poisonous. Either way, you are dying. What a poor way to conduct an inquiry when the results are only out posthumously!

So, let's make a better job of it.

One would think that these two terms would be fairly easy to distinguish with a cursory foray into scientific literature. Turns out, it's far more muddled than that and the above distinction is only good enough for a layman. Only recently have attempts to establish universal definitions to these terms have been made and that too sparsely. How long will this process take? And how longer would it take for the proposed definitions to slither in common parlance remains to be seen. But this is where this article comes in. Additionally, what makes the matter messier is that any attempt of standardization is obstructed by exceptional cases.

Both poisons and venoms fall under the umbrella term, toxin. Toxins are substances that, when present in relatively minute physiological concentrations, cause dose-dependent pathophysiological injury to a living organism, thereby reducing functionality or viability of the organism.

Here, though possibly digressive, it's pertinent to delve into the semantics of toxin vs. toxic. Simply, anything can be toxic but not everything is a toxin. Water, for instance, can be toxic if consumed in unusually high amounts but it can't consequentially be called a toxin since that'd require it to be harmful in low concentrations which it cannot be (it sustains life!).

The frustrating ambiguities around the two terms notwithstanding, there is indeed a distinction between the two: primarily, in the delivery mechanism. Poisons are passively transferred to the other organism via ingestion, inhalation or absorption without causing any injury/wound upon the organism; whereas venoms are actively (or passively in few cases) transferred to the other organism via a specific puncture wound that could be created by specialized (front-fanged snakes) or

unspecialized (Formicidae Ant Family that bite with mandibles and then spray venom through their abdominal storage glands into the wound) structures.

Uniquely, poison can cause self-induced toxicity courtesy a dysfunctional metabolism meaning the poisonous animal can in fact, poison itself.

In regards to the chemical differences, poisons are generally composed of secondary metabolites that are simpler than the venoms which are peptides or proteins. This is the reason why ingesting a cobra venom won't do any harm as your body would digest it like any other protein into its harmless individual constituents unless there's a laceration in the alimentary canal by way of which the venom—intact—could enter the bloodstream, wreaking havoc on your body.

As a consequence of this difference in the structure, poisons are easily able to penetrate the external surface of the organism they come in contact with. Plus, they cannot be broken down when ingested by the organism thus, retaining their toxic functions. Venoms, due their larger size, cannot be absorbed by the victim's external surface.

It's also thought that since poisons are secondary metabolites formed via an array of complex chemical reactions catalyzed by multiple enzymes, they might be less able to undergo rapid evolution. Venom, however, doesn't have these constraints as it is usually administered directly into tissues and is able to undergo evolution at a faster rate leading to greater variance.

Poisonous animals mostly use poison for defense whereas venomous animals use their toxin for predation as well as defense.

Coming back to snakes, most of the species do not harbor toxins at all—pythons, boas, wolf snakes and others far too many to list are neither venomous nor poisonous. However, amongst the ones that do harbor toxins, all are venomous. But, there resides a lone outlandish case of the fantastically beautiful Tiger Keelback or Yamakagashi (*Rhabdophis tigrinus*) which has the distinction of being both venomous and poisonous. Yes!

The Yamakagashi eats local poisonous toads and sequesters their toxins, bufadienolides in the specialized nuchal glands present on the back of its neck which renders itself poisonous if ingested by a curious predator.

Tiger Keelback is also venomous but it's of the rear-fang category of venomous snakes so bites are rare and one would suppose, made rarer by its antipredator poison tactic. It produces venom in specialised glands called, Duvernoy's glands and injects it via grooves present on its fangs that are located at the back end of its upper jaw. Interestingly, it's also been documented that pregnant female tiger keelbacks are able to pass the toxins acquired by eating poisonous toads to their progeny.

Things get spookier still. It's been found that gravid female tiger keelbacks actively seek out poisonous toads to feed on so its progeny could begin their lives with the

security of a poison packed neck which is amazing because their diet otherwise mainly comprises of non-toxic toads.

So, to conclude:

Poison—a toxic substance (comprised of one or more toxins) causing dose-dependent physiological injury that results in self-induced toxicity (e.g., bacterial endotoxins) or is passively transferred without a delivery mechanism from one organism to the internal milieu of another organism without mechanical injury, usually through ingestion, inhalation, or absorption.

Venom—a toxic substance (comprised of one or more toxins) causing dose-dependent physiological injury that is passively or actively transferred from one organism to the internal milieu of another organism via a delivery mechanism and mechanical injury

So, that snake we saw when we skipped classes could have been venomous or not but it certainly wasn't poisonous because we weren't in Japan.



THE WONDERFUL (FAKE) SCIENCE BEHIND THE FLASH!

- Namit Malhotra, Third Year



His name is Barry Allen and he's the fastest man alive. I mean he's really fast. The Flash can even outrun THE LIGHT! Light travels at 186,282.397 miles per second which means if you were to travel at that speed then you'd be able to go around the world seven and a half times in one second!

At some point in our lives, we've all pretended that we can run very fast.

However, this childhood dream was lost when we started learning about a little thing called *dramatic music* "PHYSICS!" (biology too) and with that, we understand how the world works (and away went our dreams of saving the world).

Well firstly when we run, we use energy. Calories are a measurement of energy in food, so when we use energy we burn calories. The faster we run, the more energy we use, the more calories are burnt. But that would mean for someone the same height and weight as The Flash, they would burn **237,000,000,000,000 Calories, running half the speed of light!** With that said, one of the most interesting bits about comic books is trying to figure out how these purported superpowers would work in real life. Questions like this pose a bit of a conundrum for science-minded people, as comic book writers often do not care about the physical implications of said powers. I mean, who cares, even if he could travel at light-speed, he would utterly annihilate anything/anyone that he punches with that super powered arm?

Bearing all this in mind: To analyse The Flash, we need to make some assumptions:

- The Flash's body can exert the force necessary to move very fast, and his body can withstand forces of this magnitude.
- The Flash's brain can sense things very fast, ergo he can think on his feet (get it?) and can process external stimuli just as quickly as he can move.
- The Flash has enhanced momentum, which allowed him to enhance the force in his attacks, strikes, impacts and collisions, often propelling objects or people several feet, that he used to compensate for his average human strength.
- The Flash has a hyper-accelerated metabolic rate, enhancing his physicality and ability to move and act (man! I wish I could do glycolysis and TCA this fast).

- The Flash can function in a stable internal environment that requires constant monitoring and adjustments to his condition that changes constantly, meaning he can resist the effects of friction and temperature, while moving at incredible speeds.

So can we run as fast as The Flash?

No. No we can't

Given that an average man needs around 2,500 calories per day, that would mean that if you wanted to run at the speed of light you would have to eat a LOT more food. No one has an appetite that big! But that isn't the biggest problem. If we were to run at the speed of light, then the air molecules in our path wouldn't have time to get out of the way. You would tear apart the atmosphere creating a huge atomic explosion that would destroy both you and everything around you, which wouldn't be good. (However the flash can move so fast he is able to vibrate his atoms at such a frequency that the air molecules can pass through his mass. It also means he could run through a wall with the wall remaining intact as it would just pass straight through him. LOL!)

Another implication of moving very fast is the friction that our movements produce. Friction, in turn, produces heat. So, if someone is moving at the speed of light, he'd literally die due to heat. SO, assuming Flash's body can withstand this heat, his costume should be made of a very heat-resistant material to prevent the latex costume from melting and going where no latex has ever gone before (hopefully). Now that we've got that uncomfortable theoretical out of the way, let's discuss the logistics of his job. The Flash usually uses his power to save people from danger by carrying them to a safer place, but in reality, Flash can never do this. To be able to carry people and move at a very fast speed, you need to accelerate, and there is a limit to the acceleration that the human body can withstand (this also poses a danger to all warp-speed engine designs). This is because our body is not entirely solid. Our brain would be smashed into our skull and our inward fluids would condense to the direction opposite of our direction of motion.

So, if lightning struck you like a JOLT!

Or even if you are Usian Bolt!

If you try run like Quicksilver, Dash or THE FLASH!

You are sure to get a WHIPLASH!

ALSO, in the present scenario of the advancement in science and technology ANYTHING is possible. So keep DREAMING!

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Queen Bee

-Shriya Sharma, Third Year

I'm the Queen, and I don't need a king
Drones and workers are enough for my fling

I live in the royal chambers,
Home is my beehive
Once I'm pregnant,
Only I know how I strive

Unfertilized are the Drones,
Appear to be each other's clones

My daughters are my enemies,
They will kill me once they have hatched,
Stronger one has to be, to be the queen,
& Yes!! My title will be snatched

Life in the hive is like game of thrones,
We might look happier outside, but inside; everyone groans



DNA RAP

- Sushma Singh, Kajal Yadav and Harshit Chawla

DNA bola nahi katega tera din,
Oh mere bin, mere bin, mere bin;
Nucleus mein tu mujhe dabake rakhle,
Tabhi toh honge tere kin, tere kin, tere kin.
Chal ab baat kare mere structure ki,
G se jude C aur A se jude T,
Pitch hoti meri 0.36 nanometre,
Meri baat maan le warna tu kehlayega cheater

Gyrase ne aake bonds kiye mere break,
par apun ko tension nahi baad mein ligase laga dega cello tape,
5' to 3' mein koi nahi hai complexity but 3' to 5' mein aa jaate Okazaki
Double strand mein karta hoon main exist,
H-bonding aisi koi na kar paaye twist,
Ek se bhale do aur do se bhale chaar,
Yehi mera aim samjho mere yaa,r samjho mere yaar, samjho mere yaar

Single strand kehnda mainu double karo,
kahan hain DNA polymerase ussey khabar karo,
aa gaye saare primers aur aa gaye SSB,
tab jake meri thodi himmat badhi,
Mil gya better half aur lagi lottery,
replication ho gayi khatam ab krenge tafree
RNA polymerase aaye mere paas,
bole thode RNA banade mere yaar
Main bola sigma factor ko toh aane de,
Main bola sigma factor ko toh aane de,

hum dono akele kya karenge aankhein chaar

mRNA se pucha kahaan hai tera home,
vo bola jaaunga hotel jiska naam hai ribosome
Wahaan par hogi party-sharty jo chalegi puri raat,
Aayega tRNA apne biwi bachcho k saath
50S aayi usne jamayi mehfil,
P se bola A tRNA aage khisak sak sak
Baby what the...

Dheere dheere baat aage badne lagi,
Aayi protein ki haseena aur sbki taaliyaan baji ,
mRNA kehde ohnu mere naal tu chal
par yeh sunkar sabki nikli hasi
Protein nu vi aaya tha cell ka phone,
Kenda Enzyme hogye khatam jaldii aaja mere kol
Agar achha lage rap toh kehna hume Eminem

Warna...

Karlo rehem thoda krlo rehem
Karlo rehem thoda krlo rehem!!



Why GK shouldn't be a part of school curricula

- Prateek Yadav, Second Year

With a heavy-eyed appearance, I drag myself to the study located in the obscure corner of my bedroom—a small space whose sleek, plywood desk greets me as I stand in its front—its yellow luster accentuated in the sunlight as the star beat on the window above the desk on a funereal July afternoon.

Oh, well. This is horrible.

Moments later, strident voices that roared "Out hai", taking the shortest route from the playground, nestled in my abode.

Unfairly horrible.

The door of the study was ajar, as if expressing my reluctance to read. Or it seduced me to shut it and guzzle a glass of *jal-jeera*. I didn't know.

Post lunch, my family had laid down, spread out on the beds. Their tummies filled with *rajma chawal*, they had unfurled themselves and slumbered without a care, making full use of a Sunday afternoon lull that preceded the challenging restlessness of a Monday. I couldn't operate similarly as I had a test to care for. The background snoring of mum and dad that mingled discordantly made sure that their instructions to me didn't abate as did their wakefulness.

Prateek, you can't play this afternoon. Better study for the test!

Yet, I had the urge to put off the work, wishing to play with my batman figure toy. I was there at the study. Present. But vacantly.

I caught myself listening for a dip in their snoring rate. When I sensed one, I instantly made a sort of trigger movement toward the study.

The desk in the study was a mess, strewn with books, a variety of stationary boxes; color pencils were coated with dusty grease telling of the rarity of the service they provided. In all its sturdiness, the desk stood firm, not much shorter than the fifth grader I was. Yet it seemed it called out to me to clear the clutter. I ignore the plea.

Heedless, I shamble toward the books at a sedate pace, swipe them to break the half-done bundles, and in a single quick scan I pick the one with Neil Armstrong & Bachendri Pal decorating its cover. Oh, there were other images of course but they have escaped my memory since. This post is to tell you why...

The bed's old wooden structure creaked as I slumped on it with a thud; after a stretch I lay sideways, one leg piled on the other and my arm supporting my head ergo a gaze on the *General Knowledge for Kids* book that rested open in front.

I turn to the Awards section, we were asked to memorize it for a test scheduled the same week.

The Nobel Peace Prize in 2004 was awarded to _____

Hmm...uh... Wan-gaari Muta Maa-tha-ee.

I probe my way through the spelling and the perceived pronunciation and perform several reruns.

Nobel Peace Prize 2004 Wangari Muta Maathai.

Wangari. Muta. Maathai. Wangari Muta Maathai. 2004. Wangari Muta Maathai. 2004. Wangari Muta Maathai...

My problem is not with the way GK is taught but the fact that it is *taught*.

GK mustn't be a chore that requires the index finger sweeping over the text, line by line while the mouth shoots off the processed data. It mustn't be a set of info ordered in bullets ready to be ingested via meditative repetition.

Rather it's something to be imbibed and acquired through experiences, interactions, adventures by venturing out of the study. It's precisely a skill that must be developed *outside* of the classroom, away from the books.

Indian education system--gelded and held in disrepute for its focus on rote learning-- adds another symptom to the ailment by attempting to mould students into robots that could rattle off trivia on demand.

Dolefully, the torturous exercise that I, as a fifth grader endured, finds itself replicated in the studies of students preparing for AIIMS entrance examination whose paper has 20 enquiries which are into the locations of obscure monuments and authors of arcane books and producers of cryptic films.

The question I pose is--why? Why should one be tested on his trivia kitty in the four walls of the classroom? Of what use is the ballooning of a meshwork of information that robs children of their precious time that could otherwise be utilised in doing stuff? Doing what, you say? Nothing in particular.

Maybe sauntering with one's buddies. Maybe going to a nearby garden and stealing guavas. Maybe crouching near bushes, observing grasshoppers hop from one woody branch to another on a twitchy whim beyond our comprehension.

Don't teach. Let them learn.

That this complaint is delayed by a decade bears testament to my procrastinating abilities which, possibly, stand unparalleled. Maybe I'll get an award for it? Maybe kids will rote learn my name? For a GK test? Just to relieve our students of the struggle, I suggest my name be written in *Devanagiri*.

A Novel Approach for Production of Electricity from Noise Pollution

Vaibhav Mahaja, Sanskriti Sharma, Ishneet Kaur, Jaya Sowkadha

Concept: When we hear, the sound waves are converted into mechanical vibrations on the tympanic membrane. These vibrations are amplified by the three ossicles of the middle ear - malleus, incus and stapes, in that order. These small bones work like a basic lever system. This enables us to hear even the faintest of sounds. Using this process of amplification, our system would generate electricity from noise pollution. A piezoelectric material would act like a transducer, converting these mechanical vibrations into electric current.

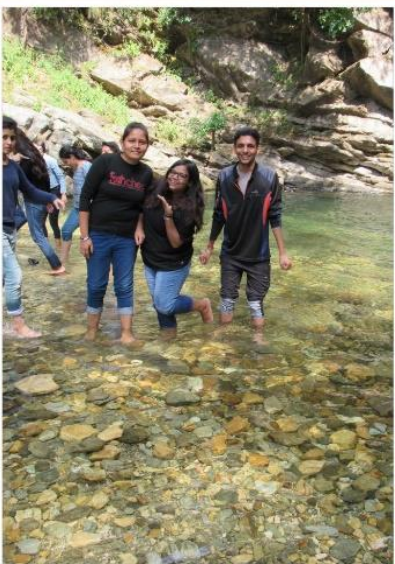
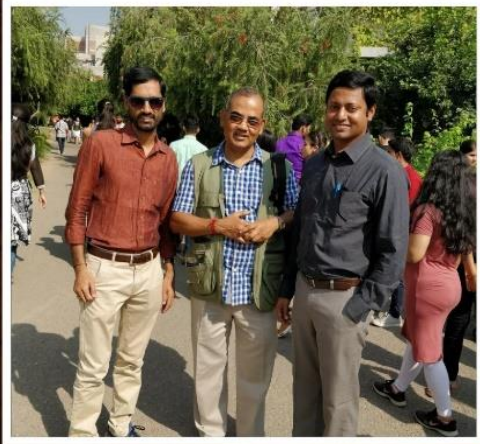
Innovation: A common obstacle for efficient electricity production from noise is the inability to utilize ambient noise. Inspired by nature's best model, the ear, our system would consist of a thin elastic membrane attached to 3D printed models of the three ear ossicles. The stapes would be attached to a piezoelectric material, PZT (Lead Zirconate Titanate). Sound waves (noise) striking the membrane would produce mechanical vibrations in it. These vibrations would be amplified by the lever system and would in turn mechanically stimulate the PZT. Due to the asymmetric unit cells of PZT, a mechanical stress on it would displace its structure causing a displacement of charge. This would create a potential difference over its surface, thus producing electricity.



Impact: The modern human civilization is powered by electricity. About 85.7% of electricity is produced using non-renewable resources, which are limited. In addition, their use creates different kinds of pollution. We aim to use noise, which is a constant source of stress in metropolitans, to our benefit. Combining this with the highly efficient model of our ear, presents us with a novel approach

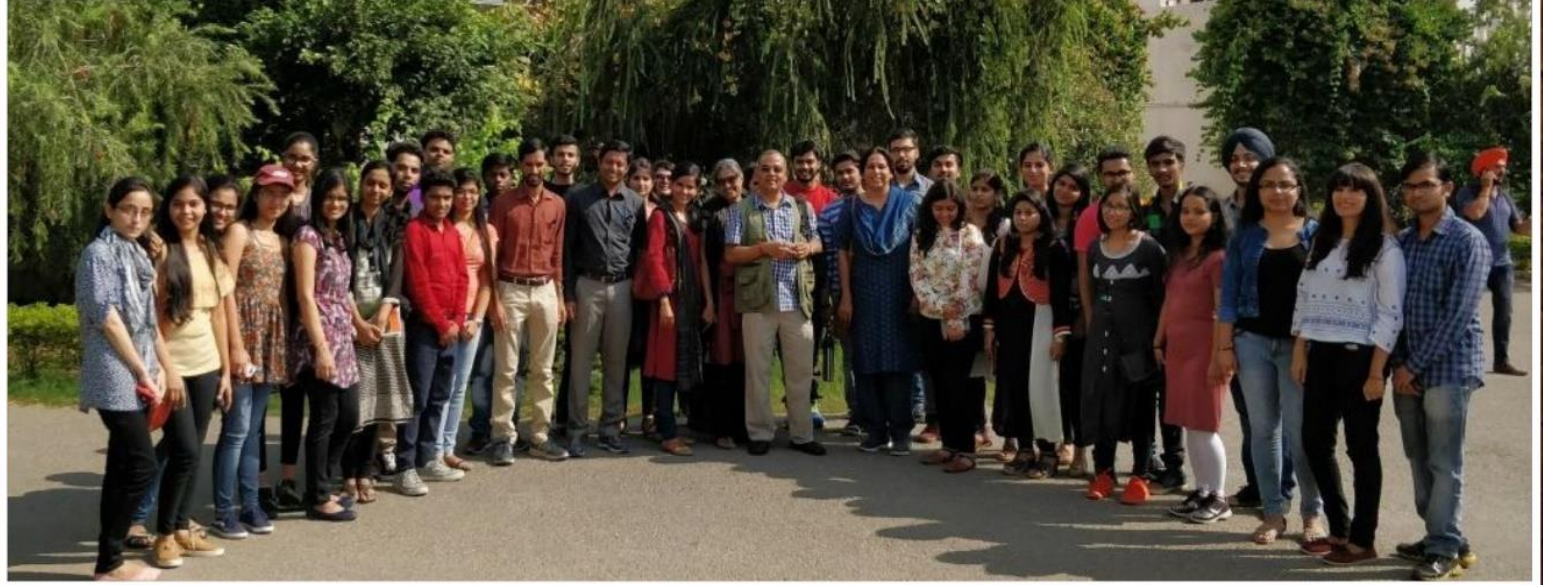
for the utilization of the constant noise that surrounds us.

▶▶▶▶▶ *let's go on an*
ADVENTURE
◀◀◀◀◀



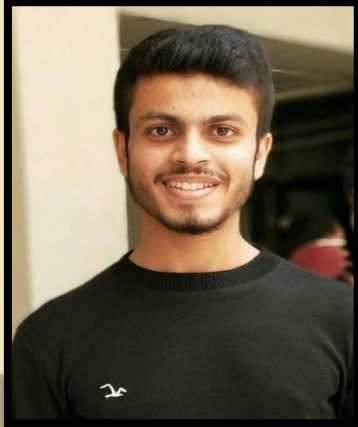


The Good Vibe



The Batch of 2018

GOODBYE



Abhishek Biswas

The pillar of your dream house is your passion so just follow it and glow the world with the glory of your passion.



Aakanksha Dogra

Be humble in your confidence yet courageous in your character.



Akanksha Maurya

I may not be the best, but I know that I am not like the rest.



Dilsher Singh Kulaar

If more of us valued food and cheer and song above hoarded gold, it would be a merrier world.

- J. R. R. Tolkien



Atrayee Gope

Wherever life plants you, bloom with grace.



Harshit Chawla

Everything I do is spectacular, it's a curse!!



Harshdeep Kaur

Train Hard, Fight Easy



Jyoti Pal

In the middle of every difficulty lies opportunity.



Kajal Yadav

I don't believe in taking "REVENGE", I just use my powerful weapon "IGNORANCE"



Lovika Rajpal

I believe in doing the right things, that's who I am!



Monika Sharma

You are only given a little spark of madness; you mustn't lose it!



Madhulika Vyas

A warm smile is the universal language of kindness.



Madhu Gautam

Be known for your kindness and grace.



Neha Adaikkappan

Make it simple, but significant.



Namit Malhotra

Accept the good in your life, like me. I'm a delight ;)



Pallavi Joshi

If you can't be the poet, be the poem.



Pooja Jha

The best preparation for tomorrow is doing your best today.



Perna Sabharwal

Be so completely yourself that everyone else feels safe to be themselves too. :)



Priyanka Goel

It is not in the stars to hold our destiny but in ourselves.



Pulin Goyal

To unknown hearts and immortal souls, try living today.



Rajan Yadav

Allah does not burden a soul beyond that it can bear.



Rohit Goyal

Right intentions are more important than a good result.



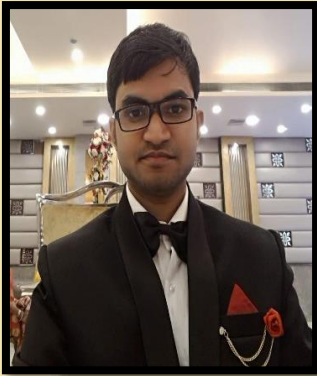
Rohit

A great man is different from an eminent one in that he is ready to be the servant of the society.



Sandeep Kaushal

Cultivation of mind should be ultimate aim of human existence.



Shubham Kumar

Sweat now so that you can smile later.



Sushma Singh

Cherish your visions and your dreams as they are the blueprints of your ultimate achievements.



Shriya Sharma

Personality begins where comparison ends.



Suneni Bhatia

Be the exception.



Taranjot Dhillon

And those who were seen dancing, were thought to be insane by those who could not hear the music.

About the back cover

THE SOURCE OF INFINITE THOUGHTS: A BIOLOGIST'S BRAIN

The back cover of *Verdure*, is based on the theme *The Heart and The Brain*. As humans we readily assign meanings to objects to make our understanding of the world much smoother, and to create 'shortcuts' in our brains to make sense of everything around us.

The way we see our heart is the reflection of how we view ourselves as human beings. The ancient Egyptians saw the heart as an organ of truth. Greek thinkers, such as Hypocrite and later Plato suggested that the brain is where the mind resides and that it served as the source of all thoughts and actions.

"The heart is a pump that does respond when the brain asks it to, but it is not enslaved to the brain. It seems science is now restoring to the heart something that rightfully belongs to it: Our Emotions."

Mind has been variously defined as that which is responsible for one's thoughts and feelings, the seat of the faculty of reason or the aspect of intellect and consciousness experienced as combinations of thoughts, perceptions, memories, emotions, will and imagination, including all unconscious cognitive process.

Cover design- Akanksha Yadav

