



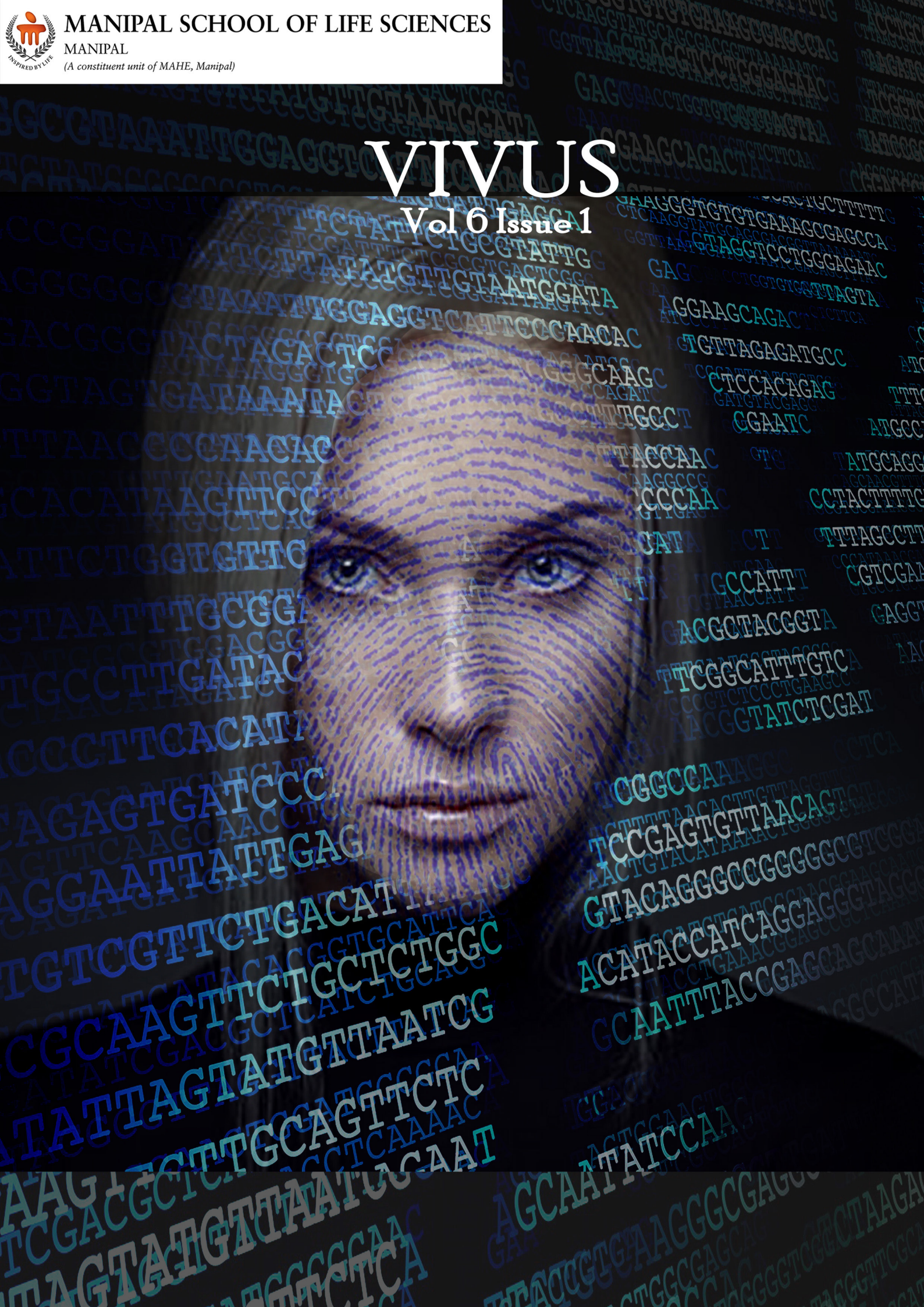
MANIPAL SCHOOL OF LIFE SCIENCES

MANIPAL

(A constituent unit of MAHE, Manipal)

# VIVUS

Vol 16 Issue 1



Dear Readers,

It goes unsaid that the year 2020 has been unlike any we have encountered thus far. Amid a time when staying indoors and staying safe takes a front seat priority, we bring you a colourful edition of Vivus volume 6.

You are reading what you assume as a college magazine, and for the most part, you are right. This is, indeed, a lovingly crafted combination of articles sent by the students, professors, research scholars of MSLS, poems reflecting their feelings and art that is an extension of their soul.

But then again, this isn't just a book now, is it?

It's a representation of the very institution we are in. In fact, alongside the visionary faculty and dedicated staff, we make Manipal School of Life Sciences. And this is nothing more than us trying to condense our collective spirit in the form of a newsletter.

To know what has been going on at MSLS for the past few months, go through the Events section and get words of wisdom in the Interviews section. Find really interesting information and cool stuff in the Science section and move on to the Creative Corner for the poems, artwork and pictures from some of the really talented and creative students of MSLS.

Vivus has been a very important part of MSLS. Firstly, we are immensely grateful to our dear Director Sir, **Dr. Satyamoorthy** who has been a constant support and has guided us through every step in bringing out this new volume of Vivus. We would also like to thank our faculty advisors, **Dr. T. G. Vasudevan**, **Dr. Vidhu Sankar Babu** and **Dr. Saadi Abdul Vahab** for their reviews and advices. We would also extend our thanks to the various committee heads for their help and to all the students who represented us at the interviews. A big shoutout to all the students who sent in their articles, poems, sketches and photographs.

We hope we did some justice to the essence of MSLS and expect more articles and creativity from everyone for the next issue.

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Presenting Vivus – Volume 6, Issue 1  
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From Halloween party to Onam to the Symposium, catch up with what has been going on at MSLS.

## INTERVIEWS

Science talk, research projects and pep talks all rolled into one.

## THE WORLD OF SCIENCE

Read interesting pieces about catching serial killers using DNA fingerprinting and much more.

## CREATIVE CORNER

“Words, in my not so humble opinion, are our most inexhaustible source of magic.”

-Albus Dumbledore

SNAPSHOTS , SKETCHES AND MORE...

*Namanpreet*



What's up MSLS?

*Namanpreet*

# Teacher's Day at MSLS



**“The best teachers are those who show you where to look, but don't tell you what to see.”**

This is one of the many quotes that describe our teachers at MSLS. And what better day to show our gratitude to our teachers than the Teacher's day!

Teacher's day is celebrated on September 5 each year, commemorating the birthday of Dr. Sarvepalli Radhakrishnan, the second President of India. This day was celebrated at Manipal School of Life Science this year with great gusto and fervour. The student council, in association with the cultural committee and other committee heads prepared heartfelt greeting cards as a token of students' gratitude and appreciation for teachers, and placed them in the chairs where the teachers were to be seated in the auditorium. After the classes, all the teachers and students assembled in the auditorium.

The program commenced with a beautiful prayer song sung by Shreeramana from M.Sc first year. After that divine start, the students had planned some fun activities for the teachers. Teachers were split into two teams, in order to create some competition and increase the fun factor. The first game played was Pictionary. Every one of the teachers were eagerly involved in the game, with team A consisting of teachers such as Mr.Sandeep, Dr.Kamalesh and others won over team B which consisted of Dr.Vidhu, Dr.Joshi and

others. Consequently a fun quiz was conducted, wherein the teachers had to guess some places in and around the campus and Manipal in general. Those who were unable to correctly guess the place were given a 'punishment' that included singing, dancing, acting and many other activities. All of which were graciously performed by all of the teachers. The students had great fun watching their teachers try their hand in doing different things, and were a very encouraging crowd. Adding more colour to the fun filled event, two BSc students performed solo dances. The first number was a collection of popular Bollywood songs gracefully performed by Kaavya Surianarayanan from 1<sup>st</sup> year. Subsequently, a western dance was performed by Sai Praneeth Tadepalli from 3<sup>rd</sup> year. Their efforts were appreciated by the teachers and audience alike. The students of MSLS are thankful to all those who helped us make this a memorable day for the teachers.



*-By Kausalya Neelavara (M.Sc. BI)*

# *Rashtriya Ekta Diwas*

Manipal School of Life Sciences, on October 31<sup>st</sup> 2019 witnessed a high amount of nationalism both within the students and the faculty members. An atmosphere of patriotism was evident especially at the Auditorium, MSLS annex, where the audience witnessed a talk by Sri Seshadri Chari, on the occasion of Rashtriya Ekta Diwas.

October 31<sup>st</sup> marked as the Rashtriya Ekta Diwas translated as the National Unity Day, commemorates the birth anniversary of Sardar Vallabhai Patel. This year marked the 144<sup>th</sup> birth anniversary of one of the greatest men this country was privileged to witness. Sardar Vallabhbhai Patel, known widely for his role in uniting India during the Independence Movement is also known as the Iron Man of India and is one of the founding leaders of the Republic of India. The Government of India introduced Rashtriya Ekta Diwas in 2014 as a tribute to Patel on his birth anniversary. In addition, 2019 also marked the merging of Jammu, Kashmir and Ladakh as an integral part of India by abrogating Article 370.

The school honoured the day by organizing a talk in collaboration with the Department of Geopolitics and International Relations, MAHE, Manipal. Sri Seshadri Chari, the Secretary General of the Forum for Integrated National Security (FINS) and member of the Planning and Monitoring Board, MAHE, delivered a thought provoking speech that centered on “Sardar Vallabhbhai Patel’s Vision of an Integrated India”. He began his talk by highlighting the important aspects of the Quit India Movement and the role of various Indian leaders throughout the movement. Following this, he walked through the events that occurred in the period soon after 1947; which mainly centred around the effort to unite the various princely states spread across India during the 1940s. Explaining the various hardships and obstacles that arose during this mission, he mapped out the combined efforts of Sardar Vallabhai Patel and Jawaharlal Nehru in ensuring the formation of the Indian Republic.

Explaining the various aspects that has resulted in the formation of an India unified as we know it today, he successfully explained the true essence of unity, and what it really means. His thought provoking words captured the attention of every person present in the auditorium. The event concluded with a Unity Pledge taken by all in the audience.

Overall, the entire event was an immensely stimulating and thought provoking experience and brought us all one step closer to understanding the processes that led to the formation of our country as it is today. Thanks to the combined efforts of the Student Council, and faculty coordinators the event succeeded in celebrating a hero of the nation.

***-By Sanjana Bhat (B.Sc. BT)***

# HALLOWEEN 2019



In the words of Elvis Duran, an American radio personality, “Halloween is not only about putting on a costume, but it’s about finding the imagination and costume within ourselves.” Manipal School of Life Sciences organised a Halloween Party on the 31<sup>st</sup> of October 2019. This spooky fiesta proved to be a refreshing and fun break from the usual hustle and bustle of labs and classes. Preparations for the event began with utmost enthusiasm from the students and staff alike. Decorations included ghostly faces painted on balloons, make-believe

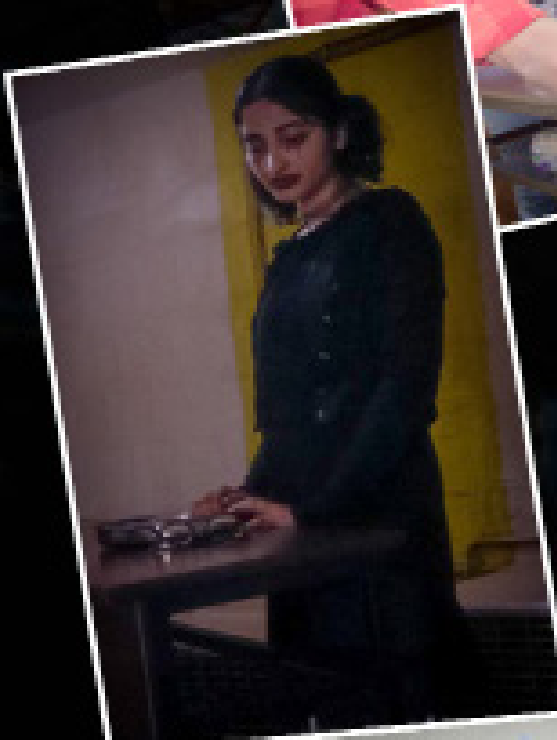
gigantic spiders in their webs along with realistic looking skeletons, and classic horror-movie weapons crafted by the students’ imagination.

Several stalls for various Halloween themed games like “Fear Pong” and “Ring It” were set up with dedicated volunteers working very hard to ensure that the event ran smoothly. Fun prizes were distributed to the winners. Food stalls featured a delectable range of snacks like popcorn, soda, candies and sweets that kept taste buds satisfied throughout. The painstakingly planned ‘Haunted House’ was no doubt, the highlight of the evening as it was immensely enjoyed by all the students who attended the event. Students outdid themselves by dressing up in carefully planned devious costumes and body paint just to give everyone a good-natured, healthy scare.

Popular horror movies like “The Exorcism of Emily Rose” and “Sixth Sense” were also screened in the seminar room, giving the students the ultimate movie-theatre experience. Photo booths with props and face painting booths were also set up. It was an evening of tricks, treats, fun and socialisation and a truly memorable one at that.

**-By Keerthana K (M.Sc BI)**

# Halloween Gallery





# Rally Conducted in Association with Swachhata Pakhwada Week



Manipal School of Life Sciences (MSLS), Manipal experienced an unusual flurry of activities at 5pm on September 28 2019. Instead of the collective trudging movements of worn out students leaving the campus, one could see a student gathering with a hustle of activities, banners, water bottles and their cameras. It was the view of a set of individuals committed to a certain agenda, excitement and determination alike etched across their faces. The agenda was to rally for "Say No To Plastic" as part of the Swachhata Pakwada week.

MSLS observes the Swachhata Pakwada week annually, by organizing several events with the underlying theme of cleanliness, preservation of environment and nature. This year the Student Council meticulously organised a rally to "Say No To Plastic" to propagate awareness among the public to actively minimize the usage of plastic, due to its huge environmental impact



The assembly of individuals gathered to take part in the rally ranged from 1<sup>st</sup> year B.Sc. students to Research students to the faculty members. Once all the necessary banners and posters (made of cardboard and newspapers by the members of The Art Collective) had been distributed among the participants, and the customary set of inauguration pictures were clicked by the student photographers, the troop of students set out of the college campus. The rally started from MSLS, walked round Syndicate circle, walked the road behind MAHE turned round at MCOPS and finally stopped at the MAHE Edu Building. Holding up the posters, slogans like, "Don't Be Mean, Just Go Green" and "Don't Be Dramatic, Say No To Plastic" were chanted. The streets of late evening Manipal were lightened up by the constant caroling. Pedestrians squinted at the banners, the shopkeepers glanced out of their shops and vehicles slowed down as a result of the rallying cry. An hour had passed and the rally finally ended at the MAHE building and the rejoicement over an event successfully carried was expressed collectively. The rush of satisfaction and hope filled every individual present in the rally towards the efforts put in this cause, which may bring change, albeit, diminutive in the attitudes of the general public, and engage within them the similar desire to help by playing a part, no matter how small but sincere, to preserve and conserve Mother Nature.

With this, the band of students dispersed, hope and comfort flowing in every individual's heart with an aspiration for a better future.



## Vigilance Awareness Week

28<sup>th</sup> October through 2<sup>nd</sup> November 2019 witnessed Manipal School of Life Sciences, MAHE meticulously observing the Vigilance Awareness Week, through the efforts of the institution, students council and faculty members.

The Vigilance Awareness Week, observed every year during the week centering around Sardar Vallabhbhai Patel's birth anniversary, mainly revolves around themes of anti-corruption and its risks to the integrity of society at large. The main purpose of the Vigilance Awareness Week is to generate awareness in the public at large about the ill effects of corruption. It also encourages the general public to collectively participate in the prevention of, and the fight against, corruption and to raise public awareness regarding the existence, causes and the threat posed by corruption. This year, honouring the initiative to curb corruption and its evils, Manipal School of Life Sciences organised a quiz that revolved around general knowledge regarding the current ongoing affairs as well as themes centred around integrity and anti-corruption. The main motive of this quiz was to promote awareness among students, as well as to instil an interest among students to encourage them to actively contribute towards ridding our society of corruption and its threats. The Integrity Pledge was also taken by those present.

**-By Sanjana S Bhat (B.Sc. BT)**

## OSA Symposium

The morning on 26<sup>th</sup> October 2019 dawned bright and early. Students and faculty alike could be seen hustling about and making last minute arrangements. All the excitement was for the One Day International Symposium on "Advances in Biophotonics and its Imaging Applications". The Symposium, jointly organised by Manipal School of Life Sciences and Manipal OSA Student Chapter was being held in the new Auditorium of MSLS Annex building.

Once the registration process was over, and the participants were given their participation kit, the symposium was inaugurated. The diya was lit by our esteemed Director Dr. K Satyamoorthy, Dr. Colin Sheppard and the other dignitaries of the day. The first talk of the day was given by Dr. Colin Sheppard, Professor at the University of Wollongong, Wollongong, Australia. His talk focused on "Confocal microscopy: past, present and future". The talk was followed by interesting discussions between the Professor and the students that extended into the tea-break that followed. Dr. Gireesh Gangadharan, Assistant Professor at Manipal School of Life Sciences, Manipal gave a talk on "Optogenetic approaches to understanding neural basis of behaviours in mice". Dr. P Nandakumar, Professor at BITS Pilani, Goa focused on "Photothermal microscopy: Biomolecular imaging using non-fluorescent nanoparticle labels" while Dr. Manesh Thomas, CEO of Manipal-GOK Bioincubator delivered a short talk on the Bioincubator that was recently inaugurated in Manipal.

During the day, participants were taken on a short tour around the various research facilities and briefed on the current work being carried out at MSLS.

**-By Sanjana S Bhat (B.Sc. BT)**

# Sports Week



The sports week was conducted from 28<sup>th</sup> to 30<sup>th</sup> October 2019. It was a fun filled event which saw active participation of the BSc, MSc, PGD students and research scholars. Showing that "age is just a number", the staff, too, enthusiastically participated in all the events giving a tough competition to the students. Sports week comprised on three events - Basketball, Cricket, Volleyball conducted on consecutive days.

The first event was basketball played by 1 team from MSc (first year) and 3 teams from BSc (two second year teams and one first year team) at Sharada court besides Sharada girl's hostel. Each team consisted of 3 members each (3 vs 3). The teams played against each other with all the matches ending in nail biting finish. All the teams displayed equal and good defense with extraordinary jump shots. The finals were played by the two BSc second year teams with the BSc A team winning the finals. The next event held was cricket organized on 29<sup>th</sup> October at the same venue. This was fairly a large event which included the MSc and BSc students along with the staffs and research scholars playing against each other. The finals were played by the research scholars and the staff teams, which was a high-strung match where both the teams put their best foot forward, but the research scholars team ended up winning the event.

On 30<sup>th</sup> October volleyball event was held at the MIT volleyball court. From the first-year students to the research scholars and staff, all actively took part in the volleyball events. Every match that was played, also played on the nerves of the audience. Although the students gave a tough fight, they were no match for the skills and coordination borne by the scholars and staff. The speed and acceleration that the players used to pass on the ball was worth the watch. In the women's tournament, the staff emerged as winners. The men's finals were played between the research scholars and the staff with the match ending in a tie. The tie breaker match was an edgy one with the staff emerging as the champions.



*-By Carol (M.Sc. BI)*

# *7<sup>th</sup> Annual Symposium of Society of Biological Chemists (India) - Coastal Karnataka Chapter*

The Society of Biological Chemists (India) – Coastal Karnataka Chapter held their 7<sup>th</sup> Annual Symposium at MSLS on 23<sup>rd</sup> November, 2019. The symposium was conducted in the Auditorium,

MSLS Annex, Silver Jubilee Block. The day started with registrations and breakfast after which the symposium was inaugurated by the honourable dignitaries present at the venue.

The symposium was divided into 4 sessions and the first session had 3 distinct talks by Dr. K Kemparaju, Dr. P Rangarajan and Dr. Paturu Kondaiah on the topics ‘Echis carinatus venom induced tissue destruction: An emphasis on NETosis’, ‘Development of an indigenous recombinant hepatitis b vaccine: current status’ and ‘Role of Fibroblasts in stroma for the progression of breast cancers’ respectively. This session was chaired by Dr. Ganesh Nagaraju. It was then followed by a tea break.

The second session was chaired by Dr. Keshava Prasad and 4 talks were delivered on different diseases. Dr. Ganesh Nagaraju spoke on the topic ‘RAD51 paralogs: unravelling the new roles in genome stability and tumor suppression’. Dr. Rajendra Pilankatta spoke about ‘Understanding of Dengue virus – host interactions: Need of lipidomic approach?’. The next presentation was by Dr. Raghu Bhushan on ‘Deciphering the noncoding and coding genomes during skeletal muscle development and cardiovascular diseases. The next talk was by Dr. Sudharshan Prabhu about ‘Ferroptosis: A critical Cell Death in Neurological disorders’.

Following this, lunch break was provided with delicious food to all the participants and guests. During the lunch break, Poster Session was organized where posters were displayed by a few participants. This was followed by the third session of talks chaired by Dr. Indrani Karunasagar. First presentation was by Dr. Guruprasad Kalthur on the ‘Role of antidiabetic drug metformin in reproduction’. Next presentation was by Dr. Anurag Sharma about ‘Benzene induced hematopoietic toxicity: Insights from Drosophila’. Dr. Chithra Manisseri spoke about ‘Unlocking Plant Cell Walls to Biofuels’ next followed by a presentation by Dr. Vidhu Sankar Babu on ‘Foliar and Floral Nastic movements – Hypothesis and Anatomical Evidence derived from Portulaca species’.

The fourth and last session was chaired by Dr. Krishnanda Prabhu. This session had two talks by Dr. M S Mustak and Dr. KK Mahato on the topics ‘Genetic risk factors for the myocardial infarction in south west coastal region of India’ and ‘Protein fingerprinting by LASER and LED induced autofluorescence’ respectively.

This brought an end to a really informative and productive day with lots of interactions for all the participants and guests. Dr. Angela Brand proposed the Vote of Thanks and concluded the successful event on a high note.

# Onam 2019



**A**s the sun shone on the gates of Manipal School of Life Sciences on the 11<sup>th</sup> of September 2019, students and faculty were welcomed to the college with a stunning arrangement of flowers laid on the floor, called a Pookalam, at the entrance. Nearly everyone was dressed in white saaris and dhotis (aka mundu in Malayalam), ready to enjoy the auspicious festival, Onam.

Onam is a 10 day festival celebrated in the state of Kerala, normally around late August or early September. According to legends, the festival is celebrated to commemorate King Mahabali, whose spirit is said to visit Kerala at the time of Onam. According to Hindu mythology, King Mahabali was the great grandson of a Brahmin sage named Kashyapa, the great-grandson of Hiranyakashipu and the grandson of Vishnu devotee, Prahlada. Mahabali was a great, generous king, who won over all the three worlds. According to the Vaishnavite mythology the defeated devas approached Lord Vishnu for help in their battle with Mahabali. Lord Vishnu however, refused to join the gods in violence against Mahabali, because he was a good ruler and his own devotee. Instead, he decided to test Mahabali's devotion at an opportune moment. Mahabali, after his victory over the gods, decided to perform a Yajna (homa sacrifices/rituals) and grant any request during the Yajna. At this event, Vishnu took his fifth avatar of a dwarf boy called Vamana and approached Mahabali. The king offered anything and everything to the boy, to which the boy said, "one should not seek more than one needs", and all he needed was "three paces of land." Mahabali was amazed at the young boy's wisdom and agreed to his wish. Vamana then grew into an enormous size and covered everything Mahabali ruled over in just two paces. For the third pace, Mahabali offered his head for Vishnu to step on, an act that Vishnu accepted as evidence of Mahabali's devotion. Vishnu granted him a boon, by which Mahabali could visit again, once every year, the lands and people he previously ruled. This revisit marks the festival of Onam, as a reminder of the virtuous ruler and his humility in keeping his promise before Lord Vishnu. The last day of Mahabali's stay is remembered with a nine-course vegetarian 'Onasadya' feast. A pookalam is arranged on the floor to welcome 'Maveli' which is an alternate name for King Mahabali.

At around 10 am, the respected Director, Dr.K. Satyamoorthy commenced the celebrations by lighting a diya (lamp), with the whole college present to witness it. Soon after, Manoj sir had organised for some lip smacking Payasam (an indian sweet) for everyone to enjoy. As the day progressed, everyone was excited for the evening celebrations to start. When the sun started setting Ms. Sahiti Sudha and Mr. Sreeramana from MSc 1<sup>st</sup> year invoked the celebration through a divine song. 10 girls from BSc 1<sup>st</sup> year and MSc 1<sup>st</sup> year then danced to a traditional Onam dance called Thiruvathira. They had choreographed it and practiced it all in just one day due to time constraints. Even then, it was absolutely beautiful to witness! Just after that, the student council and sports heads had organised a series of games for the whole college to participate in. The first of which tug of war.

The students were on one side, and the research scholars and teaching faculty were on the other. The first of three games was won by the students, but the other two were won by the latter. Alas, experience proved its strength. Subsequently, a game of 'uriyadi' was played. This is when a person is supposed to break a pot tied at a height with a long wooden stick, blindfolded! A student from each class was chosen to play the game. A talented young man from second year B.Sc successfully located the pot and broke it, spilling out dozens of sweets for everyone to eat!

Just then, the sound of beats was emerging from inside of the building, which indicated, party time! A series of upbeat Hindi, Malayali and Tamil songs were played for the whole college from 'Dilliwali girlfriend' to 'Pistaah' everyone was dancing and singing along with all their might. The wonderful event finally came to an end as the sun went down. The student council, volunteers and everyone who participated in the event made it a humungous success, making it into a day no one from MSLS will ever forget. Onam 2019 was fantabulous.

***-By Kaavya Suriyanarayan (B.Sc. BT)***

# Onam Gallery



A photograph of a sunset over the ocean. The sun is low on the horizon, creating a bright reflection on the water. The sky is filled with soft, golden clouds. In the foreground, there are large, dark rocks partially submerged in the water, with waves crashing against them. The overall mood is serene and contemplative.

# WORDS OF WISDOM

Picture Credits: Neha Kumari  
(B.Sc. BT)



## *Dr. Sher Ali*



Dr. Sher Ali is a renowned professor and scientist at the Jamia Milia Islamia university located in the capital of the country, New Delhi. His research is currently focused on cancer cell lines.

*Good afternoon, Dr Ali.*

*To begin the interview, let's go all the way to the beginning - where did it all start? What was your career plan before you got into research?*

This is a very important question particularly in the context of mentoring a student. When I was in high school I used to prepare my notebook rather carefully and using my skills, make it very artistic and my biology teacher used to be very happy with me. I also used to be an extremely obedient student. So, one of my teachers once said, "You ask so many questions, when you grow up in your life you should become a scientist. You should pursue research."

For example, a simple question I had was, when you consider the leaves of chickpea and sweet pea, the chickpea ones are slightly salty but sweet pea leaves are not. Why is this? When I asked this, my teacher looked at me and said, "How about you go do science and find out?" That was the beginning.

*Would you mind telling us in brief what your study currently focuses on?*

At present, I'm at Jamia Milia Islamia, where we deal with cancer cell lines. We're trying to answer two basic questions. The first is how the cancer cell lines are different from biopsied sample based on the aspects of genetic integrity, gene expression, proper protein preparation, protein folding and misfolding, copy number of the gene and variation between somatic cells and spermatozoa. The second is testing the plausibility and capability of a marker for these cancer cell lines which could be augmented in regular diagnosis.

One of the primary aims that I have, personally, is to train good students. There are very few centres, for a county with a population of 1.2 billion, where real, dyed-in-the-wool biomedical research is done. Unfortunately, there is no MD/PhD program that can prepare you for such research. If clinicians and researchers work hand-in-hand, this aspect will be taken to a very high level and we can then change our orbit in the context of high-quality research.

*You talked about the lack of good research institutes in India currently. So have there been any other road blocks that you have faced in your career? Not just in this particular research project of yours, but also in general.*

The question you have asked is something that a lot of funding bodies have also begun pondering. We have a serious problem with respect to our scientific attitude. We also have a massive paucity of support staff, the purchase of equipment, so on and so forth. Unless you are an influential, well-known person, like a Vice-Chancellor or Director, things just do not get moving.

Of course, I tried to revolt at some point. However, the problem is if you revolt against the system, you will be wiped off the platform. This is something I never wanted to say, but I can afford to now, because not much is there for me to lose. I made whatever I made and I'm at the fag end of my career. I must clarify; I'm at the fag end of my career, not at the fag end of my thought processes.

Regarding the roadblock, Charles Darwin mentioned "It is not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change." So, following his dictum, I, in my own way, tried to adapt to the prevalent situation. In the process, the first thing was to preserve and establish myself, and then get better at what I was doing. That is the essence of survival.

I never said we don't have any good institutions or good labs in India, I said looking at the country's size, the huge laboratories and universities that should have been existent are not. That's why. And how do we know this? By comparing it with the United States of America, which has a lower population than our country but more land and money pumped towards science. Why is it like that? The attitude of Indian science universities should be such that you should gain confidence from the way your teachers support you. First you slog and commit mistakes and run into difficulty and only eventually do you gain knowledge and expertise. Our assets are not our publications, they're students like you.

Unfortunately, science is very demanding. A lot of people are not recognized despite working extremely hard, while some are recognized despite not working at all. Mendel never got a Nobel Prize because the practice started much later, yet Mendel is known as the father of genetics. I call that impact. Barbara McClintock was a lovely lady aged 29 when she began experimenting on *Zea mays*, showing the jumping gene concept. However, she got her Nobel Prize only at the age of 80, which means the Nobel committee took 50 years to understand the significance of her work.

Science is an uncertain path to trail. However, if you have the determination, perseverance, knowledge and above all, blessings from your parents and teachers and an abiding faith on the almighty God, trust me, it takes you to a very high level of orbit. That's my message.

*What would you tell the young minds who want to follow your footsteps, to encourage them?*

Young students should ask one question. Are they willing to work hard? Science, as I said, is demanding. If you do science in a casual, half-hearted manner, you cannot hope to reach your destination. It is the determination that counts.

The human brain is finite, but the mind is like the universe - ever-expanding. Your mind is equally capable of absorbing one book and a thousand of them. And while the limits of the universe are still being found, what is beyond your repertoire of knowledge is not an unknown variable. So, to all the students reading this, you have to ensure that you don't waste your time. Eat as much as you need and read beyond it. Moreover, if you are doing research, you must be able to find a good teacher. If you find a good instructor, a good mentor, trust me, your life is 50% secured. Another pivotal aspect is honesty. No pilferage, no copy-paste business, just be honest, and the results will come no matter what.

### *Do you have any other advice for our listeners and readers?*

Yes, I would say within the context of your university, for example, there are so many other beautiful places, Manipal University offers tremendous opportunities, you must feel that you are an extraordinarily blessed person and you must thank God Almighty, your parents, your teachers and your university administration.

My sincere advice to you is that make the best possible use of all the facilities that are available in this campus whether it is the hostel facilities or the library facilities, the gymnasium facilities. Extracurricular activities really help in rounding out your personality. If you are smart and powerful, then the next huge responsibility that comes on your shoulder is that you should be polite and approachable, because one thing that many of us carry unnecessarily that makes us a bad human being is Ahankara or Ego. So, let there be no ego because whatever we achieve is very temporary if you look at it from a philosophical point of view. These are just some of the things that should be kept in mind. Even as teacher, in the future, there is a huge role that you can play like mentoring, being a student's friend and trying to gradually and slowly push them on the right track. These are some of the things that will go a long way for you to be a good human being.

### *Finally, if/when you get a satisfying conclusion on your present research, is there a dream topic or subject that you would have wanted to research; maybe something you have been wanting to take up for a long time?*

Of course. I still want two things to happen in my career and life. With two hundred different types of cancers, and there are four hundred different types of blood cells present in the human body, there are roughly thirty trillion sequences in the human body, there are forty six chromosomes in the normal human including XY and XX in males and females respectively. One thing I would like to see done is to have all the cancers studied and try to find out how many genes are common amongst all the cancers. And when the common genes are there, what is the mutational load and how often copy number variation does take place and then correlate with the different ethnic groups, and then correlate also with the lifestyle and food habit, because all of these seem to be intrinsically linked. The other question that I have in my mind, which I have not yet been able to work on, is that- how does a cell decide "now I have to become cancerous, that I have to go affect the prostate, or any other part of the body"? How does a cell know? After all, our entire body began as one fertilized egg, that's where the story started, right? So, what happens? What guides these cells?

There is another interesting thing, I want to know about though I believe I may not convince you about it. It is my belief that a person who is very god fearing, a person who is a stand-up human being is, by and large, saved from many troubles. That is something which you don't see discussed in the mainstream; but it happens in life. We don't even understand how to live our life. If we know the art of living, then we can know the art of decorating our lives. We need to treat and maintain our mental faculties the way we treat our materialistic possessions.

### *There must be students that you are mentoring currently. Looking at their progress, would you care to make a general statement about the present scenario in India, especially with the youngsters? How satisfied are you with their work and how would you rate the country's potential?*

I have no issue with the students of this country. However, we in India have a highly diversified population of students, which means, quite naturally, that some students will be at a disadvantage compared to others. Some students come from very poor backgrounds where the tradition of education in their family didn't exist. It is our collective responsibility to be nice to them and teach them. The first lesson to teach them is to instill in them a sense of confidence, that's the beginning of the journey.

As an example, I would like to cite our own president APJ Abdul Kalam. Coming from a very modest background, he wasn't as privileged as others in his position. However, he made it a point to respect every person and religion, and today I think everybody would agree with me than no one has anything negative to say about him. He had a mission to make missiles so that it could act as a deterrent both to our neighbouring countries as well as in the world. And this vision and mission has transformed India into something what we see today.

When you are teaching students, remember that they are also sons and daughters of somebody. Treat them like your own and you will have this beautiful relationship. I have a really good relationship with my students. They are doing great in their respective careers, and that is my greatest satisfaction. If you ask me point blank what my achievement is, I will say I produced 26 fantastic students who can eke out their own livelihood. No one is on the road. They are making their own money, earning their own name and fame. They are looking after their family. That's what I call success. Yes, I have not collected a huge amount of money, but I have enough to survive. And that's all that should matter.

*-Interviewed by: Prahlad Rao and Anoushka Borthakur*

*"Challenges are what make  
life interesting  
Overcoming them is what makes  
life meaningful"*

*- Joshua J. Marine*

## Dr. Colin Sheppard



Dr. Colin Sheppard hails from the University of Wollongong, Australia. His areas of research are in optics, microscopy and imaging, including confocal and multiphoton microscopy, diffraction, 3D imaging and reconstruction, super resolution, beam propagation and pulse propagation.

*Interviewer: Can you talk about your current work of research?*

Dr. Colin Sheppard: At the moment, I'm working on - a few different projects to do with optical imaging in the microscope. So, I guess the biggest one is to do with Image Scanning Microscopy using Pixel Reassignment and I'm doing some theoretical studies to improve the way you reconstruct images.

*Interviewer: Can you tell us about your most interesting or fascinating discovery or development that you made or came across in the field of your work?*

Dr. Colin Sheppard: That's a difficult question. But there are few topics that I feel like I'm proud to have been involved with. And the first thing we would think about is the confocal microscope. And also the two photon, fluorescence microscope. Something I have been involved with from very early on. But, you know, I guess, looking back, I think the most interesting thing is the scanning microscope which was a technique that I originally proposed back in 1988. So that's a long time ago now. 30 years ago. And, which was mostly ignored. That paper which was published had virtually no citations at all for the first 20 years. So now it's very satisfying to see that that paper is getting a lot of citations, that people are noticing it.

*Interviewer: Sir, was there any specific reason or a specific challenge that you were looking to solve when you began with your research project?*

Dr. Colin Sheppard: I think when we first started research on the confocal microscope back in 1974, we didn't have a clear idea about where we were leading at all. We just felt that we could do better than people had done up until then and I think this is the thing about research, one step leads to another and it's very difficult to know where it's going to lead to. So, I think you have to reassess where you're going all the time.

*Interviewer: So, after you have gotten your satisfactory result in this line of work, what is next? What do you want to do? Any wild imagination you have?*

Dr. Colin Sheppard: I don't really know. I have the opportunity now; I don't actually work towards any definite project. I'm free to do what I like. So, that gives me a lot of freedom. On the other hand, I don't know what I can think of at the moment, but there are a few other projects that I am working on. There

are two other main areas that I have been thinking about in the last few years. One is polarization and imaging, I have published a few papers on polarization in the last few years. And I've got some more ideas about that. And the other technique is phase contrast microscopy. You know, polarization and phase imaging are both types of label free imaging. So, you don't have to use a fluorescent label. Hence, there's a lot of advances in these label free approaches. However, they need to be improved in some ways to increase the performance levels. One very intriguing thing (this is something I would love to be able to solve, but I don't know if I can) is, at the moment we had the Nobel prizes given for super resolution microscopy a few years ago and there are now a number of different approaches that people have used in order to get this resolution improvement. But most of them, when they get a significant improvement in resolution based on fluorescence or this sort of approach, we don't at the moment know how to do a similar thing with these label free type methods like polarization or phase imaging. So, I think I just have a feeling that there must be some way of getting that resolution, but maybe I'm not clever enough to find out.

*Interviewer: Sir, in your career, are there any particular hurdles that you had to overcome?*

Dr. Colin Sheppard: Um. Have I had any hurdles to overcome? Well actually, I think, firstly, I have to say that I've been very lucky. Everything has worked very well throughout my whole life. Starting from when I went to university till when I got a job and everything. So, I guess I really haven't had any great hurdles. Isn't that fabulous? But, of course a lot of decisions had to be made. And whether I made the right decisions in difficult times, I never knew that. You never know what would've happened. You know, I think one of the best decisions I have made was to go to Oxford. After I got my PhD, I worked in the industry for two years. And then I left there to go back to Oxford on a short-term contract. And everyone told me this was a crazy thing to do. That I gave up a permanent job in industry to get a temporary job in a university. Which could have led to nothing. But as it turned out everything worked out pretty well. But there were some big decisions. For example, I said in 1989, I went to Australia. So, that was a big decision. We went to Australia first on sabbatical. I went there for 3 months. We had a great time there. I went back to Oxford. I didn't think that I would be moving there at all. And then soon after I had a letter suggesting and asking whether I am interested in moving to a professor job in Australia. So, this was a great shock to me at the time. And then we had to decide whether we were going to leave Oxford or stay in Oxford. So, I chose at that time to go to Sydney. I don't know whether it was the right move. Maybe it wouldn't have made that much difference by then. So, it was very early and very important. Going to Oxford was an important step.

*Interviewer: What would you tell the young minds right now to encourage them to follow in your footsteps?*

Dr. Colin Sheppard: I would start by saying that I've really enjoyed my life. I mean it's been a great job and the academic world is a superb employment. Except of course, you don't have as good a salary as say being in an industry. And sometimes it's hard work, you have to do a lot of mundane things- a thing I always hated was marking exams. Actually, probably even more, writing exams. It's very hard to write exams- I hated that. So, there are lots of other sides to it of course which aren't that enjoyable. Luckily for the past few years, I've managed to avoid most of those things so I just do the things I like, and not the things I don't like. But to encourage other people, the best encouragement is that I did it and I don't regret doing it. I also have to acknowledge that it's becoming really tough now, and I don't know if it's really becoming harder but it seems to get an academic job is getting more and more difficult every year. So, you have to persevere on this.

*Interviewer: Sir, this interview is going to go up as a podcast. Any advice for the listeners?*

Dr. Colin Sheppard: A bit of a difficult question! Like I said, you've got to keep on doing what you feel you want to do and not be sidetracked into searching for money or things like that. What you ought to do is to go for what you really want to do.

**-Interviewed by: Sanjana Bhat and Anoushka Borthakur**

*"The universe is full of magical things  
patiently waiting for our wits to grow sharper"*

*-Eden Phillpott*

## Dr. P Nandakumar



Dr.P. Nandakumar has done his PhD on the ‘Optical properties of semiconductor quantum dots’ from IIT Madras. Thereafter, he did his post-doctoral research at the Indian Institute of Science, in Bangalore, the Weizmann Institute of Science in Israel, and the University of Stuttgart in Germany in the area of ultrafast laser spectroscopy and microscopy. He joined BITS Pilani (Goa Campus in 2005. His current research interests include nonlinear optics, mesoscopic systems, ultrafast laser spectroscopy and microscopy and its application in biophysics.

*Interviewer: Was there any specific reason or any driving force that led you to venture into the field of Biology?*

Dr. P Nandakumar: Lately, there are several physicists venturing into the field of biology as it is an open field. There are so many things that are yet to be discovered and most of the biological processes are based on simple concepts of physics. For example, the biomolecular transport of substances due to the difference in concentration of those substances.

*Interviewer: Did you have any specific aims or goals in mind when you decided to take up this field?*

Dr. P Nandakumar: It was the curiosity to understand Biology from a physicist’s point of view, that led us to take up this field. For example, normally, the nuclear membrane does not permit foreign genes to enter the genome. However, the activity of Rhinovirus or Adenovirus can successfully cause the symptoms of common cold. This concept could be implemented in gene therapy by introducing the required genes into the genome or by replacing defective genes that are the cause of various genetic disorders. Most often, the desired gene is not incorporated at the appropriate site. As a physicist, the first thing I would do is to try to understand the mechanism of biomolecular transport that would answer most of my questions. This requires me to have a good knowledge of physics as well as biology.

*Interviewer: Could you please tell us about any fascinating discoveries or developments that were made in this line of work?*

Dr. P Nandakumar: I worked on semiconductor nanoparticles/quantum dots during my PhD days. Since it was a relatively new and upcoming field, we studied its non-linear optical nature, size dependence and various other properties. This introduced me to microscopy and led us to develop the Raman nonlinear optical microscope, which has a greater signal strength than the normal Raman microscope. We hope that this will have lots of applications in biology and medicine because cells and cellular structures can be observed very clearly.



*Interviewer: What hurdles did you face during the time of your research?*

Dr. P Nandakumar: Research in India has always been problematic because we tend to depend on other people for various requirements and equipment. There is a lack of self-sufficiency. Importing of even the smallest of equipment is a very big process and may take about six months to a year. There are also additional factors of finance and time constraints that need to be taken into consideration. This very often leads to a loss of interest in the topic, in the time that it takes to obtain the required instrumentation. This is a challenge faced by most experimental scientists in India.

*Interviewer: What advice would you give to all the students who are interested in taking up research?*

Dr. P Nandakumar: I would advise students to follow their passion. Research is not always about discovering something great. It is about working on a something that you enjoy and are passionate about, no matter how small the subject. I am excited about developing this microscope even though it is not a big discovery. It is still very challenging, because particles as small as five nanometres cannot be visualised using normal microscopes or optical techniques. So, happiness is as small as obtaining a good signal strength. I would also advise students to study hard, work with sincerity and enjoy it.

*-Interviewed by: Sanjana Bhat and Shruti Thergaonkar*

*”The quickest way to find self-confidence is to do exactly what you are afraid to do”*

*- Anonymous*

## Dr. Gireesh Gangadharan



**Dr. Gireesh Gangadharan is a scientist and Assistant Professor, currently working here at Manipal School of Life Sciences. He has expertise in neurobiology, neurophysiology, behavioral neuroscience, electrophysiology, in vivo electrophysiology, in vitro electrophysiology and molecular neurobiology.**

*Interviewer: Sir, what inspired you to take up neuroscience?*

Dr. Gireesh Gangadharan: Basically I am interested in cognitive neuroscience or behavioral neuroscience. First I thought of myself, while I was giving my speech I also thought about it.

I thought about how even before exams we are all very anxious. Sometimes due to this we can't even write the exam properly even though we studied well. And sometimes people are fearful without any reason. So these kinds of emotions and other emotions like empathy, understanding others. For example the mother and child connection. If the child is hurt, the mother feels the pain. So these fundamental emotions made me curious on how the brain actually controls these emotions. So that's the main thing that made me get into neuroscience. Also, many psychiatric disorders these days, like many people are depressed, social stress and other issues. Our brain is such that even we don't know it's potential. It is very complex. Studying the brain has always been fascinating to me. Moreover, the brain contains neurons so the neurons can produce action potential that we can study, these kinds of processes made me get into neuroscience.

*Interviewer: Thank you, and why did you decide to come to Manipal School of Life Sciences?*

Dr. Gireesh Gangadharan: There are two answers for that, firstly, MSLS is very diverse in its research area. People work on biophysics, plant sciences, cancer biology, proteomics. These days science is very interdisciplinary. We cannot go with only one subject, we need to collaborate with different people, so in that sense, MSLS is a very good opportunity for me.

The other answer is that, it is very close to my home, so I wanted to get a position somewhere close to home

*Interviewer: If you could go back in time, and choose another path, would you? And if yes, what would be that path?*

Dr. Gireesh Gangadharan: I really like this profession, research is something I am very interested in. I am also very interested in teaching, but I am new to it so I am developing my skills better. I don't think I want to choose any other profession.

*Interviewer: Sir, how do you think your work will help in the future*

Dr. Gireesh Gangadharan: Since I'm interested in behavioural neuroscience, I really want to study the mechanism of this area of it. I am working on a basic, fundamental research, which is very important. So we need to know what is actually happening. Thereafter, people may be able to work from there to figure out more about the subject. I want to work on different aspects of behaviour. Right now, here in Manipal School of Life Sciences, I'm also working on aging. The life expectancy of human beings is increasing, even in India. Hence the associated disorders that come along with it are also becoming more and more common. This is something that we should address. For example, old people lose memory (dementia and Alzheimer's) to the extent that they cannot recognize their own family members- this is the type of work I am currently doing.

*Interviewer: So, you are laying the foundation for others to follow?*

Dr. Gireesh Gangadharan: Yes. Indeed.

*Interviewer: What advice would you give young scientists who are entering into a similar field?*

Dr. Gireesh Gangadharan: I am not that big of a person to give advice, I am also a beginner, but the thing is, for any profession, you should be extremely focused, motivated and interested. For example, you should not pursue a PhD just for the sake of the title. Instead, do something you truly like. If you have a real interest in some subject, just go for it. Just look around where such research is going on, and pursue that. Everyone has an interest in a specific subject. Find that subject by exploring different options. Instead of studying something you don't like, if you can focus on something you like, maybe you can contribute in a better way.

*-Interviewed by UmmuAbiha and Amandeep Kaur*

*” Happiness is not about getting  
all you want  
it's about enjoying all you have ”*

*- Anonymous*

# Dr. Manesh Thomas



**Dr. Manesh Thomas currently works as the Chief Executive Officer of the Manipal-Government of Karnataka Bioincubator. He was earlier working as the project coordinator of Savli Bioincubator TBI (Technology Business Incubator) of Department of Science and Technology, Government of Gujarat. He also researched in the past, under the India Council for Agricultural Research (ICAR) in Application of Microorganisms in Agriculture and Allied Sector (AMAAS), in a project which utilised microbial communities for enhancing agriculture**

*Interviewer: Sir, what does your work currently focus on?*

Dr. Manesh Thomas: Currently we are looking into the translation of basic research into translational research and thereby creation of good startups for the promotions of basic as well as scientific research into translation of commercial products and services.

*Interviewer: What are the hurdles you have overcome during the course of setting up the bioincubator?*

Dr. Manesh Thomas: As the physical premises, we are focusing on multiple domains like biotechnology, biomedical, dental as well as healthcare as well as meditech startup. So, our domains are very broad, hence creation of infrastructure for this R&D was one of the big challenges, but with the support of the Government of Karnataka, we initiated the small infrastructure for the support of all this research, and we're looking for other funding agencies like BIRAC and DST for supporting us with further development in various domains. Once we develop this infrastructure, we can handhold these innovators with our good infrastructure and facilities so that they should not go outside for testing and their own experiments or their proof of concept. We want to handhold completely independently inside the bioincubator upto what they expected from us, so that was to fulfil and that was a big challenge. We will also start sensitizing; as an academic institution, it takes a lot of time to sensitize the people and promoting them to go beyond their research into technology commercialization as well as do something good for the society as well as the economy of India.

*Interviewer: If somebody has an innovative idea, but does not know how to implement or create the product, are there other methods to help them out?*

Dr. Manesh Thomas: Incubators are meant to support these people who have innovative as well as general ideas which they may not know might be innovative, or which they do not know will work; so what one can do, is anybody with some sort of idea can walk into the incubator and take basic mentoring sessions and these sessions will cover all the technical, business, financial and regulatory aspects. These sessions are free and anybody can walk into the incubator and discuss this idea. Once you confirm that your idea is novel and there is no IP, filed in similar aspects, we can go ahead with these incubation programs, and there are other third-party agencies that are available for a similar purpose, so if you are confident that your idea is novel, we will recommend you to take IP activities after which you can go ahead with the commercialization of your product. Parallely, many times the

technology will not work, thus we should also lend that what you are going to go for in the society, who is going to buy your product and how long your business is going to last. Hence, along with technology, the incubator will give equal importance to business as well as legal, regulatory as well as other parameters.

*Interviewer: If there is an innovative idea that will be very beneficial to our society but because of ethical issues, it will not be possible to create the product and put it out into business, how are such cases overcome?*

Dr. Manesh Thomas: These ethical parts or regulatory parts aren't that hard to crack and if you are offering a product of your idea, or your innovative idea is good enough, then there will be some sort of handhold from the incubator. We will also give equal importance to the innovator and we will address their problems in getting approval before the regulatory authorities so that they can have some review on the regulatory process before the product goes ahead for commercialization. Regulatory compliances can also be changed by committees from the ministries. They have regular meetings and if some add-on is needed, they will do so accordingly. This is not really an issue; the problem and the idea should have some genuine, technology-packed innovations, then we can go ahead with it. Sometimes it may face a little time lag but ultimately, you will get clearances if your technology is promising.

*Interviewer: At the end, any advice you would like to give to the students?*

Dr. Manesh Thomas: Technology-business incubators are present across India, so you should be able to identify which incubators are nearby to whichever part of India you are in. You should identify these incubators and if you have some sort of idea, you should go to the incubators, discuss with your mentors and try to identify whether you can contribute something for our nation with your competency.

*" An investment in knowledge  
always pays the best interest "*  
*- Benjamin Franklin*

# *Get Scientified*



***Credit: Neha Kumari ( B.Sc. BT)***

## A Killer's Code

In the labs of the University of Leicester in 1984, Dr Alec Jeffreys- a geneticist who was studying hereditary illnesses turned the course of his study when he made an astonishing discovery. He had placed the DNA samples he had obtained from a technicians family into a photographic developing tank and on viewing the X-ray image of the profile, noticed that the bands were variable. They showed similarities as well as differences amongst members of the family. Variable Number of Tandem Repeats (VNTRs) he soon discovered, could be used to identify humans and differentiate them from one another in a precise and reliable way. Dr Jeffreys and his team then began to use this technique to analyze DNA samples of people embroiled in immigration and paternity disputes. Being the only lab to do so, he was not surprised when one day the police department called him for his help. The case that they were enquiring about however would change the way we now view and solve criminal cases forever.

The body of Dawn Ashworth, a fifteen year old girl who had left her home on the 31<sup>st</sup> of July 1986, had been found at a footpath in Narborough. A scarf had been used to strangle her and the post mortem indicated rape and violent attack. The police investigating the attack recognised a similar pattern of killing in one of the open case files from three years before. Just a small distance from the scene of crime, on November 22, 1983 the body of fifteen year old Lynda Mann had been found under the same circumstances. Having no conclusive evidence against any particular person, the case had been left open for further investigation. The detectives working the Dawn Ashworth case, quickly compiled the evidence from both the cases only to confirm that the blood type of the killer- recovered from the semen from both the cases was indeed of the same type. This along with the distinctive murder strategy displayed by the murderer signified the presence of a possible serial killer. The identity of this murderer however, was yet to be ascertained. Public outrage and fear was at an all time high and it was not long after the discovery of Dawn's body was an arrest made.

It was Richard Buckland, a seventeen year old boy with learning disabilities. During the course of questioning, the boy revealed some details of the case that had not yet been made public. This cemented the detectives opinion on his guilt, until Buckland confessed even to the first crime. This would have meant that he had been 14 during the first murder. This coupled with the repeated confession and take back of the statements that the boy would make led the police to make the historic phone call to the geneticist Dr Jeffreys.

Dr Jeffreys agreed to use the technique of DNA profiling that he had published recently in his academic papers, to try help solve the chilling cases. One test was enough to exonerate Buckling from the murder case. His DNA sample simply did not match the DNA samples recovered from either of the victims. This RFLP-based technique however did establish another fact. Both the girls had been killed by the same killer.

The fear of having a serial killer in the midst of Narborough, Leicestershire was mounting. The local newspapers warned the people of the consequences of having a criminal on the loose. The police found themselves back to square one. A month later, the detectives came up with an idea to screen the entire male population of the area using this new technique. The blood samples were to be given voluntarily, however societal pressure overrun this, and in the end almost 5500 men had given DNA samples to be discounted from the search for the killer.

This groundbreaking procedure drew even international attention with papers like the Los Angeles Times picking up the story. However despite all these efforts, the killer was not to be found. It would be almost a year before the police got the next break in the case.

In August of 1987, a friendly meeting in a pub would lead Ian Kelly to drunkenly reveal that he had provided the DNA sample for his friend, Colin Pitchfork. This piece of information was later revealed to the police by a overhearer at the pub which led to Kelly being brought in for questioning. It was found that Colin Pitchfork-a baker by profession, had inserted Kelly's photograph on his passport to provide misleading identification for the team collecting the DNA samples during the case investigation. The police brought in Pitchfork and immediately sent his samples to Dr Jeffreys lab- the only lab in the world at the time which was using the DNA 'fingerprinting' technique. While the results were being processed, the detectives made further discoveries on the past of Pitchfork. He had been earlier convicted of public indecency and exposure, and his alibi for both the events was weak- he claimed to have been taking care of his infant children during the time of the murders.

The results came back conclusive. Pitchfork indeed was the killer. His sample had matched those that were being investigated. After the results came in, it was easy to obtain a confession from the man. He would be the first man to have been convicted of a crime using DNA identification techniques.

This technique would be later lauded for its immense help in the case, and the British government, followed by the rest of the world, would start training professionals in this technique to solve crime.

The technique was used again by Dr Jeffreys in the high profile case to confirm the death of Josef Mengele- the hated doctor who performed terrible human experiments in the Nazi concentration camps by identifying his femur bone in Brazil.

Similarly a year later in 1991, this technique was used to identify the bodies of Tzar Nicholas II- the last emperor of Russia and his family in Yekaterinburg who had been assassinated during the Russian civil war.

The method of using short tandem repeats to identify people was polished later by Peter Gill and other scientists. Nowadays, the original technique that was used in the earlier cases is now no longer used. Instead techniques like PCR and Southern blot among others have taken over. Despite all the progress, the credit of getting DNA profiling to be used as a technique to solve crime and for it to be used as valuable evidence in a court of law still goes to Dr Jeffreys and his team of scientists who blended science with the world of crime and have changed the future of crime detection forever.

## References:

<https://inews.co.uk/culture/television/dawn-ashworth-lynda-mann-murders-killer-colin-pitchfork-dna-evidence-cathing-britains-killers-bbc2-649109?amp>

[https://www.google.com/url?sa=t&source=web&rct=j&url=https://en.m.wikipedia.org/wiki/Colin\\_Pitchfork&ved=2ahUKEwiNn8LsoJTnAhUQT30KHUzbDGAQmhMwDXoECA4QIQ&usg=AOvVaw2EawKGG8EnaOu\\_s-jCn0SMq&cshid=1579594752246](https://www.google.com/url?sa=t&source=web&rct=j&url=https://en.m.wikipedia.org/wiki/Colin_Pitchfork&ved=2ahUKEwiNn8LsoJTnAhUQT30KHUzbDGAQmhMwDXoECA4QIQ&usg=AOvVaw2EawKGG8EnaOu_s-jCn0SMq&cshid=1579594752246)

<http://aboutforensics.co.uk/colin-pitchfork/>



# The Milk Problem

A running joke in the popular television series 'The Big bang Theory' is Leonard Hofstadter's lactose intolerance and the ironic near constant presence of the gang at the local Cheesecake factory outlet. Now Hofstadter, presumably is ethnically Jewish, as indicated by his surname.

And rightly so, for lactose intolerance has a high incidence rate in the North American Jewish population and these findings are similar to those found in the Jewish community of Israel. Lactose intolerance develops as an inability to digest lactose in the body and is signified by the absence of the Lactase enzyme. It leads to symptoms like severe abdominal pain, blasting and nausea. Lactase production in the body is generally stopped in early childhood as it is only needed during the breastfeeding stage. The development of lactase persistence however leads to lactase production well into adulthood - and this is what gives those who are not afflicted by the intolerance to digest all dairy products with no difficulty. But how did lactase persistence begin in a natural system of losing lactase and lactose intolerance? The Lactase persistence (LP) trait has been observed most commonly in dairy practicing or pastoring populations. Around 35% of the human population share this trait.

About 10,000 years ago, different populations around the world gained the ability to process milk all through adulthood. These populations were all cattle farming communities. The benefits of lactose tolerance were many. For one, relying on dairy and its products for energy proved valuable. Milk is an excellent source of energy and in times of famine and drought, this trait would enable survival.

Dr. Harpending, an anthropologist at the University of Utah claims that lactose tolerance gave an edge to the European and Arabian empires that took over the previous Byzantine empire by helping soldiers survive better on cattle produce. Persistence also proved to be an evolutionary advantage and exerted a selective pressure over small periods of time. Milk provided a pathogen free fluid alternative to water in times of contamination crisis.

Lactose intolerance is a variable condition. It affects some with the worst symptoms than others. Currently those of African, Asian (excluding north Indian and Mediterranean descent) majorly show lactose intolerance. A reason for this might be due to the ancestral struggles with harsh climate and cattle pathogens as indicated by a Cornell Study. Temperature too could have had an effect. Milk left out in a colder climate like that in northern Europe, would leave the milk in a fresh state- but prone to infection. However in a different climatic condition of Southern Europe, milk- while still fresh, would turn into yoghurt- enhancing its value and thus enabling those who consume the two very different products to develop two different reactions.

All through these various findings, it was also confirmed that a nomadic lifestyle which decreased spread of cattle pathogens and disease allowed for the gene mutation for lactase persistence to be passed on. Another possible way for this phenomenon to occur would be the conversion of milk to cheese which removes much of the lactase as observed from biochemical evidence from ancient pots used to make cheese.

These theories, all however point out to one fact. The gene mutation causing lactose tolerance gave humans a distinct evolutionary and survival advantage, benefits of which we still enjoy today.

## References:

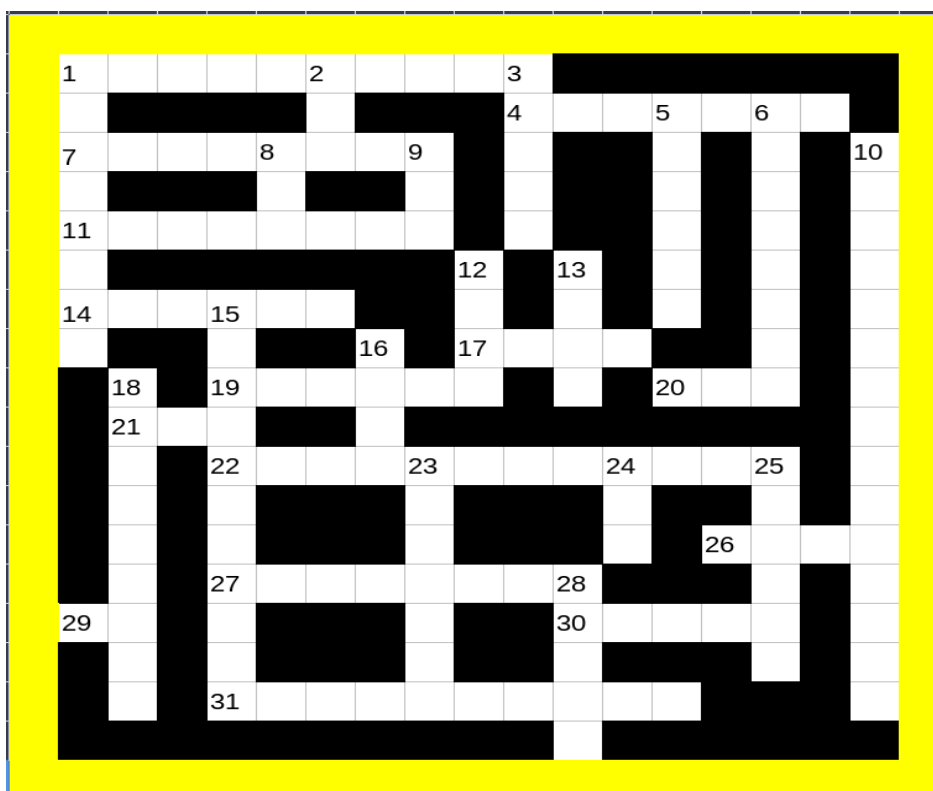
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[https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.smithsonianmag.com/arts-culture/lactose-tolerance-and-human-evolution-56187902/&ved=2ahUKEwiMnNvKoZTnAhVlbysKHYfeBdkQFjAaegQIARAB&usg=AOvVaw2-KOu-PU5qq\\_JbTc4yFPfjx](https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.smithsonianmag.com/arts-culture/lactose-tolerance-and-human-evolution-56187902/&ved=2ahUKEwiMnNvKoZTnAhVlbysKHYfeBdkQFjAaegQIARAB&usg=AOvVaw2-KOu-PU5qq_JbTc4yFPfjx)

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**-By Aswini Uchil ( M.Sc. MBT)**

# BRAIN TEASER



**ACROSS**

1. An invertebrate model organism(10)
- 4.A component of RNA polymerase as well as the colon(7)
7. Keeps you young but also kills you (8)
- 11.Adenine and Thymine(8)
- 14.Researchers' most visited and valued site(6)
17. A void set is also \_\_\_\_\_
19. The best articles you can find at?
20. A \_\_\_\_ of light
21. A physician for when you get otitis
22. \_\_\_\_\_ space between cells
26. Gelidium and Gracilaria
27. The \_\_\_\_\_ of DNA contains a 3' Hydroxyl group
29. An old editor
- 30.Plant hormone
31. Imitation of a process

**DOWN**

- 1.Electronic storage(8)
- 2.A type of graph(3)
- 3.Investigative procedure(5)
- 5.Lord of the flies(6)
- 6.Biological military(8)
- 8.Geography, Restriction Digestion and Google have what in common?(3)
9. Software for your statistical needs
- 10.A method used by Watson and Crick(15)
12. Functional unit of heredity
13. .txt, .jpg
15. ...CAGCAGCAGCAGCAGCAG.....(11)
- 16.Layman term for calibration
18. Dwarfism is caused by \_\_\_\_ alleles in Mendel's favorite plant
23. A top cause of DNA damage
24. 3 letter abbreviation for a polar amino acid
- 25.The \_\_\_\_\_ binds to the receptor
28. Extinct language, still popular in science

Stay tuned for the answers in the next issue of Vivus.....

-By Kanaya Bhattacharya (M.Sc. by Research) and Vishnu Karthik (M.Sc. BI)

**CREATIVE**

**CORNER ....**



*Namanpreet*

# The Art of Reading

“Reading maketh a full man; conference a ready man; and writing an exact man”. Friends, these are the words and ideas of Francis Bacon. And so, if a man writes little, he needs to have a great memory; if he confers little, he needs to have a present wit; and if he reads little, he needs to be cunning, to seem to know what he does not. These words aptly point out to us the importance of reading. The art of reading is slowly fading away.

Today’s youth are not just weary of reading but they are just not interested. With technological advancements, books and reading have taken a back seat. But we fail to see the great help that reading does in shaping one’s personality.

A well-read person is always ready for a conversation on any topic at any given time. Since he knows, maybe a little about everything, it instils confidence in him. Such a person will also make his own views on issues and will be knowledgeable and a logical thinker. His vocabulary will never be in dearth of words and he will be able to explain his views not just vividly but also assertively. Reading not only makes you knowledgeable, it opens up wings of your imagination and fantasy. Visualizing what you read gives immense satisfaction and happiness. To absorb every word, every line, every paragraph just as the writer, is a feeling only to be experienced.

The joys of reading are a plenty. Friends, let us pledge to revive the art of reading. Let it not fade but instead let us make reading a part of our lives and enjoy it. Only then will we become a “full man”.

*-By Preksha Mandlecha (M.Sc. MBT )*

# *She Writes...*

**S**he thought, she wrote. She wrote of all the times, all the phases.

Through the lanes that led her to the dark, the fear, the anger, the love, so sheer. She wrote it all. She cried it all. Through the thick and thin, while she poured all of it out.

She smiled too, happy to realise she didn't fade out in those alleys.

Other times, she was blank.

The words so deep, halted just before they were given a purpose. Maybe, she didn't write it all.

She thought she wrote, of all the times in all the phases...

*-By Debasmita Banik (M.Sc. MBT)*

# CINDERS

It was a bright, sunny day,  
A holiday after a long period of strife.  
I was with my family in the park.  
My children ran towards me with daisies  
I spread my arms,  
And I woke up.

We were all sprawled on the grass  
Surrounded by the cloudless sky,  
Engulfed by the aroma of my wife's cooking.  
I reached forward to have a bite,  
And I woke up.

The sky eventually turned to shades of orange,  
We didn't want to go home.  
In the corner of my eye, I saw  
Something bright fall to the ground,  
And I woke up.

My children's faces flashed through my mind, I don't know why.  
I saw the puzzled face of my wife.  
I heard a roar, noticed everything around me fly hither-tither  
And I woke up.

The sky is now jet black,  
Embedded with the pretty stars.  
The view is getting disturbed by the flames around and within me.

I'm turning to my left  
I see a severed hand with a simple platinum bracelet  
'Forever', it reads  
It belongs to the woman I love the most.  
Where is she? Where are my children?

I can't feel my lower body  
Everything feels numb.  
I close my eyes.  
I try to wake up;  
I want to wake up.  
But this time, I can't.

*-By Divya Mallya (B.Sc. BT)*

# RAPE

*“Tell me for a day that it’s all going to change”*

Show me the newspaper articles, and show me the awareness campaigns and take me to the candle light march held for the girl who was in the wrong place at the wrong time.

Show me all the speeches made by the authorities in favour of the girl who is going to be branded a victim for the rest of her life, a placard over her name for the world to preach on, a version of herself she will never be allowed to forget about.

Show me all the buried FIR complaints from all the boys who never had a chance to create their own #MeToo, deprived of the luxury to be recognized just because the law says it.

Show me all the places in the country with all the “educated” population, who discuss about the fact that rape happens but don’t talk about why rape happens.

Show me all the concerned parents, who raise their girls to be preys and teach them to be victims.

Show me all the schools in the country where teachers teach the middle school girls to cover themselves up but no one teaches the boys to keep their hands to themselves.

Show me the developing country, where the grievances of the individuals belonging to the transgender community goes unheard, thousands of voices being ignored by the society that is supposed to have become open minded.

Show me the country which has assigned rape with “terms and conditions to be met”, consisting of checkboxes of Gender and Sexuality for an act to be qualified as rape.

Show me all the people who went through something no one deserves to go through being almost physically held back, whose suffering is made their identity and grieving their occupation.

Show me all the articles which say “Real Men Don’t Rape” and then show me the anatomy of the male body and then show me what it was that held them down and proceeded to explicitly show them the gaps in their vocabulary that began with ‘m’ and was immediately followed by ‘p’.

Show me the country that is concerned with rape only after it happens, after an innocence is lost and a new victim to join the battered side. So tell me it can all change for a day, and tell me consent will one day exist in everyone’s vocabulary and tell me there will come a day when the narrative will be something other than, “girls? Not surprising. Boys? A Joke and Anyone Else? Not Applicable.” “Tell me there will come a day when it will be a very improbable if and not an expected when. Please, I’m waiting.”



## The Reason

Hmm.

See, this wasn't to be a poem,  
I just type, typical drivel my specialty,  
Pent out frustrations and aspirations  
All colliding underneath my demented dome.

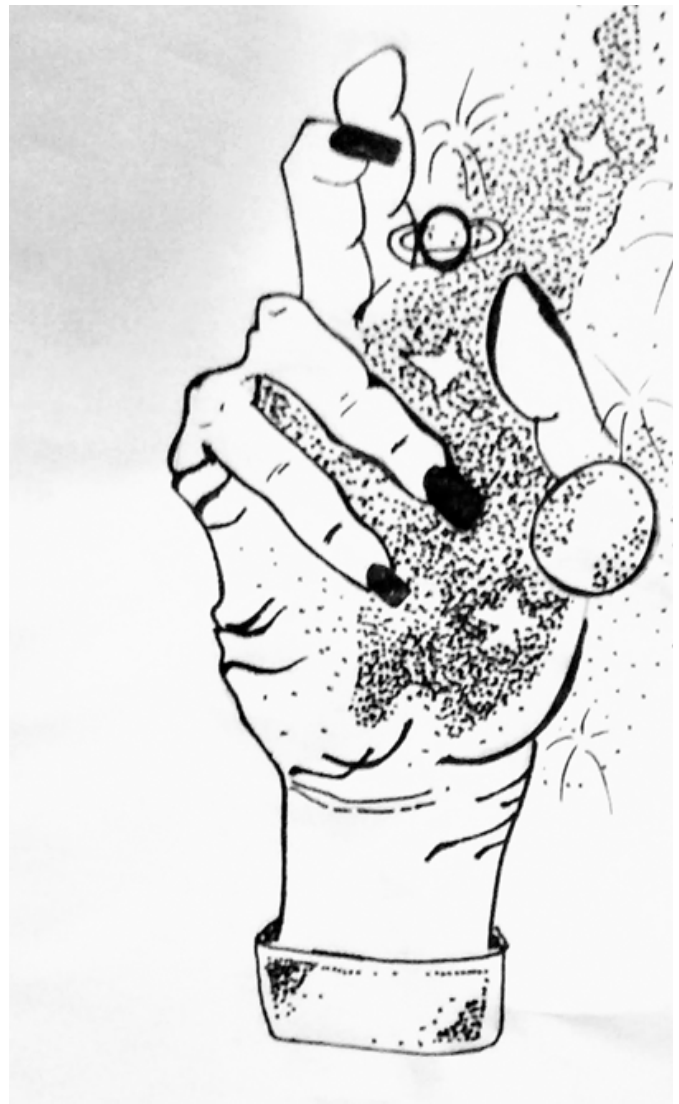
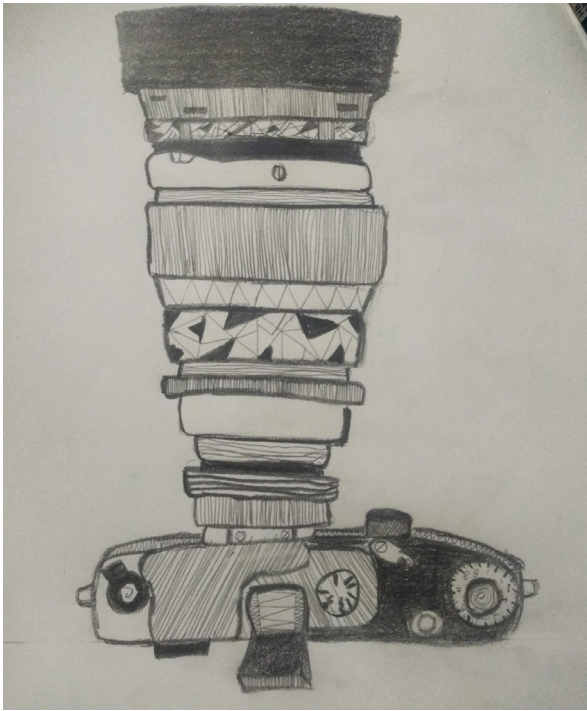
But aah, au contraire!  
Seems like today's not  
The day my damning deliberations  
That rival the best  
scrambled eggs in their structure  
Become exactly what those guileless ova become:  
Wasted unto the deep dark bowels of man.

Apparently, 'tis finally the day!  
The day this woeful wreck of a man  
(God, how I adore self- pity)  
Might actually churn out some half decent  
Fecal matter! Oh my!  
[Fecal fetishists rejoice]  
Here, have my tiny two cents  
That somehow  
Are worth even less  
Than the suggestion of the expression.

Have a go at  
Attempting to assimilate  
My maniacal machinations  
And exit, having undergone, uncomfortably  
My deeply disturbing diarrhoea  
[Verbal Vomit? Nah]  
Only to realize  
You were perfectly played;  
Welcome to an exercise in alliteration.

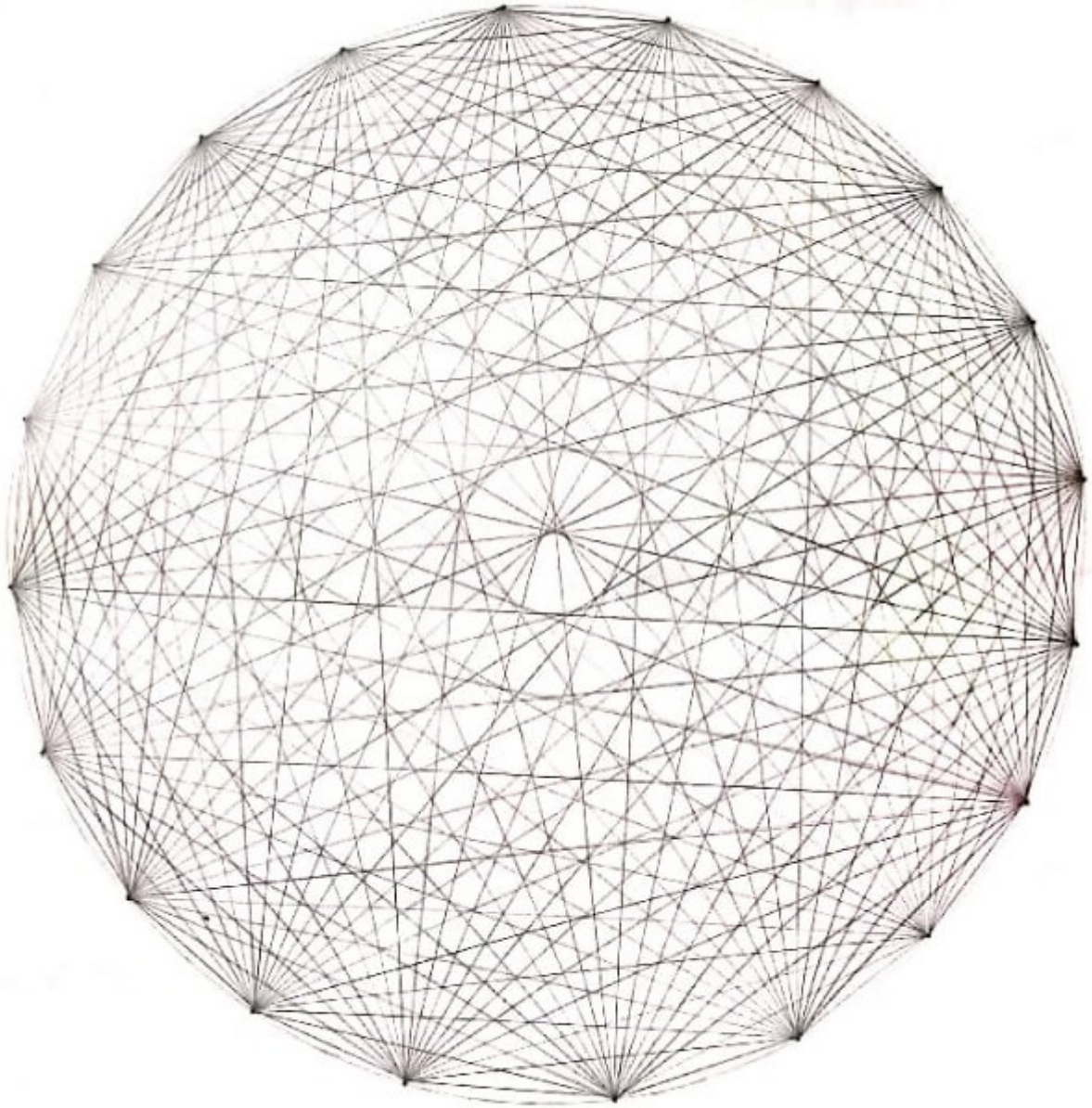
*-By Prahlad Rao (B.Sc. BT)*

# SNAPSHOTS , SKETCHES AND MORE...



**Artwork by:**  
**Neha Kumari (BSc. BT)**

# LIFE IS A PATTERN



**Artwork by :**  
**Poojitha Kondur (B.Sc. BT)**

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