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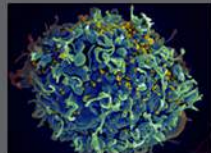


School of Life Sciences

Newsletter



Latest News



Research Highlights



Funs and Puzzles

Science Matters

DEFINING THE GENOMIC SIGNATURE OF TOTIPOTENCY AND PLURIPOTENCY DURING EARLY HUMAN DEVELOPMENT

- Vani Patel, MSc 1st Year

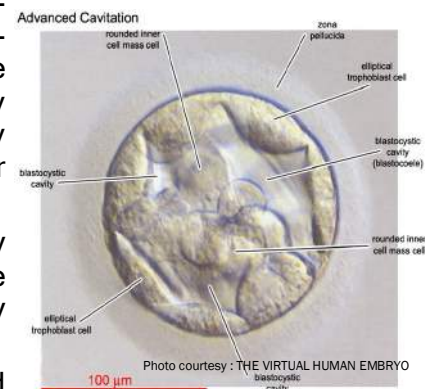
That a solid mass of cells covered with a sheath, transforms into a full fledged organism has been a fascination for mankind. Decades of genetic analysis have today given way to a few, if not all, answers regarding this transformation. Among those interesting findings, stem cells are of greater interest as they are characterised by self renewal and their ability to differentiate into various types of tissues or their potency. Stem cells can be

1. Totipotent - Cells can differentiate into an embryo along with extra embryonic membranes (e.g. Blastomeres).
2. Pluripotent - Cells can forms a multi varied array of organs (e.g. Inner mass of cells of a blastocyst).
3. Multipotent - Cells are restricted to a particular progenitor and produce cell of this lineage only. Other variations of the potency include bipotency, tripotency etc.

A recent study undertaken at the Valencia Node National Stem Cell Bank, Centro de Investigación Principe Felipe on human embryonic stem cells (hESC) has shown that totipotency (ability of single cell to divide and produce all differentiated cells) and pluripotency (potential of stem cell to differentiate into any of the three germ layers) are at the base of both embryo development and stem cell field. The study clarified that blastomeres were the totipotent stem cells as they gave rise to the complete embryo, i.e. the three germinal layers, including the extra embryonic membranes, while the day 5 blastocyst with the inner cell mass gave rise to pluripotent cells. Their study revealed that pluripotent and totipotent stem cells display different and unique transcriptomes thereby giving a clear difference between the two.

To differentiate them further, researchers tried to identify any specific markers, the adaptability (irrespective of the source) and the factors governing the human totipotency and pluripotency.

For this, the hESC were derived from whole embryos and from single blastomeres. The derived hESC were cultured and maintained as undifferentiated hESC on irradiated human foreskin fibroblast cells (ATCC) in multi-well cell culture plates with appropriate media. The media was changed every 48 hours. Three cell lines of hESC were derived from ICMs (inner cell mass) (VAL-5, VAL-7, VAL-8) and two cell lines of hESC were derived from blastomeres (VAL-10B, VAL-11B). The genome-wide transcriptional analysis of these cell lines were compared using microarray analysis and bio-informatics tools and results were validated validation using real-time quantitative PCR (qPCR).



Genes involved in totipotency and pluripotency were classified based on expression levels, using the comparative undifferentiation network signature (UNS) expression profiling of human blastomeres versus ICM and hESC. UNS showed that expression of 189 genes was significantly different between hESC from ICM and blastomeres, while that of 77 genes was the same. There was no difference between the hESC derived from different sources. Some of the upregulated and downregulated genes are listed in the table below:

Upregulated Genes	Function
ABCG2	membrane transport protein
H19	Imprinting gene
DNMT3L	Methylation

Downregulated Genes	Function
GTSE1	cell cycle markers
HMGB2	transcription factor
HSPB1	heat shock protein
EP300	transcriptional regulator.

Thus these downregulated genes also worked as the genomic signature for pluripotent stem cells.

The *in vitro* pluripotent signature (IVTPS) of the stem cells, comprised 107 genes. This list of genes included significant pluripotency and self-renewal markers, including the core pluripotency transcriptional genes namely POU5F1, NANOG and SOX2, other transcriptional factors including HMGB1, KLF4, MYC, SALL2 and so on. Other genes included telomerase related genes, *de novo* methylation markers, ribosomal genes, and the genes related to the pluripotency representative signalling pathways.

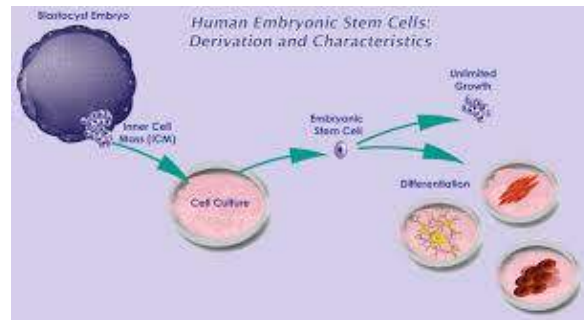


Photo courtesy : Blurrent

This paper helps us to know the gene signatures for blastomeres (TS), hESC (IVTPS) and ICMs (IVVPS). The network analysis performed, helped to establish biochemical, physical and functional interactions between genes and the segregated expression cluster, which helps to define each developmental stage. This further initiates the interest in the complex process and pathways relating to the human embryo development.

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TREATING LIVER DISEASES WITH PROBIOTICS—A POSSIBLE STRATEGY?

- Nitufa Mulla Ahmed MSc 1st year

Several exogenous and endogenous factors have negative consequences on the liver. This may cause destruction of hepatic cells and ultimately lead to various kinds of liver diseases.

There is close anatomical and functional relationship between the gastrointestinal system, especially the gut and the liver, known as gut-liver axis. The blood supply to the liver occurs mainly through the intestine via the portal vein. The intestinal ecosystem is predominated by mostly Gram-negative bacteria and anaerobic bacteria. The portal vein can supply toxic compounds, bacteria and their derivatives, substances produced by microflora such as alcohol, ammonia to the liver for the purpose of filtration. It also modulates the activity of Kupffer cells and increases cytokine production. The rise in pathogen associated molecular patterns or PAMPs (characteristic identification for a given pathogen) leads to accumulation of toxic substances in the liver thereby causing its dysfunction. Alterations in the type and amount of microorganisms are important elements of liver dysfunction.

According to FAO/WHO, **Probiotics** are live microorganisms, which when administered into the body in adequate amounts, confer health benefit to the host. It was Elie Metchnikoff, who introduced a novel hypothesis about the health effects of probiotics at the start of 20th century. An ideal probiotic strain has certain special characteristics and functions. It should be resistant to bile, HCl and pancreatic juice. It should have the ability to tolerate stomach and duodenum conditions, gastric transport. Some of the commonly used probiotic strains are *Lactobacillus*, *Bifidobacterium*, *Escherichia*, *Enterococcus*, *Bacillus* and *Streptococcus*. A probiotic can be available in different forms such as powder, liquid, gel, paste, granules etc.

Health effects of probiotics can be seen at concentrations of 10^8 - 10^9 CFU (colony forming units) per day. Probiotics exhibit their effects via several mechanisms such as an inhibitory effect on pathogens, maintenance of the intestinal microflora balance, regulation of immune response, and intestinal epithelial homeostasis.

Probiotics can synthesize substances like nutrients, vitamin K, short chain fatty acids, peroxidase etc. and digest unabsorbed sugars like lactose with alcohol, proliferation and differentiation of epithelial cells. They also enhance the immunity against entry of pathogens from external environment, thereby preventing the colonization of pathogenic bacteria. Various strains of probiotics are used for treating or preventing diarrhoea, inflammatory bowel diseases, cancer, *Helicobacter pylori* infection, vaginosis, hepatic diseases, allergy, lactose intolerance, high cholesterol levels, colitis, modulation of the immune system.

LIVER DISEASES AND EFFECT ON PROBIOTICS

Probiotics have various effects on liver health and also a primary effect on gut function. Consumption of probiotic could allow Enterobacteriaceae through competitive inhibition.

It improves intestinal epithelial viability and stabilizes physiological luminal permeability and ammonia absorption. It also controls the flora bacteria quality that lead to decreased endotoxins and other toxic compounds such as ethanol, phenol, or indoles, which cause injury to liver. It also decreases production of proinflammatory cytokines (e.g. TNF- α , IL6, IFN- γ) via down regulation of NF- κ B.

Non Alcoholic Fatty Liver Disease (NAFLD) - The most globally prevalent liver disease, NAFLD includes an extensive range of disorders from steatosis to non-alcoholic steatohepatitis (NASH) and a broad histological manifestation that includes macrovesicular steatosis, liver cirrhosis, portal hypertension and hepatocellular carcinoma. A high amount of lipid storage in hepatocyte increases liver transaminase and accumulation of necroinflammatory components are both indicators of disease conditions.

The use of probiotics and symbiotic bacteria is recommended as the bacteria have the capacity to modulate micro flora overpopulation. Administration of organisms such as *Streptococcus thermophilus*, *Bifidobacterium longum*, *Lactobacillus acidophilus* etc. are tested in animal models. But clinical trials on a large scale are needed to approve these bacteria.

Alcoholic Liver Disease (ALD) - ALD is a cause of high rate of morbidity and mortality, involving hyperpermeability of intestine followed by alcohol consumption that leads to endotoxemia. It triggers proinflammatory pathways for causing ASH. Increased synthesis of nitric oxide results in oxidative stress in the hepatocyte. Chronic alcohol intake, causes changes in the microbiota. A study on human subjects also suggested a relation between alcohol induced dysbiosis and endotoxemia. A migration of microbial population during the early course of ALD has been suggested to lead to inflammation and eventually to liver cirrhosis. It is also recognised that microbiota are not involved in hepatocellular carcinoma but have a role in proliferation.

Cirrhosis - Vascular disease is recognized by attributes such as portal hypertension and hyper dynamic syndrome. Similar to most liver diseases, lack of equilibrium in the gut, normal flora and impairment of intestinal barrier causes endotoxemia. Overgrowth of gut micro flora BT, and endotoxemia found in patients with cirrhosis supported use of vascular shunts. Such complications are accomplished by stimulation of inflammation and oxidative damage in the liver, which cause hepatocyte injuries. Administration of bacterial therapy along with probiotic strains is seen to modulate bioecological system (prevention of growth of pathogen, improvement of mucosal layer, bt reduction). The probiotics help by decreasing portal hypertension due to inhibition of nitric oxide production.

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MUSIC: MYTHS, MYSTERIES AND SCIENCE!

- Akshatha Nayak, BSc 3rd year

Music continues to play a significant role in the lives of mankind, as it has since the beginning of civilization, known not only as a form of art and entertainment but also for its mystical effect of healing and expression. It has been practised, developed and studied across several civilizations in its various forms. The earliest musical instruments found, date back to 40000 years ago (e.g.: bone flutes from Southern Germany) and written records of music have been found in the Indian Vedic scriptures dating back to 1750-500 BC. “Seikilosepitaph”, an ancient Greek composition is known to be the earliest of all compositions dated to be 200BC-100AD.

Listening or even humming a tune seemingly echoes the sentiment we are living at that moment and helps convey those thoughts and emotions that perhaps verbal communication would fail to accomplish.

Nevertheless, the science behind the evolution of music still remains a mystery. Aristotle (Greek philosopher and scientist, 384 - 322 BC) had classified the power of music under “unsolved problems of world”. Kant (German philosopher, 1724-1804) said, “it merely plays with the senses”, and Pinker (Canadian experimental psychologist) believes that it was a by-product of natural selection that would tickle the sensitive spots. Moreover, Darwin’s idea of sexual selection of music suggested that music is to be studied as a biological adaptation.

Most of the ancient civilizations perceived music to be healing. The Greek god Apollo was related to music and healing. Hippocrates, the father of Western medicine, used to play music to help calm mentally ill patients. Even now, some of the music compositions by Wolfgang Amadeus Mozart are listened to and studied for their healing potential.

Indian classical music is believed to be unique of its kind, for it has been progressing through the millennia providing vast literature on music and its effects. It has intriguing concepts that include both the healing and destructive nature of music. More significantly it contributes analysis over mood (termed as *Rasa*) that is observed with respect to the combination of tones (termed as *Rāga*). Interestingly, there are nine *Rasas* mentioned - *Shringār* (Love), *Hāsya* (Comic), *Karuna* (Compassion), *Raudra* (Anger), *Veera* (Heroism), *Bhāyānaka* (Fear), *Bibhatsa* (Disgust), *Adbhuta* (Wonder) and *Shānta* (Peace) - that are used to describe each *rāga*. Each *rāga* has been given a particular season or time to provide its best effects. For example, (the *rāga*) *Yaman* has *Shānta* (*rasa*), believed to relieve oneself from mental stress, which is best achieved when sung or played during the late evening hours.

Unbelievable as it sounds, some legends even mention the power of music to bring about sudden changes such as causing rains, boiling water etc. The mechanism of its nature and the extent of its validity however, is yet unknown.

In June 2013, Masataka and Perlovsky published a scientific report confirming the role of music in human cognition. Based on both pleasant and unpleasant behaviour of music, an experiment was carried out with two audio clips composed by Mozart (The Mozart effect). One being the consonant music having harmony in musical notes makes it pleasant, while the other being a dissonant music having disharmony in musical notes, thus making it unpleasant. The effects of both were observed during a cognitive interference. It

was found that the consonant music pacifies cognitive interference, helping the participants to respond faster. The dissonant music facilitates cognitive interference, reducing the speed of response of the participants. This implies that different combinations of musical notes can have different impacts on one's cognition and ability to respond.

Previous studies state that music helps improve neurogenesis, facilitates regeneration and repair of neurons, and also alters visual perception. These findings definitely help us understand the concept of the healing power of music. However there are questions that are yet to be addressed. The constructive and destructive nature of music needs to be observed and analysed. For the curiosity-mongers amongst us, the origin and evolution of musical instruments such as bells, chimes, conches etc. and also those that are used with vocal music such as piano, flute, string instruments, are immensely awe-striking mysteries, which need to be explored.

However, no matter whether the scientists do discover the secrets behind the marvellous nature of music or not, it shall nonetheless continue to bestow its power on human minds for eternity as it has been doing till date!

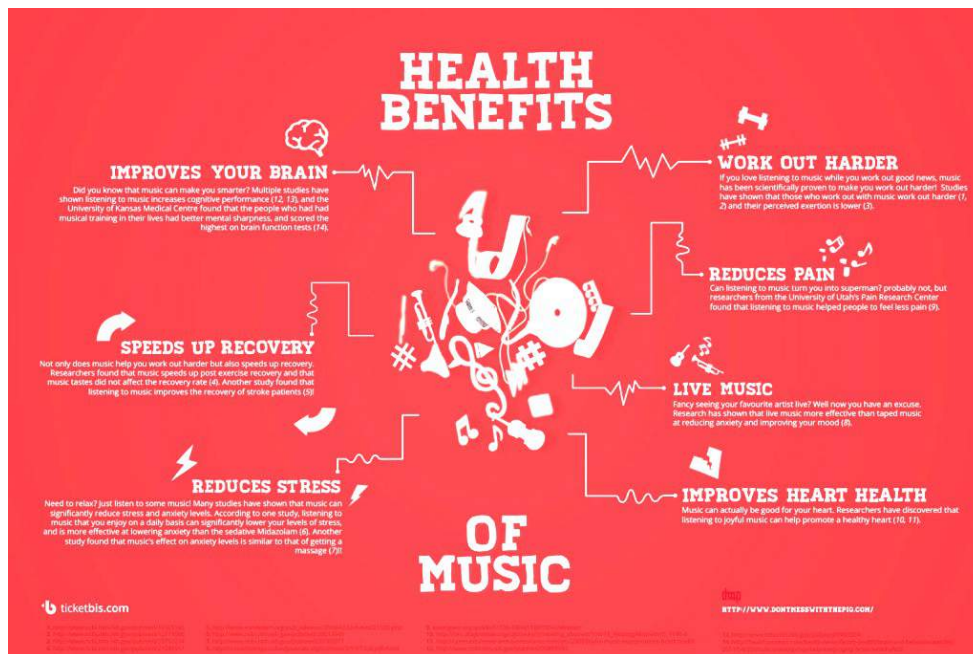


Photo courtesy: <http://www.hecticandhealthy.com>

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SLS—Events Diary

MATRABHASHA DIWAS

- Priyanka Abraham, BSc 3rd year

On the 21st of February 2015, our college celebrated 'Matrabasha Diwas' to signify the importance of the different regional languages spoken all over the country. Students, research scholars and staff members actively participated and performed (songs, presentations) in their respective mother tongue. The research scholars also performed a funny skit in the local language, Kannada, which thoroughly entertained the crowd. Presentations, including an interesting video clip, were made by faculty members which portrayed languages and cultures representing their region of origin. A white board, put up near the entrance, helped many people to write a line or two in their mother tongue. At the end of the day, the board had scripts of at least 10 languages, which indeed displayed the rich diversity of our nation (and our institution).



SCIENCE DAY CELEBRATIONS

- Preeta Ananthanarayanan, MSc 1st year

National Science Day is celebrated on February 28th every year to commemorate the discovery of the Raman Effect by Indian physicist Sir Chandrasekhara Venkata Raman on this day in 1928. It is observed to help spread awareness on the importance of science and technology.

As part of the celebrations, the School of Life Sciences, Manipal University hosted 24 school toppers from the Udupi region for a week in the campus. These students gained hands-on experience in different fields of science and technology. The week culminated with a science exhibition and other activities.

The celebrations at the School of Life Sciences, in the form of exhibition, were inaugurated by Dr. Vishal R, (Deputy Commissioner, Udupi District) and Dr. H.S. Ballal, (Pro Chancellor, Manipal University, Manipal) in the presence of Dr. G.K. Prabhu, (Registrar, Manipal University, Manipal).. The Science Exhibition had students from high schools of Udupi and Mangalore as well as students of the School of Life Sciences, who put up various science exhibits on Physics, Chemistry and Biology and was visited by 500 students and adults.

The main attraction was the Chemistry show where faculty and students enthralled the children with experiments such as “Oscillating Clock Reaction”, “Mini Fireworks” and “Catalytic Colours”, captivating them with their magic. The Biology exhibit had the students of all age groups being introduced to the field of biotechnology who got their first glimpse





of mutant fruit flies, chromosomes, cancer cells and histological sections. The visitors were also given the opportunity to view the Greenhouse and watch the shows put up at the Dr. TMA Pai Planetarium.

The award ceremony conducted at Fortune Inn Valley View, was presided over by the guest of honour, Dr S. Ananth Raj, Executive Secretary, Vision Group of Science and Technology (VGST), Government of Karnataka. He addressed the gathering of students from 13 high schools and 8 higher primary schools belonging to Academy of General Education and Dr TMA Pai Foundation, and stated that India had not been able to transform its discoveries into technologies and that it was up to the future generations to help build the scientific community in the country. He ignited their scientific temper, encouraged scientific curiosity and urged them to always be aware of various scientific discoveries and advancements.

Earlier, Dr G.K. Prabhu gave a brief description of the Science Day celebrations in Manipal University and welcomed the gathering. Dr H.S. Ballal also spoke on the occasion and congratulated the students for taking part in the science competitions.



SPORTS WEEK—The games we play...

- Vinita Kaulgud and Dhruv Seth, MSc 1st Year

The months of February and March at School of Life Sciences were packed with sports and athletics events concluding in the Annual Sports Meet 2014-15 on March 7,



The School of Life Sciences Family in sports mode....

2015 at the MIT ground. There was widespread participation from students, research scholars, faculty and staff members during this period. Here is a summary of the events and the eventual winners and runners-up.

The Football event was held between teams from the students batches and faculty/research scholars (combined). In a tense final match between the BSc I and BSc III, BSc III students bagged the championship trophy. Mr. Ankit Singh Tanwar (BSc III) was declared the best footballer.

In Badminton, Mr. Sandeep Mallya (faculty) won the men singles event by comprehensively defeating Mr. Pranoy Sahu (MSc II) in the finals. In the doubles event, Mr. Sandeep Mallya and Mr. Kamallesh Mumbrekar (faculty) overcame Mr. Suhas N G and Mr. Pankaj Semwal (MSc I) to win. The women's singles event was won by Ms. Shivani Tendulkar (MSc I) by defeating Ms. Eswari (BSc III). Ms. Tendulkar teamed with Ms. Yesha Parekh (MSc I) to win the doubles finals by beating Ms. Sanika Apte and Ms. Poojitha Reddy (both MSc I).

Volleyball matches were played between the students, staff and research scholars. The staff team defeated the research scholars in a close game to claim the championship. Mr. Vasudeep Shetty (research scholar team) was adjudged as the best volleyball player.

In Throw Ball, a team of staff/research scholars won the finals comprehensively by defeating student team. The Basketball finals saw the BSc students win

the event. The event was surprisingly popular with active participation from all quarters. Ms. Priyanka Abraham (BSc III) became the best player of the basketball events.



Bhaag Mil... Ankit bhaag.....

This year indoor games such as carrom and chess were conducted with the active participation of the students. The carrom competition was won by Ms. Poorva Huilgol and Ms. Vani Patel (both MSc I), while Mr. Rudranath Ghosh (BSc I) defeated all comers to win the chess event.

On the Annual Sports Day, athletics events such as 100m, 200m (individual and relay), discus throw, shot put, javelin, and long jump were conducted for students and staff members.

There was hard-fought competition in almost all the events, though there was an abundance of camaraderie among the competitors too. Senior faculty members also took part in an exciting cricket match against the students and won. The final highlight of the day was the tug-of-war, which saw people putting in their full strength and effort to pull the rope to their side of the marker. Mr. Ankit Singh Tanwar (BSc III) was chosen as the best out-going sportsperson (men) and Ms. Priyanka Abraham (BSc III) the best out-going sportsperson (women).



Age no bar to athletics!!!!



And the winners are.....



The triumphant students

“Mr. Manipal” Best Physique Competition

- Namrata Iyengar MSc 1st year

Gene Tunney got it right - “To enjoy the glow of good health, you must exercise”. It was with this spirit that the School of Life Sciences hosted the “Mr. Manipal Best Physique” competition of the Manipal University. Numerous youngsters with toned and chiseled figures made it on to the stage. The program was a huge success, with felicitation to the world renowned body builder Mr. Roshan Ferrao and the declaration of the winner, Mr. Tony Mammen Gorge from Manipal Institute of Technology.



Utsav 2015

-Pallavi Mathur, Bhaumik Patel, Preeta Ananthanarayanan,
Vani Patel and Simran Jain, MSc 1st Year

The not-so-early hours of 6th April 2015 saw some faculty members of Manipal University (MU) sweating it out in the WGSHA kitchen, preparing for their day ahead. Turned out that they were the participants of the cooking competitions organized by the Cultural co-ordination Committee (CCC), MU and Welcome group Graduate School of Hotel Administration (WGSHA), as part of the ‘Staff Utsav 2015’.

‘Make your own veggie dish’ was the first event, followed by non-vegetarian dish presentation, sweets and desserts showcasing, and finally by flower arrangement competitions. Dr. Sanjiban Chakrabarty of SLS won the 3rd prize in non-vegetarian dish presentation for the mouth-watering preparation called “Chicken Cake”.

The last event of the day heralded the quirky side of the MU faculty members at the KMC greens. Variety entertainment was the ultimate evidence of talents such as mimicry, singing and dance, proving that our teachers are not only talented at teaching but also in extra-curricular activities.



Yummy Chicken Cake anyone???

Day 1: 7th April, 2015

'Student Utsav 2015', started on 7th April with painting and cartooning events, wherein the students got to showcase their artistic talent. These events were organized by ICAS Manipal. Debate and extempore, organized by SOAHS Manipal, were held next. The topic of debate was "*We can wipe out corruption from our country*". This was followed by instrumental (solo) and pot pourri events, organized by MCONS Manipal and SOC Manipal respectively.

The inauguration event of Utsav 2015 was held in the evening, in which the student cultural heads of each institution along with a faculty coordinator represented their institution in a cultural progression - the Cultural Parade, in which a team from each institution presented a multi-hued image of the rich cultures of the world. The first day of Utsav 2015 ended with performances in the Indian non-classical light vocal (solo and group) categories.

Day 2- April 8, 2015

The second day began with the Indian folk art- the Rangoli, followed by a collage competition hosted by FOA, MU, where many contestants put up decorative rangolis and a vibrant display of colourful collages. This event was followed by Quiz prelims. From among



Antkshari quiz..... they are so acing it!!

numerous teams, only six qualified for the finals conducted by the quizmaster Dr. Anil Shetty. The experienced quiz master tested the finalists with eclectic questions from different subjects and varied contemporary events across the globe. It was a tough time for the participants but nonetheless, it was a great spectacle and was hosted by SLS, Manipal. Later in the morning there were Antakshari prelims, organized by MCODES, Mangalore.

The afternoon session turned the atmosphere filled with *raga* and *taals*. the students showcased their vocal powers in singing Indian classical tunes, an event hosted by KMC, Mangalore. The session later saw participants of 'Creative Jam' (organizer: MIT, Manipal) creating music from junk such as pipes, bottles, matkas, oil cans, barrels etc. The music created was recycled, refined and renewed. The fun-filled evening began with Indian classical solo dance, which was followed Eastern solo and Eastern group dance.

The performances were beautiful and enthralling to watch. The entire dance show was organized by MCOPS, Manipal



Oh yeah, that's the way we do it!

Day 3: 9th April

Even after 2 days of high-octane action, there was no let-up on the energy on the third day, the day of Creativity and Vocabulary.

The day began by viewing the *Manipal Summer* through the lens, for the Spot Photography contest, organized by MMMC, Manipal. Mr. Mahesh Nair, SLS secured the third prize for his excellent work. The photography competition was followed by an afternoon of letting the creative juices flow by making the best from waste, the Installation contest, organized by MMMC Manipal. Poetry Writing in Hindi and English was the third event of the day, which was organized by MCODS, Manipal. Mr. Anirudh Gupta, SLS secured the second place in Poetry Writing (English).

Mimicry event was one of the highlights of the day, with numerous Bollywood actors giving the job interview that sent the audiences into peals of laughter. The event was organized by SOIS, Manipal. SOAHS, Manipal wonderfully organized the two musical events of the day - Antakshari and Western Singing (Group and Solo) in KMC Greens. However the spotlight was grabbed by the performances during the western dance (group and solo) competition, organized by MIT, Manipal.

Day 4: 10th April

The last day began with a well-received JAM event and Clay Modelling, which saw good participation and admirable clay models built by competitors. The main stage events started with Mime and Street Play. SLS gave a well-rounded performance on the topic 'Say no to alcohol'. In the subsequent Mad Ads event, SLS bagged the 2nd prize by convincingly trying to sell a washing machine in a humorous and imaginative manner. SLS students also staged a stunning ballad for the Duet Dance competition. The final and most-awaited event of Utsav, the grand Fashion Show saw participation from all colleges who put their best foot forward with wildly stitched and artistic dresses and costumes. The participants walked the ramp with immense passion on themes ranging from 'Indian Weddings' to 'Wonders of the World' to social issues such as 'The story of Charlie Hebdo'. SLS tantalized the audience with their interpretation of the 'Solar System' in their colourful and creative dresses. This was followed by the prize distribution ceremony and the overall championship trophy was bagged by Kasturba Medical College, Manipal. School of Life Sciences was placed at a commendable sixth position.



On stage: The Galaxy!



Our show stopper

Prof. J. V. BHAT Memorial Oration 2015

- Poorva Huilgol, M.Sc 1st Year

The Annual Prof J. V. Bhat Memorial Oration is a legacy initiated by his family and students in 2007 and organized by the School of Life Sciences (SLS), Manipal University. For the year 2015 Dr. Harsh Vardhan Batra, Director, Defence Food Research laboratory, Mysuru was felicitated for his outstanding contributions to microbiology. The program began with a welcome address by Dr. P. M. Gopinath, Senior Scientist (SLS) regarding the genesis of the oration and a brief report on previous recipients. Dr. T. S. Murali, Assistant Professor (SLS) introduced Dr. Batra to the audience. Dr. Batra was presented with the Prof. J.V. Bhat Memorial Oration Plaque and a certificate by Dr. H. Vinod Bhat, Pro-Vice-Chancellor, Manipal University.



Dr. Batra began his oration by thanking the organizers and the family members of Prof. J.V. Bhat, and enlightened the audience with his work and achievements in microbial diagnostics. He supported the development of both applications oriented and basic research fields, saying that the key to attain success in scientific field would be through innovative thinking in terms of preparation of strategies to make use of limited resources. He spoke on his work related to bio-threat mitigation program. Dr. Batra has worked on recording specific molecular signatures of different pathogens, using this method to identify them during outbreaks in and around the country. Dr.

Batra and his team of young students have developed various kits such as ELISA-SAND1, ImmunoPCR, APTADEC as diagnostic tools for quick and efficient on-the-spot field analysis of pathogens such as *Enterobacteria* spp., *Yersinia* sp., *Bacillus anthracis*, *Orientia tsutsugamushi* etc. They are currently working on developing kits using chimeric proteins and also on developing vaccines even in the absence of strains of the pathogen.

Dr. Batra mentioned that he has tremendous belief in the abilities of the youth, their head-on approach towards the challenges and invigorating attitude for research and said that he surrounds himself with them to keep evolving to the different perspectives that come with the younger generation. The program concluded with a vote of thanks by Dr. Manjunath Joshi, Assistant Professor (SLS).



Prof. JV Bhat Oration award and certificate

Interactive session with Dr. Harsh Vardhan Batra

-Joel Andrade, BSc III year

Acknowledged as an Indian defence laboratory of the Defence Research and Development Organization (DRDO), the Defence Food Research Laboratory (DFRL) located in Mysuru,



Karnataka, conducts research and development of technologies and products in the area of Food Science and Technology to cater to the varied challenges faced by the nation as well as the Indian Armed Forces.

The students and researchers at the School of Life Sciences, Manipal University, Manipal,

were lucky enough to engage in an interactive session with Dr. Harsh Vardhan Batra, Director, DFRL. This humble yet incredibly knowledgeable man inspired students with both the technological aspects of his field of research as well as his philosophy on life, the kind of information that can only be unravelled through years of experience and hard work. Students bombarded Dr. Batra with a number of questions to which he gave prompt, frank and interesting answers patiently in a session that lasted over an hour. Here are some excerpts: Q1. What is the relation between Food and Defence with respect to the research the DFRL carries out?

Dr. Batra: “The country faces more than thousands of outbreaks a year and all are associated with food and water, which are the main sources through which the spread of epidemics takes place. And hence all our research on microbial activity is associated with food and the aim of such research is to develop preventive and curative procedures against these

outbreaks by taking theoretical models and data and applying it innovatively to achieve novel and life-saving scientific breakthroughs.”

Q2. What would be the hallmark qualities attained by one pursuing a future in research?

Dr. Batra: “Passion is the key to good research. Research is the best option in my opinion when it is more of a hobby rather than work, and hence we do not feel a workload and at the same time

love what we do. So, passion is the key to success in this field.”

Q3. What is the process by which diagnostic kits are developed for new epidemics?

Dr. Batra explained how through the hard work and innovation of his team they are able to create diagnostic kits even without having the actual strains of the pathogen in hand, “In order to prepare for sudden attacks by pathogens present in other countries, we screen large number of suspected samples of affected patients using next generation genome sequencing as well as immunoassay. It is this information along with the proper strategies set up by our time efficient team that leads to the success of our kits.”



Q4. What requires more attention, malnutrition or development?

Dr. Batra: “The answer to this would be another question- Nationalism or Selfishness?”

Q5. What is the scope for GMOs and their use in Food Technology in our country?

Disclosing that he loves being a farmer in his leisure time, Dr. Batra said that through his own little green house experiments, he has shown that our country possesses a wide variety of crops, which if studied and produced in a planned manner will knock out the need for GMOs.

He added, “Genetic diversity in India highly varies and hence we do not need to rely on GMOs but rather opt for a more suitable variety for that point of time, geographical location and environment.”

He went on to speak about how one also needs spirituality to keep us grounded and passion to keep us motivated, and then ended his interaction by wishing the students good luck and bidding a warm goodbye. It was a learning experience and a memory to cherish with the thoughts discussed during the interaction.

Playback: The year that was...

Annual Report

- Aarushi Jain MSc 1st Year.

The School of Life Sciences (SLS) in addition to research and education promotes and conducts numerous cultural, literary, extracurricular and co-curricular activities such as talks, symposiums, workshops and conferences for all-round development of its students in association with the Student Council.

GUEST LECTURES

To facilitate the student's overall development in the field of research, guests from across the country and from other parts of the world are invited to speak on recent discoveries and studies in the field of Biotechnology and provide opportunities to the students and research scholars in the department to interact with experts in their associated fields. A few of such talks and interactive sessions for the academic year 2014-2015 are listed below.

* Prof. Angela Brand and Prof. Helmut Brand from IPHG, Maastricht University delivered a talk on Public Health and Genomics in January 2014.

* Prof. Solomon F.D. Paul from the Department of Human Genetics, Sri Ramachandra University, Chennai, gave a lecture on the need of bio-dosimetry in February 2014.

* Prof. R.K. Arni, Structural and Molecular Biology Department - IBILCE/UNESP Physical Sao Jose do Rio Preto, Brazil presented a seminar titled 'Venom Proteins and Blood Coagulation: Structures and Mechanisms' in February 2014.

* Dr. Shekar Mande, Director of NCCS, Pune addressed Masters Students in March 2014.

* Dr. Jagadish Mittur, Head of Biotechnology KBITS, Department of Biotechnology, Government of Karnataka addressed students and research scholars in March 2014.

* Dr. Jagadeesh Bayry, INSERM, Paris, France delivers a talk on 'Targeting regulatory T cells in vaccination' in August 2014.

* Dr. Girish Rao, Research Head from Shell, Bangalore delivered a talk on 'GlucoWatch - from concept to product' in September 2014.

* Dr. Bhadrasain Vikram, Deputy Associate Director, Radiation Research Program, Division of Cancer Treatment and Diagnosis who shared the Nobel Peace Prize 2005 (awarded to the International Atomic Energy Agency, Vienna, Austria for their contribution to global cancer control), Dr. Pateje G Prasanna and Dr. Mansoor Ahmed, Program Directors, Radiation Research Program and Dr. Shankar Gupta, Program Director, Developmental Therapeutics System, all from National Cancer Institute (NCI) and National Institute of Health (NIH), USA visited the institute in November 2014.

The 10th Indo-Australian Workshop on Biotechnology on Epithelial Development, Function & Disease - New Frontiers and Therapies was conducted from April 11 - 13, 2014 at Fortune Inn Valley View Hotel in Manipal which was attended by more than 200 delegates. Other workshops and talks conducted were Refresher Course for Teachers on Bioinformatics in Modern Biology in May 2014, Coastal Karnataka Chapter of the Society of Biological Chemists India 3rd Annual Meeting in October 2014, 4th Annual Conference of the Society for Mitochondrial Research and Medicine in December 2014 and the National Symposium on Human Cytogenetics and Toxicology in December 2014.

Other events students were privileged to be a part of included the Prof. JV Bhat Memorial Oration Award 2015, which was conferred to Dr. Harsh Vardhan Batra, Director, Defence Food Research Laboratory, Mysuru who delivered the oration on 'My journey as a Microbiologist'.

STUDENT BOARD

The academic year 2014-15 saw the election of a vibrant student council taking a position. The Core student Council was elected on September 26th with the following members: Aarushi Jain (*President*), Preeta Ananthanarayanan (*Vice President*), Priyanka Abraham (*General Secretary*), Atrishi Badu (*Treasurer*), Nasnas Najeeb (*Joint Secretary 1*), Ramya Gupta (*Joint Secretary 2*)

The committees council encompasses *Cultural* (Head: Pallavi Mathur & Dheeraj Prakaash), *Literary* (Head: Namrata Iyengar & Poorva Huilgol), *Sports* (Head: Dhruv Seth & Vinita Kaulgud), *Social & Media Relations* (Head: Rayees Ahamed & Janith Maben) and *Recreational* (Head: Simran Jain & Ninad Ranadive) committees. A new committee, *Finance & Business Development* (Head: Bhaumik Patel & Sanika Apte), was introduced this year to handle the expenses and budgeting for the year round. Goals, objectives and student activities were devised for the academic year 2014-15.

CULTURAL ACTIVITIES

Go GFP (Green For Peace) - September 29-30, 2014: A 2-day event to celebrate Gandhi Jayanti and a prelude to the 'Swachh Bharat' campaign by the Prime Minister, the student council organized a clean drive at the Planetarium Complex, Jell-O sale, Plant-a-Sapling, and a Photography competition. The Plant-a-sapling drive was initiated by the Vice-Chancellor of Manipal University, Dr K. Ramnarayan. The winner of the photography competition was Mr. Mahesh Nair.

Diwali Celebrations - October 23, 2014: The College was decorated traditionally with symbolic rangoli and diyas to celebrate the 'Festival of Light'. The students and the staff dressed in traditional attire acknowledging the event.

Breast Cancer Awareness Day - October 27, 2014: Raised awareness among the students and the faculty on Breast Cancer. The day was themed with the colour pink, and handmade ribbons were distributed throughout the department.

Halloween Night - October 30, 2014: Screening of an English and a Hindi movie, *Dead Silence* and *Raat* respectively, with 3 shows running simultaneously were part of the Halloween spirit. Halloween inspired food sales, which included food and beverages like Bloody Mary, Rock-a-Toc Chaat, cold macaroni, Dracula's Custard with jelly. The photo booth was a splendid attraction.

Rashtriya Ekta Divas - October 31, 2014: The College was privileged to organize Rashtriya Ekta Divas on behalf of Manipal University to commemorate Sardar Vallabhai Patel's 139th birthday anniversary. An inaugural function and a panel discussion on the contribution of Sardar Patel was organized with gusto at the administrative building. The function was attended by our Pro-Chancellor Dr. H.S. Ballal, Vice-Chancellor Dr. K. Ramnarayan, Pro-Vice-Chancellor Dr. H. Vinod Bhat, and the Registrar Dr G.K. Prabhu. The chief guest, Mr Chakravarty Sulibele, delivered a patriotic talk on Sardar Patel's fight for national freedom and the unification of India. Awards for the best essay and best painting on the theme, "Contribution of Sardar Vallabhai Patel for unity, safety and security of India" were won by Ms. Namrata Iyengar and Mr. Puneeth Kumar respectively.

International Students Day - November 17, 2014: On the occasion of the International Students Day and as part of the directive from the University Grants Commission (India), the Student Council organized a group discussion on the various aspects of the Indian educational system, its pros and cons and opinions of the students on how they feel, how the system can undergo alterations for the better.

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Christmas Celebrations - December 21, 2014: College decorations and a visit to the "Vishwasada Mane "Orphanage, Shankarpura were part of the Christmas celebrations this year. Activities and games were organised for the kids, along with distribution of sumptuous treats and stationary. Christmas Carol singing and cake cutting was also a part of the celebrations in the orphanage.

CONTINERE-Cultural Week - January 14-21, 2015:A 7-day annual cultural week, CONTINERE was conducted with competitions including literary and cultural events such as debate, dance, rangoli, collage, photography etc. for the students to showcase their talent. Antakshari and Potpourri were organised for the faculty and staff on the final day.

MatrabhashaDiwas - February 21, 2015: SLS celebrated 'MatrabhashaDiwas' to signify the importance of the different regional languages that are spoken all over the country.

Sports Week & Annual Sports Day - February 25-March 7, 2015: All work and no play makes us dull and with that in mind the School of Life Sciences organized the annual sports week, which comprised of numerous events from football to seven stones. The week concluded with an action-packed, athletic-spirit-upholding Sports day, where the prizes were also distributed

Best Physique Competition - March 21, 2015: School of Life Sciences also organized the Manipal University Inter-Collegiate Best Physique Competition on 21st March, 2015 with a demonstration by Mr. Roshan Ferraro (Ekalavya Sports person of the year 2011 State Awardee).

UTSAV 2015 - April 6-10, 2015: The Cultural Coordination Committee of Manipal University organized the mammoth endeavour “UTSAV- 2015”, which showcased the multihued skills of the students of all the institutions of the Manipal family. Our college put its best foot forward participating in most of the competitions and landing the 6th position in the overall ranking for the fest.

ACHIEVEMENTS:

SLS eNewsletter: The quarterly eNewsletter, a student council initiative, released its two editions,

November 2014 (<http://manipal.edu/content/dam/manipal/mu/sols/images/Docuement/School%20of%20Life%20Sciences%20-%20eNewsletter%20-%20November%202014.pdf>)

February 2015 (<http://manipal.edu/content/dam/manipal/mu/sols/images/Docuement/eNewsletter-Feb%202015.pdf>)

Student Clubs:

DebSoc Souls - Debate Club aiming to help members develop and hone debating and public speaking skills. The members are involved in activities pushing them beyond their comfort zones- presenting pre-written declamations, presenting famous speeches, acting out a monologue from Shakespearean plays along with impromptu group discussions, minute-long speeches on almost anything under the sun. The meetings conclude with feedback sessions and constructive criticism.

MUN Club - The components of MUN (Model United Nations) procedure via mock sessions and writing practices are covered with the aim to familiarise members with the concept of MUNS.

Student Consortium: Interactive sessions were held for the students and staff on various aspects by professionals from different walks of life.

Stress Management- Dr. P.V. Bhandary, Baliga Hospital Udupi (November 21, 2014)

Biological Weapons as a tool for war and terrorism- Dr. Arvind Kumar, Manipal University (December 23, 2014)

Happiness- Dr. Vinod Pallath, Manipal University (January 23, 2015)

AWARDS/SCHOLARSHIPS/HONOURS

2 research scholars (Ms. Mallika Priya, Mr. Ravishankara) and 1 faculty (Dr. K.K. Mahato) were awarded National and International travel grants to attend conferences and present their research papers.

4 best poster awards were won by research scholars (Mr. Phani NM, Mr. Akshay Kumar Nayak) and faculty (Dr. Manjunath Joshi, Dr. Sanjiban Chakrabarty) and a 2nd prize (Mr. Pushpendu Paladhi) for research posters presented at national and international conferences.

1 faculty (Mr. Bharath Prasad) received the fellowship of Indian Academy of Sciences (Bangalore), Indian National Science Academy (New Delhi) and National Academy of Sciences (Allahabad) for Summer Research Programme 2014.

The year 2014-2015 was extremely eventful which saw enthusiastic, wholehearted participation from all the students, research scholars and staff of SLS. The events would not have been possible without the assistance and continuous support of the University, the Director, faculty and the supporting staff, and the research scholars of SLS. Looking forward to new the academic year and good luck to the incoming Student Council, hoping they continue to raise the bar and achieve in all fields!



The core students council of SLS along with the members of different committees for the academic year 2014-2015.

Top row left to right: Vinita Kaulgud, Simran Jain, Aarushi Jain, Priyanka Abraham, Poorva Huilgol, Ramya Gupta
Bottom row left to right: Ninad Ranadive, Dhruv Seth, Rayees Ahamed, Namrata Iyengar, Preeta Ananthanarayanan, Pallavi Mathur, Sanaki Apte, Atrishi Badu, Dheeraj Prakaash, Bhaumik Patel.

Cap it with a caption

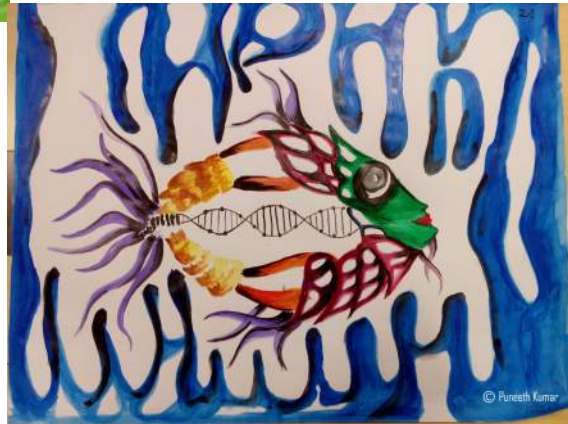
Let your creative juices flow. Take a look at this beautiful photograph and come up with a quirky caption. The best of the captions will be acknowledged in the next edition of the newsletter.

The competition is open to all faculty, research scholars, alumni and students at School of Life Sciences.

Send in your captions at avantikaperu@gmail.com .



Photos and sketches — Student's talents on display





Creativity Corner

An adventure

- Anirudh Gupta, BSc 1st year

Come m'lord, come with me,
let us sail across the open sea.
I'll steer your ship as you desire,
together we'll meet with the Sun God's ire.

Come m'lord, come with me,
let us go to a place where we'll be free.
I'll be by your side through thick and thin,
together we'll fight the red devil, and win.

Come m'lord, come with me,
let us perch atop the tallest tree.
I'll be your wings as you soar across skies,
together we'll silence the land that cries.

Come m'lord, come with me,
let us from these hunters flee.
I'll fight for you till my final breath,
together we'll run, and outrun death.

Come m'lord, come with me,
let us be what we were meant to be.
I'll sit at your side as you lay on your bed,
together we'll do all we ever said.

Come m'lord, come with me,
let us dance and sing in glee.
I'll walk with you through every door,
together we'll form the substance of lore.

Alumni talk

- Vishnu Mohan (MSc MBHG, 2009-11)

There are tides in the affairs of men (and women of course) and you are in the midst of one!

I left Manipal at the end of 2011 and I miss it. In a few years you will have your fill of Manipal and leave, but Manipal will always be somewhere in you. When you look back, you will realize that your experiences were, like countless others before, the ones that defined your choices and colored your imagination and those sordid moments included, nudged you to your future self.



I came to MLSC (*as it was known then, ed.*) in 2009 for MSc in Molecular Biology and Human Genetics (one of my best decisions so far) and our Masters batch along with the Biotech guys (whose only privilege was the DBT exam they exclusively took) was a fun group of all hues. At the welcoming ceremony, our seniors with their wit and cacophony ushered us into their world. Unlike most, I was a new comer and hadn't done my BSc in Manipal. Through countless sessions of intro at Pangal, Dee tee, Snack shack, CTF, Nehru Canteen, Andhra Mess, Woodlands etc. the experienced updated us on gossips and benevolent choices that faced us.

Manipal University, in contrast to contemporary wisdom, encouraged a certain sense of freedom among students. Like all others around me, I was there to make the most of its laxity within the cocoon of its safety. It was (and still is, I hope) a small world where everyone knew everyone else. The Akka in the canteen knew how many papads you wanted and the Akka in the juice shop at Tiger Circle knew how much sugar to put! That same Manipal tested your choices more rigorously though, than at any stage before. Here you either located your searchlight or got lost in the tunnel! At Manipal your backgrounds didn't matter, your talent did.

Our course work was all inclusive; career-wise we learned the latest and dreamed the latest. Many of us have continued in academics, a few ventured into industry and yet another few either changed course or simply married!

For exams, we all worked hard, so hard, that quite often a trip to Malpe or Kapu, movie at Diana or a ride to End Point wouldn't suffice. We had to go for a trek to Kudlu or accompany the ladies for their shopping spree in Bharat Mall in Mangalore to refresh. Once it was over, we often joked that anyone who survived continuous back-to-back final exams, with syllabi covering few books per subject, could survive the world. Today I guess, you have got gaps and a few of you still write with pencils on hostel walls to remember the pathways the night before the exam day nevertheless. The faculty and research scholars at Manipal Life Sciences Center really did teach us fundamentals and the dedicated research project at the end of MSc and BSc was unique in Indian context. I appreciate these facets of academics in MLSC, more than ever, today.

Our batch was born into action; apart from academics we took over the activities mantle from our seniors in the first year itself and I had the opportunity to be president of one-of-a-kind, super-talented council (not that those before or after were any less). We continued with *Prakaya* and bravely took on the Goliaths at *Utsav* and with the help of our nightin-

At least in our hearts and in the hearts of few, with whom we shared the stage, MLSC was not just 'Planetarium Complex' and *that* made us proud. At the end of my stint in MLSC, Prof. Satyamorthy pointed me towards an opportunity for a short internship and scholarship in Israel. One led to another and today I am into my second year of PhD at the Weizmann institute of Science. If life so far has taught me a lesson, it would be, not to anticipate your next step. I learned at Manipal to keep agile, ready to grab onto opportunities, which ever so often catch you unprepared. Keep your options open and trust your impulses. My liaison with MLSC (rechristened SOLS) still continues, with my Masters work at Prof. Satish Rao's lab maturing and seeing the light of the day in a peer-reviewed publication just 2 months ago. I am hoping for many more collaborations hereon.

Manipal was in the cusp of change when I left. KFC was coming up and new pizza and pastry places sprung up. A mini city was being built next to the library and roads got a lot better. But at the end of this twaddle, you might have realized that however unsettling change is, it is to be welcomed and below all that change lays a formidable truth, the dreams and aspirations of generations of us, ebbing along the tides of time. That brings us to the title inspired by the following words of Brutus in Shakespeare's '*Julius Caesar*'-

*"There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat,
And we must take the current when it serves,
Or lose our ventures"*.

With that call, to make the best of your days in Manipal, *adios* for now.

Vishnu Mohan
vishnu.mohan@weizmann.ac.il

Our sincere gratitude extends to.....

Prof. K. Satyamoorthy – Director, School of Life Sciences , Manipal

Dr. T.G. Vasudevan, Dr. Saadi Abdul Vahab, Dr. Vidhu Sankar Babu - Our faculty advisers.

Cover Page design - Rayees Ahamed. MSc year I.

Student Editors - 1. Namrata Iyengar

2. Poorva Huilgol

All the students who contributed to the newsletter preparation.