

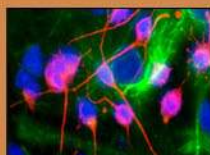


School of Life Sciences

Newsletter



**Latest
News**



**Research
Highlights**



**Funs and
Puzzles**

Foreword



Dr. K. Satyamoorthy

Director, School of Life Sciences,
Manipal University

Student Council 2014 of School of Life Sciences, Manipal University, have taken a collective decision to start a periodic NewsLetter to bring awareness to the readers the scientific, literary, social and extracurricular news. It will enhance their scientific temper, ability to work in a team and other responsibilities associated with such an effort. It hoped that this will provide a platform to the readers in general, and students and alumni in particular to be informed about the activities at School of Life Sciences. It is not going to be an easy task amidst academic responsibilities but our enthusiastic student council is upbeat about it. Congratulations to the Student Council 2014 and I wish you all the very best.

SCIENCE

Naturally Free!

-Anirudh Gupta,
B.Sc. Biotechnology, Year I

Nature, a major science journal of impact factor 42.351, announced on 20.10.2014 to have become open access. Nature Communications, which is a publication under the Nature Publishing Group (NPG) of impact factor 10.742 marks the beginning of this transition.

For those who may not be familiar, the impact factor is the measure of the average number of citations of a journal's recently published articles. It is the standard method of assessment of the effectiveness of a journal, as well as its scientific value and credibility.

Having amongst the highest impact factors of all academic journals, the previously paid access journal's announcement was received with mixed reactions across the globe. Authors of scientific papers have been known to doubt the journal's decision, believing that the ease of access could adversely affect the impact factor of the journal.

Nature Communications, however, provides the assurance that the screening process for the papers and the impact factor of the journal shall not be compromised and that the scientific community will greatly benefit from the journal's decision.

Reference: www.nature.com

Accurate & Early Detection of Breast Cancer Using 3D-Mammography

-Samayitree Das, B.Sc. Biotechnology, Year II



Figure 1: Equipment used for 3D mammography for breast examination for cancer. (Image source: www.acrin.org)

Breast cancer is the uncontrolled growth of breast cells, leading to swelling of the breast tissues. Women over 50 years of age, and individuals having ovarian cancer, late menopause, obesity, undergoing Hormone Replacement Therapy (HRT), and lifestyles involving smoking, alcohol consumption, or use of oral contraceptives are more susceptible to breast cancer. The presence of a lump or

Opportunities

1. Indian Academy of Science – Summer Fellowship Programme (www.ias.ac.in): Minimum eligibility- Bachelor's degree , Master's degree, PhD, Teachers, apply before 30th of November, 2014.

2. Innovation In house Residence Program Programme (www.presidentofindia.nic.in): Apply before 30th of November, 2014

3. CAS TWAS President PhD Programme (twas.com): Minimum Master's degree, apply before 31st March 2015.

4. Women Scientist Scheme (WOS-B) (SoRF) (www.dst.gov.in): Minimum eligibility- Master's degree, PhD

5. Prime Minister's Fellowship Scheme For Doctoral Research (www.primeministerfellowshipscheme.com): Minimum eligibility- Master's degree

6. Scheme For Young Scientists and Technologist (SYST) (www.dst.gov.in): Minimum eligibility- Master's degree, PhD

7. Start Up research Grant (www.dst.gov.in): Minimum eligibility- PhD.

8. INSPIRE- She and AORC scholarships (www.dst.gov.in)- for students who are toppers in the criterion class

mass in the breast, variation in size or shape of breast, bleeding from the nipples due to growing tumour, swelling in the armpits are some of the symptoms of breast cancer; however they may not always be seen, making it difficult to diagnose the disease solely based on symptoms. In severe cases, the invasion of cancerous cells into the liver, lungs, bones, lymph nodes, brain can ultimately lead to death.

Thus, early detection of breast cancer can make treatment effective, and prevent the development of complications. 3D-Mammography is the latest technique used to detect breast cancer in early stages. 3D-Mammography is the combination of digital mammography & tomosynthesis. Mammography is the examination of breast tissue using X-rays, where low doses of radiation is passed through the breast that is compressed between two plates used to spread the tissues. It is two-dimensional and is limited by the overlapping of tissue.

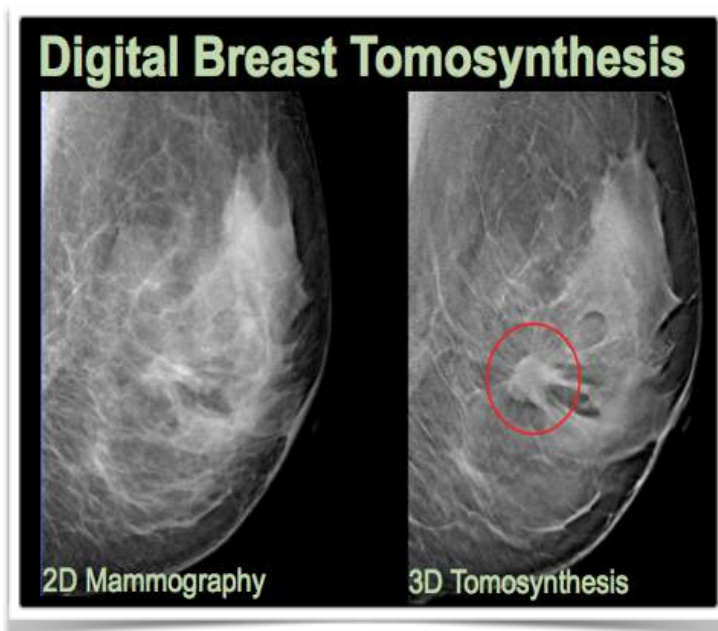


Figure 2: Result of 2D mammography and 3D tomosynthesis of the same tissue showing clearer diagnosis of severity of tumour by using 3D techniques. (Image source: www.acrin.org)

Tomosynthesis is a special kind of mammogram that produces a 3D image of the breast by using low level of x-ray radiation from different angles. A circular tube rotates around the breast for imaging of the breast tissue in less than 10 seconds. Conventionally, mammography or ultrasound techniques were used to diagnose breast

cancer, and mammography was considered the gold standard technique. It was only as recent as 2011 that tomosynthesis was approved for usage with mammography, by the FDA.

Screening with Tomosynthesis OR Mammography (STORM) was used in February this year for a comparative study, and it was found that false positive recalls were fewer, improving the efficiency of the technique. In June, 13 academic & nonacademic breast centres across the USA used the combined model of screening and diagnosed the two types of breast cancer - invasive & ductal. The Cancer Detection Rate (CDR) increased 1.2 times, and the biopsy rate was also increased by 1.3 when combined diagnostic techniques were used. Thus, 3D mammography (combined diagnostic techniques) has been proven to be a more effective diagnosis technique for breast cancer detection.

References:

1. Friedewa, S. M.; Rafferty, E. A.; Rose, S. L.; Durand, M. A.; Plecha, D. M. *et al.* (2014). Breast Cancer Screening Using Tomosynthesis in Combination With Digital Mammography. *The Journal of The American Medical Association*. 311, 2499-2507.
2. Caumo, F.; Bernardi, D.; Ciatto, S.; Macaskill, P.; Pellegrini, M. *et al.* (2014). Incremental effect from integrating 3D-mammography (tomosynthesis) with 2D-mammography: Increased breast cancer detection evident for screening centres in a population-based trial. *The Breast*. 23, 76-80.

Ageing, Switches and Chromosome Ends

-Syamala Inumella, B.Sc. Biotechnology, Year II

Telomerase is a ribo-nucleoprotein enzyme that acts on the telomeric (end) region of chromosomes. Each time a cell divides, its chromosomes get shorter at the ends, by the loss of some DNA. Every chromosome has a specific limiting length which when attained, does not allow it to divide further. Telomerase is the enzyme that adds short sequences to the ends of chromosomes; thereby elongating it slightly and thus allowing more number of divisions to take place.

Timothy M. Tucey of the University of California, San Diego, and Victoria Lundblad of the Salk Institute of Biological Sciences, California, have recently revealed hitherto unknown facts about the working of the enzyme telomerase through experiments on baker's yeast (*Saccharomyces cerevisiae*).

Telomerase is a complex consisting of four subunits- a TLC1RNA molecule and three protein molecules: Est 1, Est 2, and Est 3. Est 1 and 3 act together and are involved in regulation; while Est 1 is catalytic in function. Est 1, TLC 1 and Est 2 form a "pre-assembly" complex before the duplication process takes place. Once the genome duplication is complete, the missing Est 3 subunit attaches itself to the pre-assembly complex to form fully active telomerase.

It was believed that this active telomerase complex is available freely throughout the lifespan of the cell; but this study has revealed that the active complex disassociates, and is thus inactivated, soon after cell division by the detachment of Est 2 from the active telomerase complex. The balance between the amount of time spent in the "on" and "off" positions regulates the amount of active telomerase present in the cell at any given point of time.

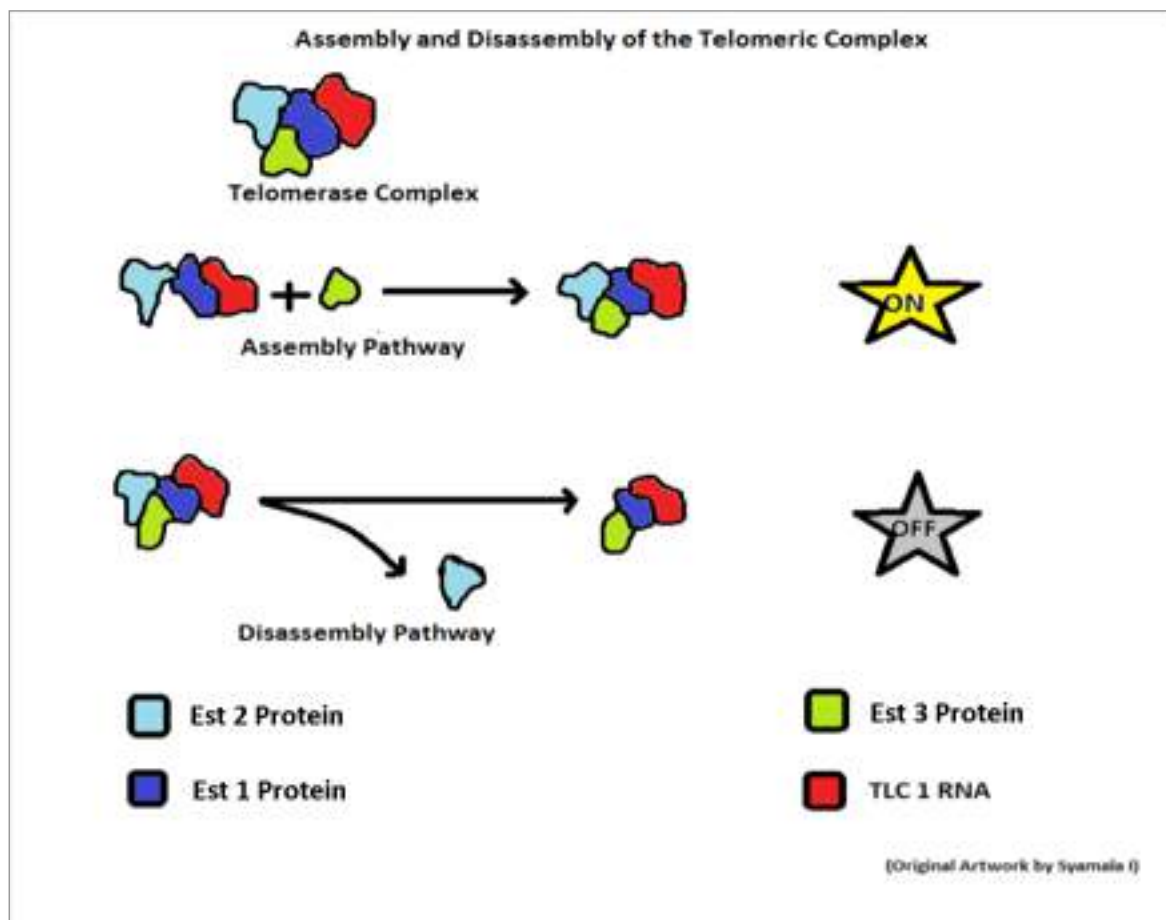


Figure 3: Assembly and dissociation of telomerase complex and its different subunits. Original illustration by Syamala Inumella.

Thus, in cells where telomerase has stopped working, disallowing it to regain its “off” position might slow down the process of ageing, while preventing it from “switching on” in cancer cells might slow down replication.

Reference: Tucey, T. M. & Victoria Lundblad, V. (2014). Regulated Assembly and Disassembly of the Yeast Telomerase Quaternary Complex. *Genes & Development*.28 (19).

The 2014 Nobel Prizes

-Aalok Verma, B.Sc. Biotechnology, Year III

Every year since 1901, as per the will of a Swedish inventor/businessman named Alfred Nobel (who invented TNT!), a set of prizes, worth a large sum of money, medals, diplomas, and a lot of respect, are awarded to people who have contributed to humanity in the fields of science, literature, peace and economics. The winners of the Nobel Prize are announced each year at the beginning of October, and this year thirteen members were initiated into the group of people we call “Nobel Laureates” for contributions including rights, lights, and other insights.

The first prize awarded was for “Physiology or Medicine”, which is the most relevant to us as students of the Life Sciences. It was shared between **John O’Keefe**, **May-Britt Moser** and **Edvard Moser**. The three scientists together contributed to the understanding of how animals position themselves –

their “internal GPS”. John O’Keefe discovered, in the ‘70s, that a specific kind of cell in the hippocampus of a rat always got activated when it was in a certain part of its chamber. He called these cells “place cells”, since they marked the rat’s place. In the mid-‘90s, he had two post-doc students – May-Britt and Edvard Moser. After completing their post-doc fellowship under Dr. O’Keefe’s guidance, the couple went on to find another kind of cell used in positioning. This cell was called the “grid cell”. Simply put, a grid cell fires when the organism is within the cell’s “grid” – the region designated to it. In other words, each grid cell has a designated grid (an abstract grid corresponding to a real-life grid). When you enter the physical grid, the grid cell with the corresponding “abstract” grid fires, hence informing you of your location. Each grid cell has a hexagonal grid, which is apparently ideal, since it gives maximum resolution with minimum cells. All this from inserting electrodes into the brains of rats and recording impulses as they scurried around their chambers eating chocolate!



Image: The 2014 Nobel Laureates (Source: www.nobelprize.org)

The next prize for achievements in Physics was awarded to scientists for a contribution that has become so ubiquitous that one hardly thinks about its significance. They designed blue LEDs, which are now found in phones, TVs, laptops, and other common light sources. Red and green LEDs existed around the ‘60s, and since then, many people tried their hand at producing a blue one to complete the trinity that would produce white light when combined. Three decades later, **Isamu Akasaki**, **Hiroshi Amano**, and **Shuji Nakamura** designed and perfected the blue LED, using a semiconductor called Gallium Nitride (GaN). The revolutionary technology was deemed Nobel-worthy and thus these three Japanese scientists were named this year’s Nobel Physics laureates.

Last in the science category, the prize for Chemistry went to three scientists for the development of a kind of microscopy known as the “super-resolved fluorescence microscopy”. By circumventing a limit in conventional optical microscopy, the scientists gave researchers (especially those concerned with the Life Sciences) an excellent tool to make the study of cells more precise as well as flexible. **Dr. Stefan Hell**, a Romanian working in the Max-Planck Institute in Germany, developed a technique known as “Stimulated emission depletion (Sted) microscopy”, while **Dr. Eric Betzig** and **Dr. William Moerner**, the former from the Howard Hughes Medical Institute and the latter from Stanford University, independently came up with “Single-molecule microscopy”. Together called “super-resolved fluorescence microscopy”, these two techniques have found their place in labs all over the world, in the study of cancer, Huntington’s disease, and more than a dozen other areas of research.

The next Nobel Prize awarded was that for Literature - to **Patrick Modiano**, a French national with a very Italian-sounding name. He was awarded the Prize “for the art of memory with which he evoked the experience of “the occupation”“(the Nazi occupation of France during the Second World War).

The penultimate Prize awarded this year, for Peace, went to two individuals - Indian national **Kailash Satyarthi** and Pakistani national **Malala Yousafzai**. The laureates worked (and continue to work) towards the welfare of children. Having won the Prize at the age of 17, Yousafzai is now the youngest Nobel laureate to date, replacing William Lawrence Bragg, who won the Nobel Prize in Physics in the year 1915 at the age of 25.

The last Prize awarded this year, for the Economic Sciences, went to a French economist named **Jean** (pronounced “John”) **Tirole** (pronounced “Tea roll”, roughly). M. Tirole has worked on the study of market economy, particularly the *regulation* of the power of firms how the government and powerful firms must work in order to get the “perfect” market that benefits everybody. He has explained that a market that is overly competitive doesn’t benefit anybody in particular, just as a monopoly benefits only the industry. Initially a mathematician and engineer by profession, Jean Tirole has developed his theories about market *organisation* with heavy use of mathematics. It turns out that he has somehow proved that the best organisation of firms would be to have a few powerful firms that are regulated by the government, since unregulated monopolies are counterproductive to society and too many small firms also turn out to be quite useless. The idea is both simple and logical, and M. Tirole expands his idea over several research papers – but the idea is something which is yet to be properly implemented in society. However, as the Nobel laureate says – “[He is] a researcher, so what [he tries] to do is design the policies, and then hope that they will be taken up by others.”

In conclusion, this Nobel Week has been one with lots of fun learning, from neuroscience to economics. Moreover, this year, the Nobel prizes have been awarded to people whose work is accessible and understandable even to the common man! Hoping that the future Nobel Prizes are as interesting and significant as this year’s. Look out for the laureates’ lectures that go up online in the first week of December!

Reference: www.nobelprize.org/nobel_prize/lists/year

Energy Parasite Turned into Energy Producer?

-Hiranya Aditi Godavarthy, M.Sc. Medical Biotechnology, Year I

Mitochondria are the power-houses of the cell, and are present in all eukaryotic cells (plants, animals, fungi, protozoans everything living that is *not* bacteria). A common school of thought on their origin, the endosymbiont theory, states that they have originated from prokaryotes (bacteria), which were engulfed into eukaryotic cells about 2 billion years ago, and found a mutually agreeable lifestyle.

Recently, Zhang Wang and Martin Wu of the University of Virginia have proposed an interesting alternative hypothesis on the evolution of these organelles, based on phylogenetic studies evolutionary studies based on the computational comparison of DNA. The mitochondrial DNA ancestry was reconstructed far beyond the last common mitochondrial ancestor within eukaryotes, to include the common ancestor with bacteria as well. To reconstruct the ancestor, the tracing back of genes that may have been lost from mitochondria and inherited in the nuclear genome was required and 394 families of genes among different species were found to be mitochondria-derived nuclear genes. Finally, the metabolic processes of these ancestors and mitochondria were analysed and

compared. The results were astonishing pre-mitochondrion bacteria (the ancestors) may have had mechanisms to import the energy currency ATP into itself, behaving as an energy parasite, not a producer! Also, these ancestors were probably motile, showing flagella, and were able to thrive in environments having low oxygen.

Image (right): Artistic representation of cross-section of mitochondria moving from being a parasite to a positive force. Original art by Hiranya Aditi Godavarthy.

The researchers suggest that the earlier hypothesis of endosymbiosis may only explain why this situation of intra-cellular parasitism was favoured by natural selection, but not its origin itself. But, despite the proposed hypothesis being quite difficult to prove, it presents an interesting perspective a parasite proving beneficial and pushing the world forward!



Reference: Wang, Z.; Wu, M. (2014) Phylogenomic Reconstruction Indicates Mitochondrial Ancestor Was an Energy Parasite. PLoS ONE 9(10): e110685.

Engineered neural stem cell - Solution to brain cancer?

- Poorva Huilgol, M.Sc. Molecular Biology & Human Genetics, Year I

Scientists of Harvard Stem Cell Institute at Massachusetts General Hospital have recently found an innovative way of using stem cells producing cytotoxins that are capable of specifically killing cancer cells. Dr. Khalid Shah, Director of Molecular Neurotherapy and Imaging lab, led the team that has achieved a breakthrough in genetically engineered stem cells incorporated with herpes virus producing toxins that can destruct cancer cells.

The stem cells are able to continuously supply toxins to the brain tumour cells. The stem cells need to be genetically engineered because of the following reasons: firstly they are to be incorporated with the gene from herpes virus which enables them to produce tumour killing toxins. Secondly, the stem cells need resistance against the toxin that they produce and secrete. This genetic tinkering is done by inducing a mutation that does not allow these toxins to act within the cells.

The other major obstacle that Dr. Shah and his team have overcome is transferring these stem cells to solid brain tumours where the cancer is not accessible to the toxins to act upon. This was done by enclosing the stem cells in a biodegradable gel.

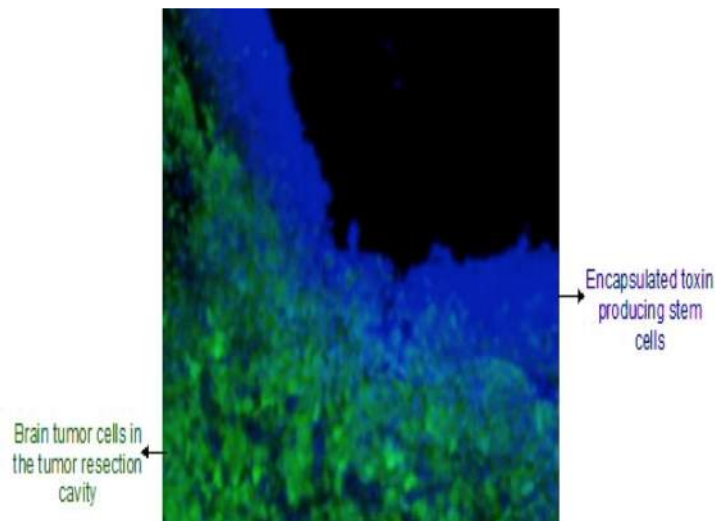


Image: Fluorescence image showing the interference between biodegradable gel encapsulated toxin producing neural stem cells and the cancer cells in the tumour resection cavity. Photo credit: hsci.harvard.edu. 24th October, 2014.

In their report, Dr. Shah and his team have shown the efficiency of the toxin producing neural stem cells to destroy cancer cells remaining in mouse brain after the tumour has been removed surgically. The stem cells are transferred to the resected cavity by enclosing it in a biodegradable gel. The

implanted stem cells produce these toxins, which have specific surface markers that recognise only cancer cells, and hence do not harm normal cells. Through various analysis and imaging techniques the toxins were found to be effective in killing cancer cells and increasing survival rate in the mouse models with brain cancer. This therapy is yet to be approved by FDA, which will lead way to clinical trials. If successful, this method has great potential to efficiently treat glioblastoma, the major form of brain cancer, through the fusion of toxin-secreting stem cells and the other therapeutic stem cells (stem cells which induce apoptosis, necrosis in tumour cells and which inhibit tumour angiogenesis), which is currently being studied in mouse models.

Reference: Stuke, D.W.; Hingtgen, S. D.; Karakas, N.; Rich, B. E. & Shah, K. (2014) Engineering Toxin-Resistant Therapeutic Stem Cells to Treat Brain Tumours. *Stem cells*. DOI: 10.1002/stem.1874.

EVENTS

Academic Events

Integrating Disciplines Developed the GlucoWatch

-Hiranya Aditi Godavartby, MSc Medical Biotechnology, Year I

September 30, 2014: Dr. Girish G Rao, a chemical engineer, currently heading Shell Projects and Technology, holds a patent in glucose monitoring by developing a real time blood glucose monitor – the ‘GlucoWatch’. In the seminar titled “GlucoWatch: from concept to product – How innovation in product development exploits fundamental concepts”, Dr. Rao explained the journey he undertook over 3 years of his post-doctoral research to develop the first ‘GlucoWatch’, an FDA approved product

commercially available in the US. The GlucoWatch monitors blood glucose while being worn on the wrist like a watch, and is non-invasive, unlike conventional monitoring methods which include the routine finger prick. This monitoring has significant implications in the management of diabetics, where a dramatic fluctuation in blood glucose level is common and dangerous.



Image (Left): Dr. Girish G Rao presenting his seminar titled "GlucoWatch: from concept to product" on September 30, 2014.

The device is based on the diffusion of ions and molecules (glucose) driven by an applied electrical field across a layer (skin). Although it sounds relatively simple, Dr. Rao recounted a number of interesting findings in the path of this biosensor's development, such as a strong positive signal at the anode

(the positive electrode) when no signal was expected there at all! Another problem was a result of skin bacteria metabolising ceramides in the skin, giving an elevated glucose value. Although these findings can make industrialists pleased, "not all positive results should be run after, even if money is involved", Dr. Rao advised. He suggested using a multi-disciplinary approach to solve problems and understand the biological mechanisms and chemistry, before giving in to the temptation of releasing a product. Dr. Rao informed that simple ideas can be surprisingly powerful, recounting how a simple suggestion of double sided sticky tape saved him and his biochemist colleagues from hours of trying to figure out how to hold the biosensor on skin. The energetic seminar, attended by post graduate students, research scholars and faculty members of the School of Life Sciences was concluded by an interactive Q&A session sprinkled with humour. The presentation by Dr Girish Rao was truly inspirational and motivational.

Society of Biological Chemists,

Coastal Karnataka Chapter: October 25, 2014.

-*Namrata Iyengar, M.Sc. Molecular Biology & Human Genetics, Year I*

The very basis of science is questioning of the seemingly obvious and sharing the information we interpret from the answers. The game of counter questioning and requesting it again propels the understanding of everything around us. Supporting this very process, the symposium organised by the

Society of Biological Chemists, Coastal Karnataka chapter aimed at acquainting the students and young researchers with the latest research happening in the fields of cancer genetics, disease diagnosis, and soil microbiome among other topics. Held at the Interact Building of the Manipal University, the inauguration session was presided over by the honourable Pro-Vice-Chancellor of Manipal University Dr. Vinod Bhat, who spoke about the efforts made by the Manipal educational trust in encouraging students in not only understanding the given syllabus but adapt an analytical approach via research. The guests of honour of the symposium were Dr. U. Varshney, Vice-president of SBCI, and Dr. V. Nagaraja, former president of SBCI. They both spoke about the history of SBCI, which is the oldest scientific society of the country, its Coastal Karnataka chapter and the importance of these conferences in enriching the students with the breakthroughs shaping up recent events. The Director of School of Life Sciences, Dr. K. Satyamoorthy gave the welcome address. Dr. Gopalkrishna Bhat was among the dignitaries on the dais.

Image (Right): The lighting of lamps by dignitaries to inaugurate the event.



SESSION -I

Chairperson – Dr. N. Udupa - Directorate of Research (Health Sciences), Manipal University

1. Dr. V. Nagaraja – Senior Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bengaluru. Topic: **Chemical perturbation of DNA topology in Mycobacteria**

The contribution of topoisomerases (enzymes involved in relieving or inducing supercoils in DNA) and associated nucleoid proteins to the compaction and storage of DNA is of immense importance. The talk focused on the targeted inhibition of the topoisomerases and proteins by drugs resulting in nicks (break in DNA) in the DNA and deterioration resulting in cell death. This application is of significance in tuberculosis treatment.

2. Dr. U. Varshney – Senior Professor, Department of Microbiology and Cell Biology, Indian Institute of Science, Bengaluru. Topic: **Mechanism of initiator tRNA selection on ribosomal P-site in *Escherichia coli***

The adaptor molecule tRNA which transports the required amino acid on to the mRNA for protein translation is very specific. The tRNA which brings the first amino acid is also the only one that directly binds to the peptidyl site (P-site) on the ribosome. The effect of change in the length of Shine-Dalgarno sequence of the mRNA and the mutation in three specific bases in the stem of anticodon arm of tRNA brings about non-integration of ribosomal subunits and thus no protein synthesis.



3 .Dr. D. N. Rao - Department of Biochemistry – Indian Institute of Sciences, Bengaluru. Topic: **Identification, characterisation and functional evaluation of double c2-like domain in cervical cancer.**

Helicobacter pylori, one of the numerous bacteria residing in our gut, has a paradoxical life style, having high competency towards accepting foreign DNA and at the same time having a high number of restriction modification genes. During the course of evolution the genes of restriction modification have undergone mutations resulting in change in the types of modification produces and independence of the methyl transferases (usually methyl transferases are associated with restriction enzymes).

SESSION 2

Chair - person – Dr .Ullas Kamath , Melaka Manipal Medical College.

1. Dr. K. Shampradasa – Assistant Professor, School of Life Sciences, Manipal. Topic: **Identification, characterisation and functional evaluation of double c2-like domain in cervical cancer.**

It has been understood that hyper or hypo-methylation of promoter sequences of tumour suppressor genes causes their inactivation and subsequent growth of cancer. In case of DOC 2B gene, a potential tumour suppressor, which brings about various functions like adhesion among cells, tight regulation of Ras, Raf genes etc., hyper-methylation of 612 base pair promoter region plays a crucial role in cervical cancer through up-regulation of Ras, Raf, CDC42 and beta catenin genes.

2. Dr. P. Kondaiah – Senior Professor, Department of Molecular Reproduction, Development and Genetics, Indian Institute of Science, Bengaluru. Topic: **Pro-tumorigenic roles of Activin A signalling in breast cancer.**

Transforming growth factor beta (TGF-B) is a cell growth differentiation factor and is involved in various other cell functions. Activin A is a member of this TGF-B family and it has been found that its suppression brings about down regulation of various genes, which in turn contribute to cell migration and invasion of tumour cells. Thus Activin A acts as a pro-tumorigenic gene.

3. Dr. K. Somasundaram – Senior Professor, Department of Microbiology and Cell biology, Indian Institute of Sciences, Bengaluru. Topic: **Autophagy: friend or foe in glioma development.**

The brain consists of various types of cells such as neurons, glial cells, etc. It is the cancer of the gliomacells which is called a glioma. Autophagy is a type of programmed cell death for degradation and recycling and has an upstream regulator ULK 2, a protein coding gene. It was found that higher expression of ULK 2 in the initial grades of glioma were found to destroy cancer cell, however in case of grade 4 glioma this ULK2 become a beneficial recycler for the cancer cells and helped in its proliferation.

SESSION – 3

Chair person – Dr P. Gopinath – Senior Scientist, School of Life Sciences, Manipal.

Dr. Nandini - Kasturba Medical College, Mangalore

1. Dr. K.R. Chandrashekhar – Senior Professor, Department of Applied Botany, Mangalore University. Topic: **From ethnobotany till drug development.**

Ethnobotany is defined as the interaction of plants and people including the influence of plants on human culture. From ancient times the benefits of many plants and their application in the health care system was an area of mere observation and application, with no scientific proof. The people of tribal origin or of ethnic background used their knowledge of the nature around them to cure the ailments they had. Since then we have progressed to the age of finding and isolation of a 'lead compound' to be used as an effective drug.

2. Dr. Anirban Chakraborty - Nitte University Centre for Science Educational and Research. Topic: **Cross talk between Tp53 and c-Myc in the pathology of ribosomopathies: evidence from zebra fish models.**

Ribosomopathies are defined as the diseases caused by the mutation the ribosomal protein genes and show manifestation as prominent tissue specific phenotype (change in the appearance of a particular tissue) and associated defects. The mutation is frequently observed in RPS19 gene, which codes for the protein required for the maturation of smaller ribosomal unit. This mutation shows manifestation as Erythroblastopenia (decreases in the number of RBC).

3. Dr. Subrahmanyam Gangavarapu, Nitte University Centre for Science, Education and Research, Mangalore. Topic: **Response of ammonia oxidising microbes to the stresses of arsenic and copper in two acidic alfisols.**

Alfisols refers to a type of soil rich in aluminium and iron. Due to their high productivity and abundance they are the most important soil type for food and fibre production. The presence of ammonia oxidising bacteria (AOB) and ammonia oxidising archaea (AOA) signifies the potential nitrification rate of the soil. It was found that from the two samples of soil taken from China and India, under various concentrations of arsenic and copper the concentration of ammonia oxidising archaea was greater, the potential nitrification rate was reduced. Another conclusion drawn was that Indian soil samples did not show metal toxicity and thus the archaea have metal resistance.

4. Mr. Kamalesh Mumbrekar - School of Life Sciences, Manipal. Topic: **Cellular and genetic risk profiles for radiotherapy induced acute normal tissue toxicity in breast cancer patients.**

Cancer therapy usually involves chemotherapy (use of drugs), radiotherapy (use of ionising radiation) and/or surgery. The exposure of radiation to cancerous tissue also brings about the damage to the healthy tissue surrounding them. A cellular and genetic risk measure of this acute normal tissue toxicity was carried out. It was found that the toxicity was independent of the patients' age, type of treatment, surgical removal of part of tumour etc.

5. Mr. Himanshu Gupta - School of Life Sciences, Manipal. Topic: **Genetic and Epigenetic variations in ABCB1 gene can modulate drug response and malaria susceptibility.**

Malaria is among the top diseases inflicting mortality among the world population. Earlier and better diagnosis of the malarial parasite in humans can lead to better treatment and reduction in the mortality. Hence, molecular tests to detect the presence of very low copy number of the parasite DNA in human blood using real-time PCR were designed and tested successfully. It was also found that the response to malarial drug response altered based on the genetic and epigenetic variations in genes, especially that of ABCB1, in a population.



UPCOMING EVENTS:

1. **December 8-9: 4th Annual Conference of the Society for Mitochondrial Research and Medicine (SMRM). Register online at <http://smrm2014.manipal.edu/registration.html>**
 2. **December 10-16: Human Cytogenetics & Genetic Toxicology and Basics of Flow Cytometry & Genetic Toxicology. For more details: <http://manipal.edu/sls/sls-news/sls-events-list/worshop-on-basic-of-flow-cytometry-and-genetic-toxicology.html>**
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Sports Events

Basketball Tournament

-Vinita Kaulgud & Dhruv Seth, M.Sc. Year I, Sports Committee

The Manipal University basketball tournament for men and women was held between 19 to 21 of September in. There was active participation by students from various institutes of the University. There were many teams for both men and women. SLS teams of both gender comfortably won the first round games, but alas could not clear the next hurdle.



Extra-curricular Events

Student Council Elections

-Aarushi Jain, M.Sc. Medical Biotechnology, Year - I



On 26th September, 2014, 130 students of graduate and post-graduate courses at the School of Life Sciences voted for nominees for various posts in the student council.

Elected Student Council: Aarushi Jain (President), Preeta A. (Vice President), Priyanka Abraham (General Secretary), Atrishi Badu (Treasurer), Nasnas Najeeb (Joint Secretary 1), Ramya (Joint Secretary 2)

Diwali Celebrations

-Pallavi Mathur & Dheeraj Prakaash, M.Sc. Year I, Cultural Committee

On 23rd October, 2014, School of Life Sciences celebrated the festival of lights, Diwali. A day before the festival, the student council members came together and decorated the college. Colourful paper lanterns, dupattas and lights adorned the entrance to the building. A beautiful, floral rangoli was made and lit up with diyas to celebrate the essence of the festival.

On the day of Diwali (23rd October, 2014) all the students and the staff members were dressed in traditional Indian clothes and made the whole event successful and memorable.



Student council for Diwali decorations

Rangoli made for Diwali

Green for Peace: Swachh Bharat

-Aarushi Jain & Preeta Ananthanarayanan, M.Sc. Year I, Student Council

Gandhi Jayanti Celebration was held in the School of Life Sciences as a two day event that was a prelude to the Swachh Bharat campaign by the Prime Minister Narendra Modi.

Day 1: A Clean Drive was held at SLS and the Planetarium Complex.

Turnout: 120 students joined by the faculty and senior staff at SLS including the Director, Dr. K. Satyamoorthy.

SoLS Students' Council
presents: **GO! GFP** Green for Peace

29TH & 30TH SEP 2014
5 pm onwards

Event List :

Monday:
1. Clean Drive at SoLS

Tuesday:
1. Plant a Sap
2. लेलो लेलो Jello
3. Photography Contest

Prizes & Participation Certificates will be Awarded



Day 2: 'Plant-a-Sapling day' where 12 saplings were planted besides the college canteen, a newly renovated area. Dr. K Ramnarayan, the Vice Chancellor of Manipal University was the chief guest for the event and initiated the drive by planting a sapling. The day saw activities like a photography contest and a Jell-o sale.



Halloween Night

-Simran Jain & Nimad Ranadive, M.Sc. Year I, Recreational Committee

Straddling the line between the fall and winter, plenty and paucity, life and death, Halloween is a time of celebration and superstition. It is thought to have originated with the ancient Celtic festival of Samhain, when people would light bonfire and wear costumes to ward off roaming ghosts.

Evolving from the ancient Celtic holiday of Samhain, modern Halloween has evolved to become the festivity today that is less about literal ghosts and ghouls and more about costumes and candy. Over the millennium the holiday transitioned from a somber pagan ritual to a day of merriment, costumes, parades and sweet treats for children and adults.

Likewise, this year's Halloween night was celebrated at SLS and the event was attended by faculty, research scholars and students from all colleges of the Manipal University. The event included a movie night with food stalls and photo booth. Two thematic 'horror' movies were played a Hindi movie 'Raat' and an English movie 'Dead Silence'. There was a huge response for the English movie in comparison to that for the hindi movie. The food stalls were a hit and the food was relished by everyone. At the photo booth everyone wanted to and enjoyed posing with props and getting themselves clicked.



Though the event wasn't a big event as the Halloween is celebrated everywhere, it was a short, small and happy night of festivity.



Salutations to the Man Who United Our Country

-*Namrata Iyengar, M.Sc. Molecular Biology & Human Genetics, Year I*

“The Iron man of India”, “Bismarck of India” or “Patron saint of the civil services” - which is your choice of admiration for Sardar Vallabhai Patel? A man whose many sacrifices, fore sight and shrewdness in the course of the struggle for independence and after it has lead India to be the glorious country that she is today. As per the Union Government order, 31st October, Vallabhai Patel’s 139th birth anniversary was celebrated with gusto as “Rastriya Ekta Diwas” and it was carried out with gusto at the Manipal University campus. School of Life Sciences, Manipal, in particular was given the honour of conducting an inaugural function and a panel discussion on the contribution of Sardar Patel to our country. The function was attended by Pro-Chancellor Dr. H.S.Ballal, Vice Chancellor Dr. K.Ramanarayan, Pro Vice Chancellor Dr. H.Vinod Bhat, Registrar Dr.G.K.Prabhu and the Chief Guest and speaker Mr. Chakravarty Sulibele. The heads of other constituent institutions of the Manipal University also attended the function. Dr. Prabhu gave the welcome speech and Mr. Bharath from School of Life Sciences introduced the Chief Guest.

In his goose-bumps raising patriotic speech Chakravarty elucidated the various attributes of Sardar Patel, his enormous contribution to the freedom struggle and his endeavour in unification of India. He also inspired us students to eagerly involve ourselves in the ongoing of the nation and have a valid opinion of the situation. The function was conducted by Ms.Preeta and the vote of thanks was given by Ms.Aarushi.

Images (from top): Special address given by Dr Gopalakrishna Prabhu, Registrar of Manipal University. Inspiring speech by Mr. Chakravathy Sulibele. Award for best essay on the theme “Contribution of Sardar Vallabhai Patel to unity, safety and security of india”- Ms. Namrata Iyengar. Award for best painting on the same theme - Mr. Puneeth Kumar.



FUN & EXTRAS

Photos | Sudoku | Literature | Word Games | Alumni News

Sudoku

-Original Sudoku by Anirudh Gupta, B.Sc. Biotechnology, Year I.

		2	5	7		8		4
4	1			2	8		5	
	8		3				1	2
3			9		2		4	
		5	4					1
9	4			1	5	3	2	
		3	1					
7		8			3			9
	6		8		9	2	3	

How Many Words?

-The SLS editorial committee

In the spirit of Halloween, we ask you how many words of 5 or more letters can you make from the letters of the word **“CONJURING”**?

Answers:

curio cuing junco union ruing ringo incur inorn coring curing cronin nuncio junior coming unicorn

Another day @ it's birth, Viewing Heaven on Earth

-Dheeraj Prakaash (Pen name: Df004), M.Sc. Bioinformatics, Year I.

At dawn, the sunrise whose sight just without a price...
The peace around and greenery surround,
Serene air and the sun's mighty flare,
What a beauty... At extremity.
A friend's intimacy in proximity,
Together viewing heaven on Earth
as the day takes birth,
Looking up at the sky,
trying to look up to the Lord so high
A thanksgiving to Him
through a prayer, a soft, devotional hymn
Sharing a smile with the one at the moment after a slight sway,
Wishing that, like this, every soul has a nice day...



Photo credit: Original image by Dheeraj Prakaash

Photograph (below): The winning photo for the "Green for peace" initiative photo contest taken by Mahesh R, M.Sc. Medical Biotechnology, Year I.



Science Quiz

-Nitufa Mulla, M.Sc. Medical Biotechnology, Year I

1. Which is the largest organ in the human body?
 - A. Heart
 - B. Bone
 - C. Skin
 - D. Liver
2. Plants growing on sand are termed as _____.
 - A. Chasmophytes
 - B. Psammophytes
 - C. Oxylophytes
 - D. Lithophytes
3. The blood protein that regulates amount of water in plasma?
 - A. Globulin
 - B. Fibrin
 - C. Fibulin
 - D. Albumin
4. Man belongs to which family in taxonomic category?
 - A. Hominidae
 - B. Muscidae
 - C. Poaceae
 - D. Anacardiaceae

5. The part that connects two hemispheres of brain?
- A. Brain stem
 - B. Carpus callosum
 - C. White matter
 - D. Cerebrum
6. Viticulture is related with ____.
- A. Pine apple
 - B. Strawberry
 - C. Grapes
 - D. Orange
7. The pollutant that affect blood leads to death?
- A. Cadmium
 - B. Asbestos dust
 - C. Carbon monoxide
 - D. Lead
8. Bamboo is classified as ____.
- A. Grass
 - B. Tree
 - C. Weed
 - D. Bush
9. Which one of the following is an anti-malarial drug?
- A. Aspirin
 - B. Neoprene
 - C. Chloroquin
 - D. Isoprene
10. Most highly intelligent mammals are ____.
- A. Dolphins
 - B. Elephants
 - C. Kangaroos
 - D. Whales

Answers: 1-C, 2-B, 3-D, 4-A, 5-B, 6-C, 7-C, 8-A, 9-C, 10-A

Alumni Talk: The Way We Were

-Arindum Guba, Student of 2003 Batch

My Journey at Manipal began in August, 2003 when I got admission for integrated B.Sc. – M.Sc. Biotechnology course at MLSC (as SLS was formerly known). We were the second batch of that department with only 20 odd people in the batch. So it was pretty easy to get to know each other and gel along soon. Our seniors, the maiden batch students, were a chilled out bunch of people and our first ‘introduction’ session was filled with jokes and laughter. Thus began a long lasting friendship with the senior batch which lasted through our stay at Manipal and beyond. This also ensured that ‘ragging’ was never a part of MLSC culture.

Life at Manipal was “fun” if I had to describe it in one word. The 20 of us would hang out together, go to Downtown in a gang, invade the serene nature of the beaches around in a crowd and even used to study at the library together. Our regular hang outs used to be end point (it was a jungle and that too a scary one after sunset back in 2003), Snack Shack (formerly Shack point, a literal shack near the location where the imposing Mandovi Palace stands today), Down Town (Down town lounge was not born then), Edge, Sphinx (Formerly Blue Waters at that time), the library stair case (the old one near the KMC water fountain ATM), Shenoi’s, Greens and Goa (we were regulars in the unreserved compartments of trains to Madgaon from Udupi). Oh yea, even the hostel terrace, till we got caught by the security guard one day!!

1 to 2 weeks before the exam we used to all become “nerds” and slog our entire day diving into the books that we rarely looked at throughout the year. A few of us, the guys (or the minority group) especially, never had any notes and we ensured that the Xerox shop at TC had a good business Xeroxing off notes from the very few girls in our batch, who took notes in the class meticulously. But we did study well when it mattered and we all ended up scoring well consistently. Though there were moments (1st year MSc, pharmacology exam in B.Sc. etc.) when we felt that only a miracle could make us pass.



Mr. Arindum Guha, R&D Scientist ,
Biocon Ltd, Bengaluru

The project semesters (B.Sc. final semester and MSc final year) were the most enjoyable periods that we all had. We got to do good research work and at the same time had a lot of fun outside the work hours. During these times we organised movie shows, food fest, social drives etc. It was our mission to make us (the Biotech group) stand out from the rest in Manipal. It was during these times that we conceptualised and initiated Prakaya. The first year was a flop show as none of the invited colleges responded, but we learnt some important and basic lessons in organisational skills and the next year we got back with a bang (the 1st Prakaya in 2008). We even got big sponsorships and ensured that it was a show to remember.

Our batch was a talented one and took part in almost all the cultural and sports events taking place in Manipal and even represented KMC in various events at Utsav every year (till we were a part of KMC). It was a tough journey to get noticed initially in the vast crowd of KMC, but we never gave up and at the end of 3 years we became a recognised force in KMC.

We have literally experienced the department grow from 20 students per batch per year to ~50 students per batch per year, from a staff strength of 4 teachers (including Satyamoorthy sir) and 3 research scholars to what it is today, from having no student council to the first of many student council elections (where I was elected as the vice-president and eventually the president the next year) and from a department in KMC to a full-fledged college called MLSC. Manipal was also evolving continuously with the new library being build, new apartments rising, increased volume of student intake per year and the food court. Having a Barista, two CCDs, subway and various other food outlets in and out of the food court (besides only Dollops, Shack point, Saiba and Planet Café) in Manipal was actually a luxurious dream come true at that time. Any new thing that came up, made us, the city-life-craving people at the near rural Manipal, excited about it. I still remember the day when the girls dragged the guys to the recently opened Big Bazar at Udupi and spent 3 – 4 hours only to survey what was available!! We cribbed then, but now looking back, it was fun and a part of the best days of our lives. And when Bharat Mall opened in Mangalore, most of our weekends in the next few months were spent there!! A mall with multiplex even in cities like Bengaluru in 2005 was a dream come true, let alone in Mangalore.

After 5 years, moving away from Manipal and from friends was tough, but we were also excited about the new beginning. I got a job offer at Biocon as a Scientist at R&D and I accepted it. All our batch mates also moved in PhDs or industry jobs and are doing well in their professional lives. I have been now working here at Biocon for the last 6 years and the values imparted to us at Manipal i.e. work

discipline, sincerity, 'help each other' attitude and healthy competitiveness still drive me. The journey at Biocon has been equally delightful with great working environment and talented people around to learn from. I have learned a lot from Biocon in the last 6 years and I would recommend that every individual, even though he or she may be interested in pure academics, should once in their life work for 2 – 3 years in an industry. It provides you with a different perspective about work discipline and culture which we will never pick up in an academic institution. Biocon has provided me with opportunities to prove myself and create a niche for myself. Constant challenges ensure that every day is actually a new day, is never boring and a one that you would look forward to when you wake up in the morning.

Before we left Manipal in 2008, all of us made a pact to meet up again at Manipal in 2012. That did not happen and we all still have that reunion as a target where all the 20 of us would meet up at Manipal and relive those moments. Someday..

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