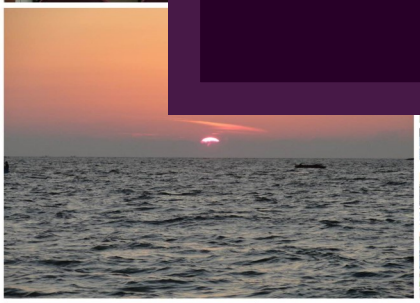
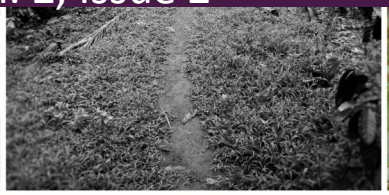
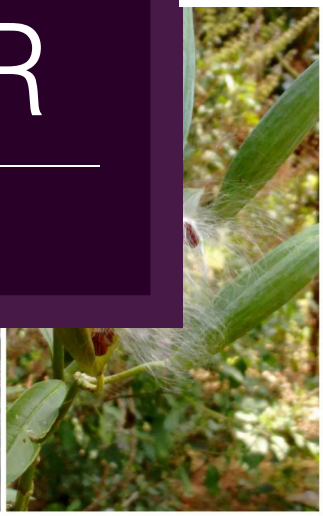
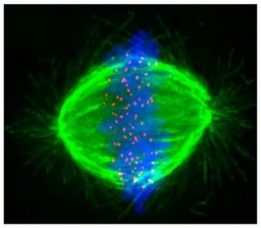
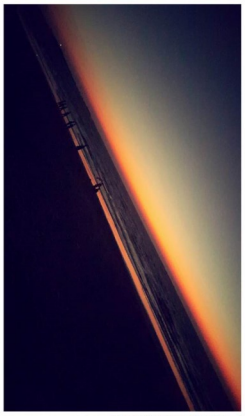
NEWSLETTER

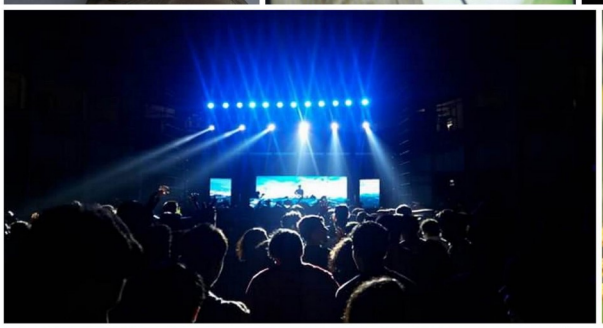
SCHOOL OF LIFE SCIENCES

2016, Vol. 2, Issue 2








THE SCIENCE

Research highlights and news

THE LIFE

Events and student contributions

School of Life Sciences

15th February 2016 Volume 2 Issue 2

Contents:




This issue of SLS's eNewsletter is a revamped version– with two sections that encompass life here at SLS; The Science and The Life.

The Science Section covers three major research articles that appealed to the scientific community at large and of course, our student writers. It also includes the latest developments in science over the last few months.

The second section incorporates all the events that SLS had seen recently. Also to be found are profiles of two reputed visiting scientists. Our student contributors have come up with an amusing biology-related crossword and comic strip. Included are photographs and drawings by SLS students, and finally, a quick peek at the opportunities the future might hold for BSc and MSc students.

We would like to extend our gratitude to:

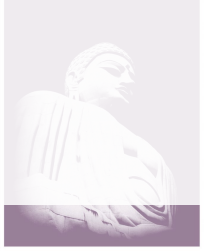
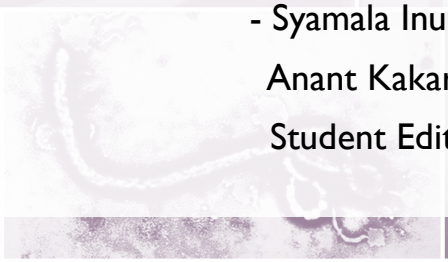
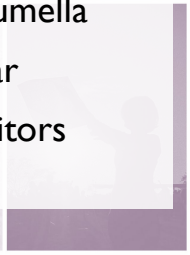
Prof. K Satyamoorthy, Director, SLS

Dr. TG Vasudevan, Dr. Saadi Abdul Vahab, Dr. Vidhu Sankar Babu; Faculty Advisors

The Editorial Committee - SLS

All the students who contributed to this issue of the newsletter.

- Syamala Inumella
Anant Kakar
Student Editors

THE SCIENCE

RESEARCH HIGHLIGHTS AND NEWS

Blood-based Ebola Therapy Trial Yields Unsatisfactory Results

- Ramya Gupta, BSc II

Ebola Virus Disease (EVD) is a severely infectious disease caused by the Ebola virus and has claimed many lives in recent years. It has an average fatality rate of 50%. This virus belongs to the family Filoviridae, which includes three genera – *Cuevavirus*, *Marbugvirus* and *Ebolavirus*. Five species have also been identified – Zaire, Bundibugyo, Sudan, Reston and Tai Forest – of which the first three have been linked to large EVD outbreaks in Africa.

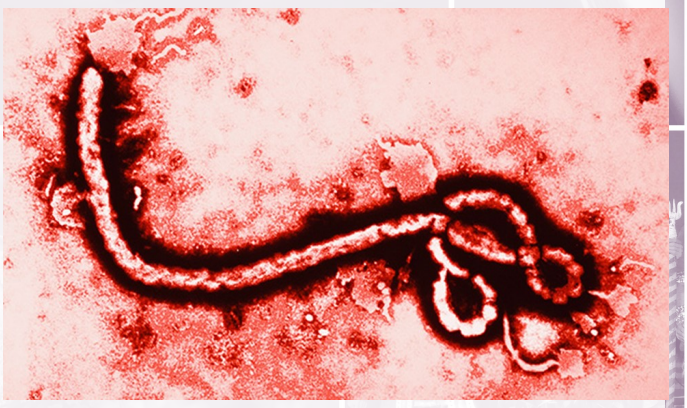
EVD first appeared in 1976 in two simultaneous outbreaks in Sudan and the Democratic Republic of Congo. The disease derives its name from the second outbreak, which occurred near the Ebola River in the Democratic Republic of Congo.

The disease made international headlines with the outbreak in West Africa that started in March 2014 and killed more people than the number of deaths during all previous EVD outbreaks combined. To make the situation worse, the disease then spread to neighbouring Guinea, Sierra Leone and Liberia. It then spread further across West Africa and reached the USA through one unfortunate traveller. The species responsible for the 2014 outbreak was Zaire.

The time period between the infection with the virus and the onset of symptoms is between 2-21 days. Humans are not infectious until they show symptoms. The first symptoms are the sudden onset of fever, fatigue, muscle pain, headache and sore throat. This is followed by vomiting, diarrhea, rashes, symptoms of impaired kidney and liver function, and in some cases, both internal and external bleeding (such as oozing from the gums and blood in the stools). Laboratory findings include low white blood cell and platelet count along with elevated liver enzymes.

"There is no drug available yet that is proven to cure EVD."

Fruit bats of the Pteropodidae family are natural hosts for the Ebola virus. It is introduced into the human population through close contact with the bodily fluids of infected animals such as fruit bats, monkeys, and porcupines that dwell in the rainforest. It then spreads among humans via direct contact with infected bodily fluids and with surfaces and materials (such as clothes) contaminated with these fluids.



Current Treatment

There is no drug available yet that is proven to cure EVD. The current treatment provided by healthcare workers is only symptomatic and aims at improving the chances of survival. This includes administration of oral or intravenous fluids for rehydration of the patient.

Potential treatments such as therapy using whole blood/plasma, immune therapies and drug therapies are being studied for potential use. No licensed vaccines are available, but two potential candidates are under evaluation.

Is Convalescent Plasma the Solution for EVD?

Can the antibodies present in convalescent plasma (plasma of Ebola survivors) be used to treat EVD? This method is an age-old technique that was widely used to treat infectious diseases such as mumps, diphtheria and measles in the twentieth century.

The European Union funded and helped set up the Ebola-Tx project under its Horizon 2020 research and innovation programme to answer this question. It was led by the Institute of Tropical Medicine in Antwerp, Belgium after several months of intense preparation starting February 2015 at the Donka Ebola Treatment Centre in Conakry, New Guinea. The results of the trial were published in the New England Journal of Medicine in an article titled 'Evaluation of Convalescent Plasma for Ebola Virus Disease in Guinea' (van Griensven, *et.al,* 2016) and were described by many researchers as 'disappointing'.

EBOLA-TX

A non-randomised comparative study was conducted, in that 99 patients of various ages with confirmed EVD were selected and of them, 84 were included in the primary analysis and given convalescent plasma to compare their survival rates with that of a control group of 148 people. Pregnant women and infants were also included in the convalescent plasma (CP) group.

In accordance with World Health Organization guidelines, patients in the CP group received two consecutive transfusions of ABO-compatible convalescent plasma. Each transfusion was of the same volume (200-250 ml) and was administered over a 20 minute period with a 15 minute time interval. The plasma administered during the two transfusions was obtained from a two different Ebola survivors. Small adults and children weighing less than 45 kg received two transfusions of 10 ml per kilogram of body weight.

The amount of antibodies present in the plasma was unknown at the time of administration. Also, whole blood therapy was not tested because at the time of the trial, only plasma samples were readily available.

Survival of patients in the convalescent plasma group was monitored up to 30 days after administration of the plasma. The same was monitored for patients in the control group up to 16 days after the start of the trial.

Results

Between day 3 and day 16 after diagnosis with EVD, deaths of patients in the convalescent plasma group stood as follows: 26 of the 84 (31%) patients in the convalescent plasma group died while 158 of 418 (38%) of the patients in the control group died. This raw data indicated a difference of 7% for the risk of death (called 'risk difference') among the two groups. However, further adjustment of this data to account for age differences of the patients in each group, longer duration of symptoms and increased difficulty of swallowing (both are associated with increased risk of death) and protocol deviations (there was one major and 14 minor deviations during convalescent plasma transfusions for 15 patients), it was found that the risk difference was only 3%, and not 7%. This difference was determined to be not statistically significant.

But there were some upsides to these results as well. It was observed that there were no serious adverse reactions during plasma transfusion and so, the procedure is safe for both recipients as well as donors. There is also the possibility that some patients will benefit more than others from treatment with convalescent plasma. Children younger than 5 years of age had the highest risk of death in the control group. However, four of the five child patients treated with convalescent plasma survived. Another interesting point to note is that six of the eight pregnant women treated with convalescent plasma survived. These patients might also have benefited from the coagulation factors present in the plasma. Unfortunately, pregnancy was incompletely recorded in the control group so nothing can be conclusively said on the basis of this trial.

Questions to be Addressed: Next Steps

At the time of the experiment, it was not possible to measure the amount of antibodies present in the convalescent plasma transfused to the patients because of the non-availability of a biosafety lab 4 (BSL 4) in Guinea or any of the neighbouring countries. But now, these plasma samples have been sent to a BSL 4 in Lyon, France for quantifying the antibodies in these samples. This will allow researchers to experiment with blood-based therapy for Ebola using different concentrations of antibodies. It may be possible that using plasma with a higher antibody load will be more efficient against the Ebola virus.

Researchers were advised to terminate the study in July 2015 because of the low caseload. But, during longer and more extensive studies in the future, the frequency of convalescent plasma transfusion may be changed to determine whether a higher frequency of administration will be more effective in reducing the risk of death. Similarly, experimentation with different volumes of plasma transfusion may also be carried out.

It also remains to be seen whether the treatment may be more effective for certain groups of people, such as children and pregnant women, as seems to be suggested by the raw data in this study. Larger randomised trials involving more participants need to be carried out to be able to ascertain whether any such age group can be better benefitted by blood-based therapy.

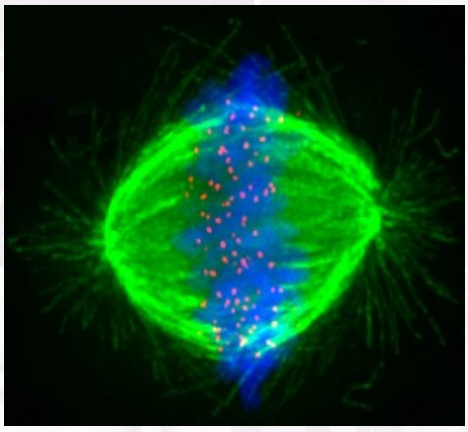
Lastly, only the use of convalescent plasma was evaluated in this trial. Further studies using whole convalescent blood or its other components can also be carried out to determine whether they have greater efficacy than convalescent plasma.

From Cell to Tissue: The Protein Critical to Multicellular Evolution

- Syamala Inumella, BSc III

One question that has eluded the scientific community for years is: how did unicellular organisms evolve into multicellular ones?
Many theories have been proposed; the Symbiotic, Coenocytial and the Colonial theories being the most widely accepted ones (Anderson et al., 2016). However, all of these still require an explanation at the molecular level. How do single cells make the decision to divide on a particular plane in order to form tissue?
The key to organised tissues is the orientation of the cells. This is taken care of by the mitotic spindle. This microtubule-based structure is responsible for separating chromosomes before the cell divides into two daughter cells.
A group of scientists from the Universities of Oregon and Chicago believe they have solved the conundrum of the origins of multicellularity. They traced the components of the mitotic spindle back to an ancient protein function, thus pinpointing the mutation that was responsible such a huge leap in evolution.

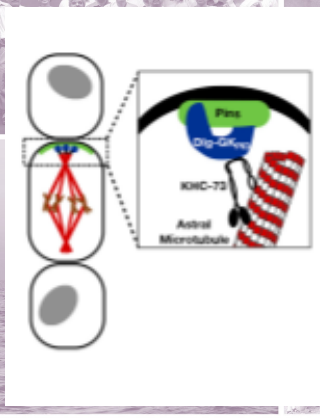
"A single mutation led to the evolution of multicellularity"



The spindle apparatus is involved in the mitotic division of cells.

(http://physioweb.uvm.edu/stumpff-lab/research/)

The GK_{PID} (Guanylate Kinase Protein Interaction Domain) is a part of the molecular machinery that causes the mitotic spindle to orient in the desired direction. It steers the motor proteins to the marker proteins at the periphery of the cell. Anderson et al. (2016) enforced the method of ancestral protein reconstruction to identify when and how GK_{PID} inherited its function. They did this by retracing the protein back up its phylogenetic tree until they found an



The GK_{PID} of the protein Discs-large (Dlg, blue) serves as a scaffold for spindle orientation by physically linking the localized cortical protein Pins (green) to astral microtubules (red) via the motor protein KHC-73 (black)

ancient protein from which GK_{PID} originated. The original gene was for the enzyme, guanylate kinase. However, a mutation caused the gene to evolve in two ways - leaving one original version of the gene and one mutated version that would later evolve into GK_{PID}.

Further investigation into the genetic basis for this change resulted in the discovery that either one of two substitutions, S36P or F33S gave the ancient protein its binding ability. It was possibly only because of this point substitution that further evolution could take place to produce the thriving multicellular organisms we are today.

Thus the basis for the existence of multicellular organisms can be traced back to a single mutation. This evolved to form the mitotic spindle-allowing the organised arrangement of cells into tissues, tissues into organs, and so on.

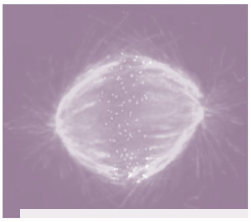
Reference: Anderson DP, Whitney DS, Hanson-Smith V, Woznica A, Campodonico-Burnett W, Volkman BF, King N, Prehoda KE, Thornton JW. Evolution of an ancient protein function involved in organized multicellularity in animals. eLife, 2016; 5 DOI: 10.7554/eLife.10147

Quantum Phenomenon in Magnetoreception

- Ravipati Piusha, BSc I

Avian migration is a regular seasonal movement observed mainly in birds. Birds fly hundreds and thousands of miles to find the best ecological habitats for feeding, breeding and raising young ones. Many different migratory patterns are observed in birds. How are the birds able to navigate with pin-point accuracy? How do they find their ways back?

Well, it has been shown that some use solar or celestial navigation, some memorize land marks and some smell their way around the planet. But the ability of European Robin (*Erithacus rubecula*) to detect the direction and strength of magnetic field, known as magnetoreception, is a captivating navigational sense to study.



Earth's magnetic field is very weak, between 30 and 70 μT (microtesla) at the surface, to initiate a detectable chemical reaction in animal's body. The amount of energy supplied by the interaction of magnetic field and molecules in living cells is too low to break or make a bond. How then are the robins able to sense magnetic field? To understand this let us shrink ourselves and travel to the most fascinating quantum world.

"The earth's magnetic field, albeit weak, initiates a detectable chemical reaction in the animal's body"

Schulten proposed that pairs of free radicals generated by a process known as fast triplet reaction could possibly have their electrons quantum entangled (quantum entanglement is a behaviour observed at the quantum level wherein two particles which were once bound together can still communicate with each other when separated) which could be one of the reasons for the separated electrons to show high sensitivity to magnetic field.

There are basically two models that explain magnetoreception: magnetite model and radical pair mechanism model (RPM). Of these two models, the RPM model gives a promising explanation of avian navigation. Magnetoreception is observed due to the presence of an avian compass which is an inclination and light dependent compass. This avian compass is located in the bird's eye.

The radical pair mechanism involves three stages-

Photons with sufficient energy activate certain types of molecules capable of producing free radicals (cryptochrome as in bird's eye) and inducing electron transfer reaction (from the ground state- state in

which there are 2 electrons per orbital which have opposite spins and are paired) and producing radical pairs in their excited singlet state (state in which electron in higher energy orbital has an opposite spin orientation relative to the electron in the lower orbital).

Under the influence of geomagnetic field and the internal hyperfine interaction (interaction involving electron spins and neighbouring nuclear spins), the state of the pair can remain a singlet state or become a triplet state (the state in which the excited valence electron may spontaneously reverse its spin. This is called intersystem crossing. Electrons now have same spin orientation having some effective magnetic moment). Different inclination angles, associated with external magnetic field induce different ratios of the singlet and triplet states.

Molecules in different states will generate different chemical products which can induce detectable signal with respect to magnetic field lines.

In robins, the cryptochrome was discovered to be a protein that could potentially generate radical pairs. Cryptochrome (Cry1a) contains blue-light absorbing chromophore and FAD (Flavine adenine dinucleotide). This FAD cofactor is reduced through a series of light induced electron transfer, from a chain of three tryptophans (Trp) that bridge FAD and protein surface. In this process, two radical pairs are formed, RP1 ($FAD^{*-}TrpH^{*+}$) is formed which on protonation and deprotonation forms RP2 ($FADH^{*}Trp^{*}$). During the above mentioned protonation and deprotonation, RP1 interconverts coherently between singlet and triplet states under the influence of hyperfine interaction and external magnetic field.

By understanding the role of magnetic field in avian navigation it can be concluded that birds can detect the change in intensity of geomagnetic fields and the approximate direction of parallels than sensing the exact direction.

Studying magnetoreception in birds has inspired scientists to design devices capable of detecting weak magnetic fields.

Reference:

Zhang et al , The Radical Pair Mechanism and the Avian Chemical Compass: Quantum Coherence and Entanglement, International Journal of Quantum Chemistry 2015, 115, 1327–1341

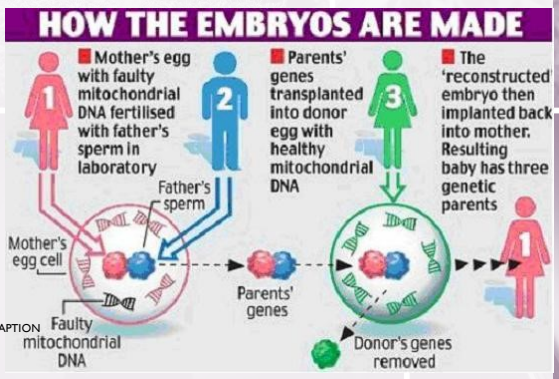
This Quarter in Science

Three Parent Babies

-Sritama Pramanik, MSc I

Have you ever heard of babies with three parents? Three parent babies have garnered big headlines in the genetics community for the last year when the procedure won legal approval for therapeutic use in the UK in February.

Mitochondria, the power house of the cell do not just produce energy but also influence a wide range of cellular processes, from cell death to immune responses. They have their own set of 37 genes which are separate from the 20,000 or so genes that shape who we are. Variations in mitochondrial DNA are linked to many common human conditions, including neurodegenerative disease, cancer and aging. There is no curative treatment for patients with mitochondrial disease. Inherited diseases caused by mitochondrial gene mutations affect at least 1 in 5000-10000 children and are associated with severe clinical symptoms.



In February, UK government approved mitochondrial replacement therapy, a technique that would allow a woman with a mitochondrial disorder to give birth to healthy children by pairing her nuclear DNA with the healthy mitochondrial DNA from a donor's egg. The approval came after a 3.5 year effort to review the safety and ethics of creating individuals with DNA from 3 people (3 parent baby). The nuclear DNA comes from the biological mother and mitochondrial DNA will come from donor. It results in babies with 0.1% of their DNA from the second woman and is a permanent change that would pass through the generations resulting in 'designer babies'.

The process of producing a three-parent baby, Three Parent In Vitro Fertilization (TPIVF), involves taking the nucleus of one egg and inserting it into the cytoplasm of another egg which has its nucleus removed, but still contains mitochondrial DNA , and then fertilizing the hybrid egg with a sperm. The purpose of the procedure is to remove a nucleus from a cell with defective mitochondria and place it in a donor cell with healthy mitochondria, which after fertilization will contain a nucleus with genetic material from only the two parents.

Is Increased Adult Neurogenesis the Secret of Our Memory?

-Ketki Mulay, BSc II

Who does not want a powerful memory and productive learning? There have been numerous exercises elucidated till date to boost our energy and enhance our learning skills. But imagine just by popping a pill or undergoing a physical treatment one could get superfast learning skills and get rid of all the old, useless memories which keep on overlapping with the new ones. The relationship between hippocampus neurogenesis and memory power is a promising future for such kind of research.

We have known for quite some time that our memory and learning areas are situated in hippocampus region of our brain. We also know that neurogenesis is the process by which neurons are generated from neural stem cells and progenitor cells in hippocampus. Now if one thinks about it, a relation can be seen between the two. There have been reports showing that increased adult neurogenesis leads to better memory formation and maintenance. It has also been shown that increased adult neurogenesis gives rise to better memory separation, which means our old memories remain separated from the newer ones; thus causing reduced confusion. This mechanism is also known as pattern separation. Now if we take an example of increased adult neurogenesis by some neurogenesis inducing activities the capacity of the brain to learn, separate and store the information is increased tremendously.

The experiments conducted on mice show that adult neurogenesis can promote the hippocampal network capacity and memory clearance of old memories. Scientists have further elucidated that increasing neurogenesis will not only help in pattern separation and integration but also helps in clearing old memories and reducing their interference with the newer ones. These studies show that proper neuronal growth is necessary for learning and memory skills. A hypo or hyper adult neurogenesis may lead to various disorders related to memory and learning. The question that remains is if a drug or physical treatment can increase the neurogenesis till a certain level and then help in boosting our memory and learning skills.

BrainPort

-Aditya Sethi, MSc I

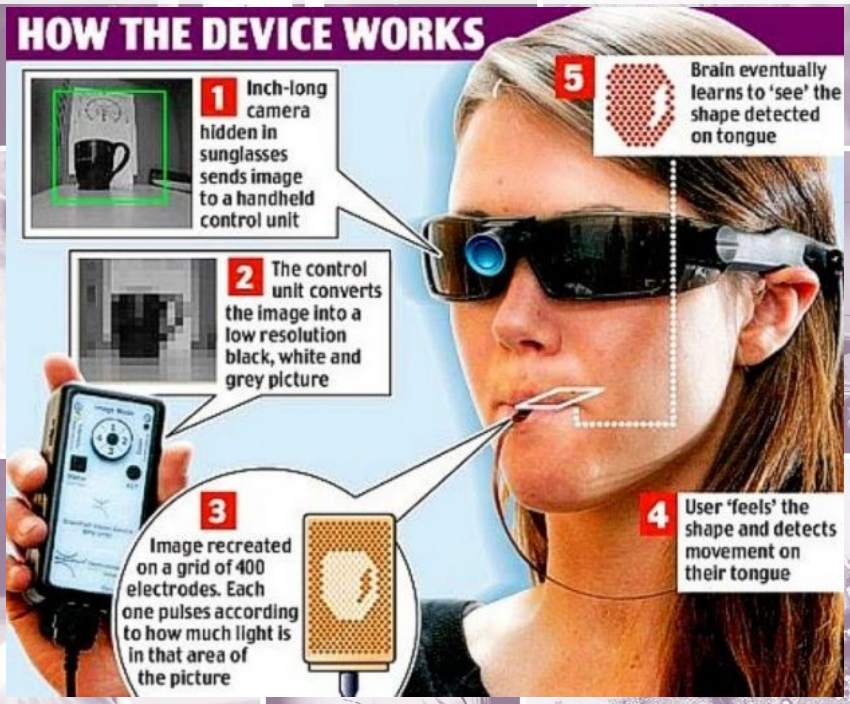
The human brain has potential to be dynamic owing to its neuroplasticity, even during adulthood. Can this neuroplasticity be manipulated to substitute one sense for another? This question arose in Paul Bach-y-Rita's mind at the University of Wisconsin, after his father miraculously recovered from a stroke. Bach-y-Rita started wondering if vision could be given to the blind using sensory substitution and started using the term 'Vision Substitution' for his experiments.

Our own sense of vision is nothing but millions of nerve signals that travel along different cables. It is the brain that actually sees, and not the eyes. Our brain is enclosed in a chamber of complete darkness, receiving these nerve signals that help us perceive brightness and colour. Optic stimulation in our retina is converted to a spatio-temporal nerve pattern of impulses along the nerve fibers. We obtain our vision when the brain receives this pattern and analyses it to recreate images. David Eagleman, author of the book 'Incognito' says, "Your brain is in the dark but your mind constructs light". Just like our eyes, if one can create another portal that sends the same nerve signals to our brain, we should be able to perceive brightness and colour using that portal. It does not matter to the brain where the impulses come from; as long as it can accurately coordinate with our movement, the brain will construct vision.

Using this idea, Paul Bach-y-Rita invented a vision stimulation device called BrainPort. BrainPort allows visually impaired individuals to see with their *tongue*! The fundamental idea behind this device is to send images from a small video camera attached to one's forehead to a hand-held control unit. This control unit converts the image into a low resolution, black, white and grey picture. At this stage, the image is recreated on an array of electrodes present on the tongue of the individual. The grid translates the image into a pattern of electrical impulses that allow the tongue to distinguish various qualities such as distance, shape, movement and size. The brain then learns to interpret this sensory information and convert it into a direct sensation. In this manner, the brain can learn to 'see' using the tongue, thus developing a new route toward perceptive sensation.

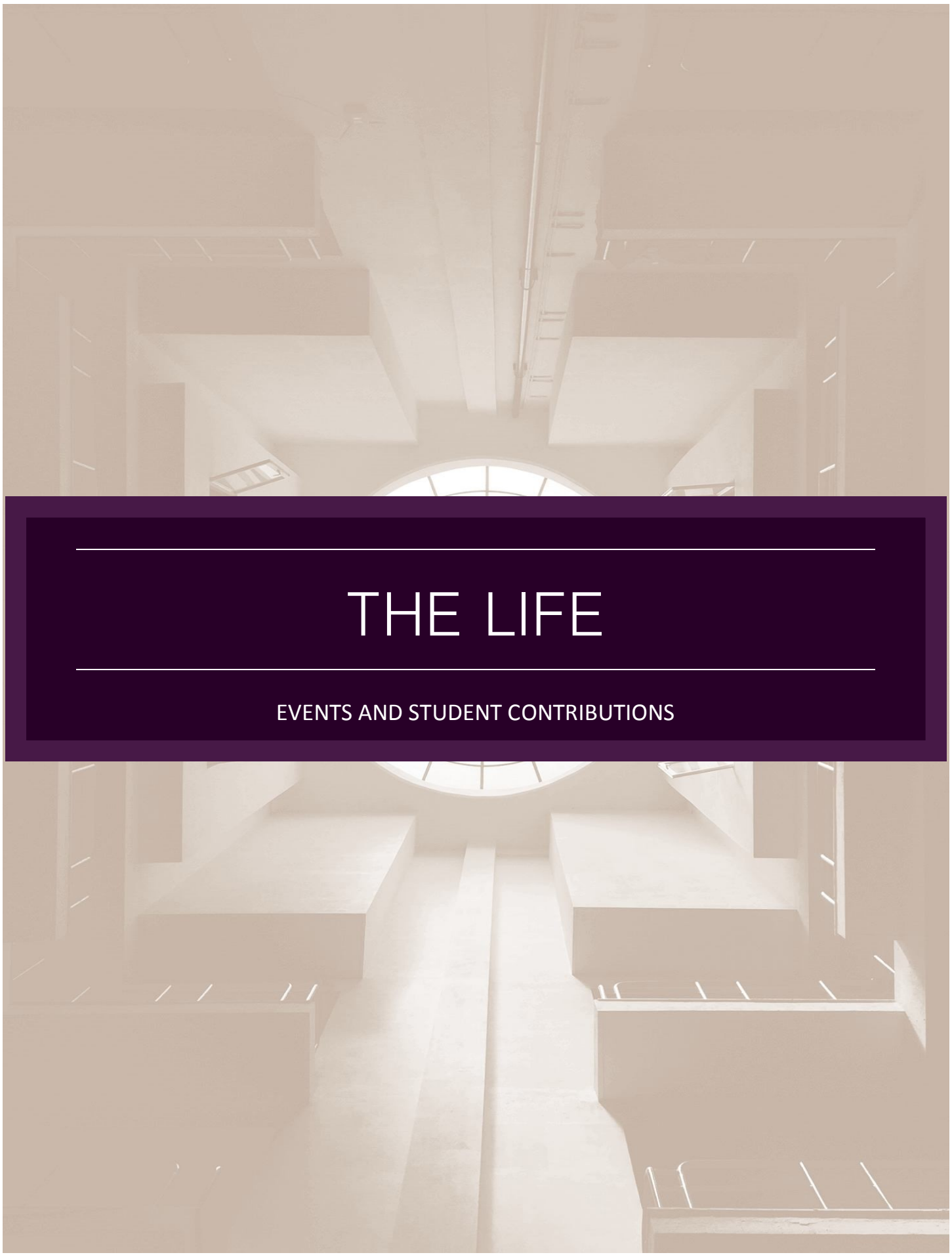
However, there is a learning curve. Our brain takes time to adjust and adapt to the sensory information coming from the tongue. At first, the stimulation is only perceived as unidentifiable edges and shapes, but over time, the individual becomes an expert at navigating using BrainPort. Although BrainPort was developed by Bach-y-Rita in 1998, FDA approved it for marketing only in June 2015. BrainPort is now manufactured and sold by Wicab Inc., founded by Bach-y-Rita. Currently, scientists are pursuing research to determine the factors that affect the time taken by an individual to get completely adapted to BrainPort. Without training, patients cannot perform using BrainPort and occupational therapy plays a key role in the patient's success or failure. Researchers are working on making this device more user-friendly and economic.

BrainPort has made the world come alive for the visually impaired. It is a step, one among many, showing how advances in science are benefitting us in ways previously considered unimaginable. Hopefully, this technology will soon be more accessible, bettering the lives of numerous people across the globe.



http://www.thesilverink.com/wp-content/uploads/2015/06/FDA-Approves-BrainPort-V100-Which-Enables-Blind-People-To-See-With-Their-Tongue.jpg

"BrainPort allows the visually impaired to 'see' with their tongue."



THE LIFE

EVENTS AND STUDENT CONTRIBUTIONS

This Quarter in SLS

Halloween 2015

31st Oct,2015

A shiver passes down your spine as you try to hear the howling of dogs afar, the incessant rattling of the windows and the cackling of the witches shattering the dead silence of the night. A creepy deathly cold surrounds your insides…that feeling you get when you feel something supernatural around you. Well my friends don't fear, because Halloween is here again!

Saturday night, 31st October, 2015, School of Life Sciences (SOLS) Manipal witnessed one of the spookiest Halloweens ever. The students prepped up quite enthusiastically for the event, starting right from all the decorations with the nasty pumpkin faces to floating spiders and bat stencils. Apart from that, going along with the customs, there were two horror movies put up, Shining and The Exorcism of Emily Rose to set the horrifying mood for the evening. To make the movie time even more interesting, there were tempting snacks like sandwiches, popcorn, cola float and candies all arranged by the members of council itself. And since Halloween calls for costumes, students were seen glamorously dressed up like their favorite cartoon characters or zombies. Among all, zombie get ups and that of superheroes were a hit. Apparently Batman, Cat Woman, Zorro, Spiderman were the current favourites. Many of them had put on very creative Halloween makeup on their faces and bodies to make it look even real. When asked they added, "Simple makeup like eye pencils, lipsticks can give the desired look instead of sticking to just face paint". Overall, the spirit of bewitching festivities was in the air!

National Unity Day

31st Oct,2015

National Unity Day commonly called as "Rashtriya Ekta Diwas" is celebrated on 31st October every Year as an annual Commemoration of the birthday of the Iron man of India – Sardar Vallabhbhai Patel, one of the founding leaders of Republic of India.

Celebrations at the School of Life Sciences (SOLS), Manipal University witnessed active participation from the students and the faculty members. The event started with the rendition of our national song "Vande Mataram" by the students of School of life Sciences setting the mood for the event. Dr. K. Satyamoorthy, Director, SOLS, welcomed everyone and emphasized the importance of National Unity Day.

The Guest of Honour was Dr. U. Vinith Rao, Researcher, Department of Gandhian studies, Mahatma Gandhi Memorial College, Udupi. Holding a Master's Degree in Political Science, he is a researcher in Gandhian studies and has conducted many workshops and trainings across India to spread the awareness of "Gandhian Worldview". He addressed the audience on Sardar Patel projecting his multifaceted personality as a lawyer, social worker and a freedom fighter. He also stressed upon the reason behind celebrating the National Unity Day and how it should be perceived by the future generations. He extended his appreciation and gratitude to the students and the faculty members for their efforts in organizing such an event and having him as a guest for this Special day.

The event also witnessed cultural activities by the students of SOLS. Be it music or dance or a skit, the students exhibited their varied talents. The highlight of the event was a jugalbandi performance featuring a flautist (Ms. Chaitra of BTFS) and a guitarist (Mr. Pankaj of MSc). The flute and guitar complemented so well and mesmerized everyone. The Vote of Thanks was given by Mr. Aditya Sethi, President, Students Council, SOLS. The memorable event concluded with the rendition of the National Anthem.

12th Jan,2016

Celebration of Swami Vivekananda's Birth Anniversary

On 12th January 2016, the School of Life Sciences celebrated the 153rd birth anniversary of Swami Vivekananda.

Life and Relationships

- HImanshu Goswami, BSc I

Life. The very word unfurls a whole new dimension. It could be hard to clearly define the meaning of life. It is a myriad of things, those that we know so well and the obscure things that somehow manages to escape our eyes.

Relationships are as hard to define and as strange as life. But, as Swami Vivekananda said, "Relationships are more important than life, but it is important for those relationships to have life in them", life is not just about going on without forming bonds, strong and feeble with our near and dear ones. If one believes in the concept of life after death, won't the afterlife be more peaceful and serene with the knowledge of relationships in the past life? Or perhaps that one was just a vagrant soul who roamed around without a meaning in life? Relationships can be formed not just between people, but also with anything in nature – an animal that gave immense joy to play with, a tree that was nurtured from young that continues to yield fruits (pun intended) over successive generations.

Now the other thing with relationships: it is equally important have 'life' in them. Any relation to have life in it means effective understanding between each other, made possible through communication. Marriage is usually a relationship that is spoken of more often, though many start with the mere tying of knots in the name of god. Many a times a marriage (a form of relationship) gradually disintegrates not necessarily because of the conflicts etc., but because of lack of communication that sucks the life out of the relationship. Friendships, a relation that one makes during life, can also become 'lifeless' due to lack of communication. Two friends, who depart after school days promising to keep in touch, can drift so far apart so as to not recognise each other, due to the lack of communication. So, communication and understanding are crucial factors in putting the 'life' in relationships, lest the relationships turn as stale as rotten fruits in kitchen due to neglect. That makes one to think that relationships are more important than life, otherwise life would have no meaning at all. We need to create bonds with others to survive in this planet. Otherwise life would be futile. But, we should make sure that the relationships created do not become weak with the passage of time or there is not vibrancy and life in them.

(Edited excerpt of winning essay written for the competition held towards National Youth Day celebrations on January 12, 2016 at the School of Life Sciences)

PhD Defense *Viva* Presentation

2nd Feb,2016

On 2nd February 2016. Mr. Ravishankara of the Department of Biotechnology presented his defense viva for a PhD entitled "Development of Reverse Dot Blot Array for Screening of Single Nucleotide Polymorphisms and Allele Specific Expression Analysis in Folate Metabolism Pathway Genes".

Comprehensive investigation on the importance of folate metabolism gene polymorphisms in health and disease is hampered due to lack of simple, cost effective and rapid screening methods. A reverse dot blot array based sensitive, high throughput, and cost effective genotyping technique was developed with a new computer aided tool for allele discrimination. The developed method was implemented to screen folate metabolism gene polymorphisms in acute lymphoblastic leukemia (ALL) patients (n=203) and normal individuals (n=246) of Indian population. The plasma folate level was estimated by microbiological assay, total plasma homocysteine level and 5-methylcytosine content of leukocytes DNA were estimated by reversed phase high-performance liquid chromatography method. The genotyping results by developed assay showed 100% similarity with gold standard DNA sequencing results. The newly developed image analysis software can fasten the genotyping analysis. Our case-control study showed RFC1 G80A polymorphism is associated with ALL. The evaluation of effect of gene polymorphisms on plasma folate, homocysteine level and 5-methylcytosine content leukocytes DNA explored that, only MTHFR 677TT genotype was significantly associated with elevated total plasma homocysteine levels.

Swachh Bharat Mission

8th Feb,2016

The School of Life Sciences recently joined ranks as a participating institution in the Ministry of Human Resource Development's (GOI) initiative for a Clean and Sanitized India. The students and faculty took a Swachhata Pledge that is as follows:

- I take the pledge that I will remain committed towards cleanliness and devote time to clean India.
- I pledge to devote 2 hours per week to voluntary work for cleanliness.
- I pledge to neither litter nor to let others litter.
- I pledge to initiate the quest for cleanliness with myself, my family, my locality, my city and my school.
- I pledge to propagate the message of Swachh Bharat Mission in cities, villages and towns.
- I pledge to encourage 100 other persons to take this pledge which I am taking today.
- I pledge to take every step towards cleanliness that will help in making my country clean.

Jai Swachh Bharat

Jai Hind

Profiles

Zee Upton

The Students Council was privileged to be given the opportunity to interact with distinguished scientist Dr. Zee Upton. With an astounding number of publications and patents and path-breaking research, Dr. Upton has worthily placed herself in the top echelon of international scientists. In a candid rendezvous Dr. Upton fervently spoke about her passion for tissue engineering and regenerative medicine.

On completing her PhD from the University of Adelaide, Dr. Upton joined as an adjunct professor at the School of Biomedical Sciences, Queensland University of Technology. She later laid the foundation for a one-of-its-kind tissue engineering company, Tissue Therapies Ltd. Vitronectin, Skin fibroblast regeneration and wound healing, IGF and its role in wound healing have been her prime focus of research which eventually brought to life a new product that veritably could be used for healing wounds in diabetes patients. "Research is futile unless it can be used for the betterment of mankind" says Dr. Upton.

The dynamic scientist is an active member of various international organizations such as the Australian Society of Biochemistry and Molecular Biology, Women in Technology, International Society for IGF Research, Australian Society for Medical Research, the Australian Wound Management Association and Australasian Wound and Tissue Repair Society.

The scientist-entrepreneur envisions India as the future destination for biomedical research and investment. "The change in India in the last ten years is phenomenal. It is worth taking risk for when it comes to investment. India, as I have seen it, is trying to jump to innovation and invention. I would love to set my next investment here." Dr. Upton said, "India is vibrant and diverse and it is just right to start up something new."

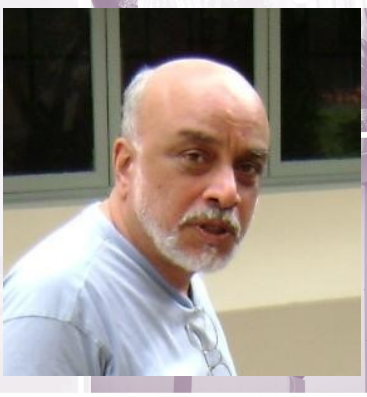
As a parting note Dr. Upton sends out a strong message to the young blood in biomedical and biological sciences, "Deliver the most of you, at your utmost best. Being passionate about the work you do is extremely important. Research only when it looks and smells like a product."

"Research is futile unless it can be used for the betterment of mankind."

Raghuvir Arni

Dr. Raghuvir K Arni, Professor at the Department of Biophysics, Sao Paulo State University, visited the School of Life Sciences on November 25, 2015 to discuss an ongoing collaborative project. Despite his busy schedule, he took a few minutes to shed some light on his research areas of interest.

Dr. Arni did his PhD at the Department of Molecular Biology at the Free University of Berlin, and his post-doctoral research in Macromolecular Crystallography and Biomolecular NMR at Rutgers University, New Jersey. Currently working in Sao Paulo, his primary research interest focuses on a bacterium, *Corynebacterium pseudotuberculosis*, prevalent in tropical countries such as Brazil and some African countries. This bacterium affects livestock such as cattle, horses, pigs, and so on, and causes abscesses on the head and neck region of the affected animals. It is contagious and usually the infection of one animal would result in the whole herd needing to be sacrificed, leading to a huge loss in a variety of livestock products such as meat, leather, and milk.



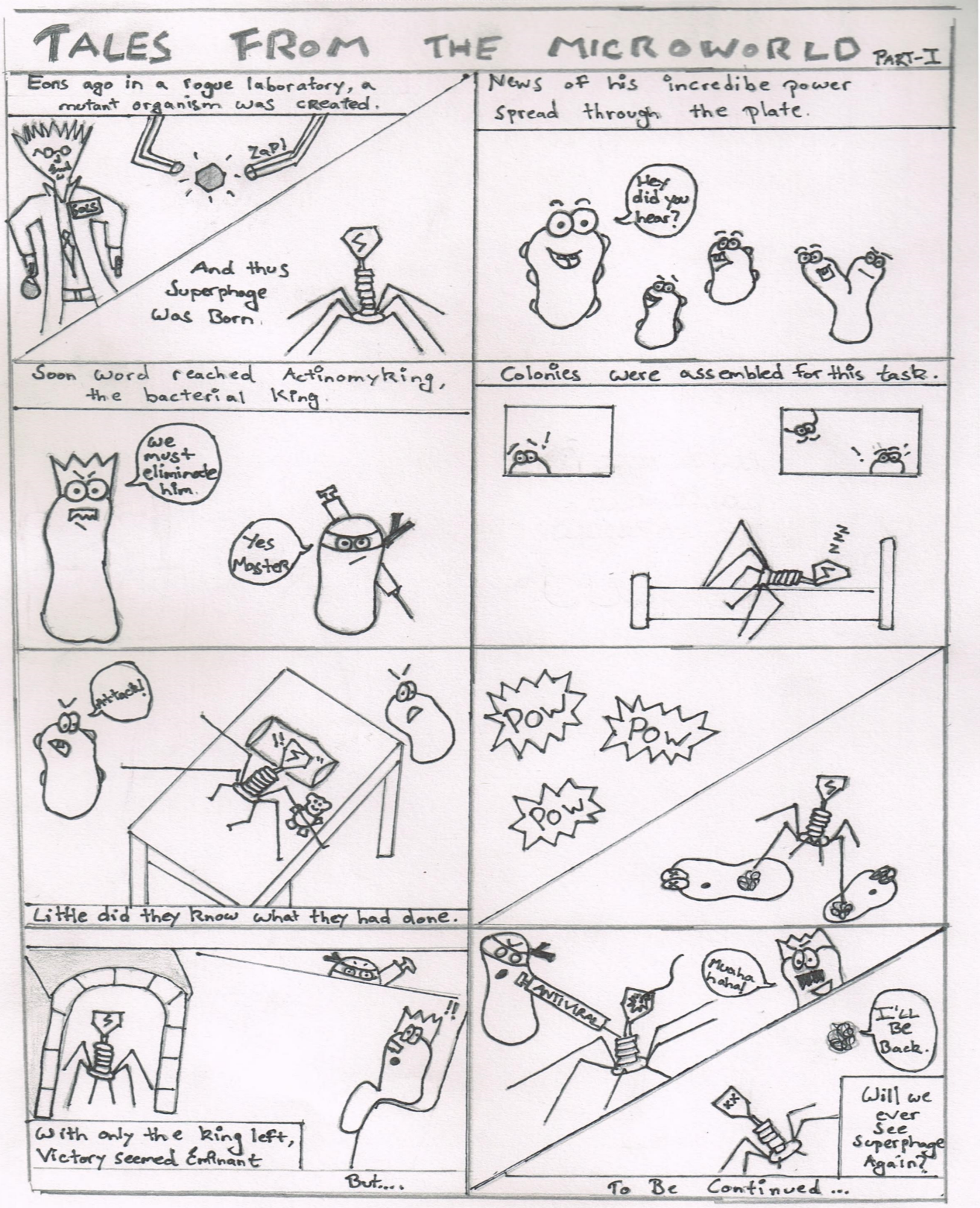
Dr. Arni and his team are analysing the pathways this bacterium uses to survive and cause infection, to find a target pathway that can be intercepted by a chemical compound. This pathway must be unique to this species of *Corynebacterium*, as the metabolic pathways of other useful floral bacteria should not be affected. This bacterium contains a total of about 2,000 proteins, out of which 40 have been cloned, expressed, and subjected to biophysical and structural studies by Dr Arni and his team; the next step would be to 'bombard' these proteins with various chemical compounds to ascertain their effectiveness in blocking the activities of these proteins. The aim is to find key differences between these proteins and other bacterial proteins so that such differences can be targeted to specifically block those proteins, to be able to ensure that this bacterium cannot survive and propagate inside the livestock host(s).

Dr. Arni is also working on/carrying out research on the 'drumstick' tree (*Moringa oleifera*), which has commercial applications in Brazil to make biofuel for cars. A variety of biologically important seed storage proteins present in this tree are made as inactive 'pre-proteins', which are then cleaved to become active. He and his team have isolated two proteins from the drumstick tree and carried out structural and functional studies to enable a greater understanding of how they fold and how the activating cleavage takes place.

Fun and Games

Comic Strip

-AYM Nadeem, BSc III

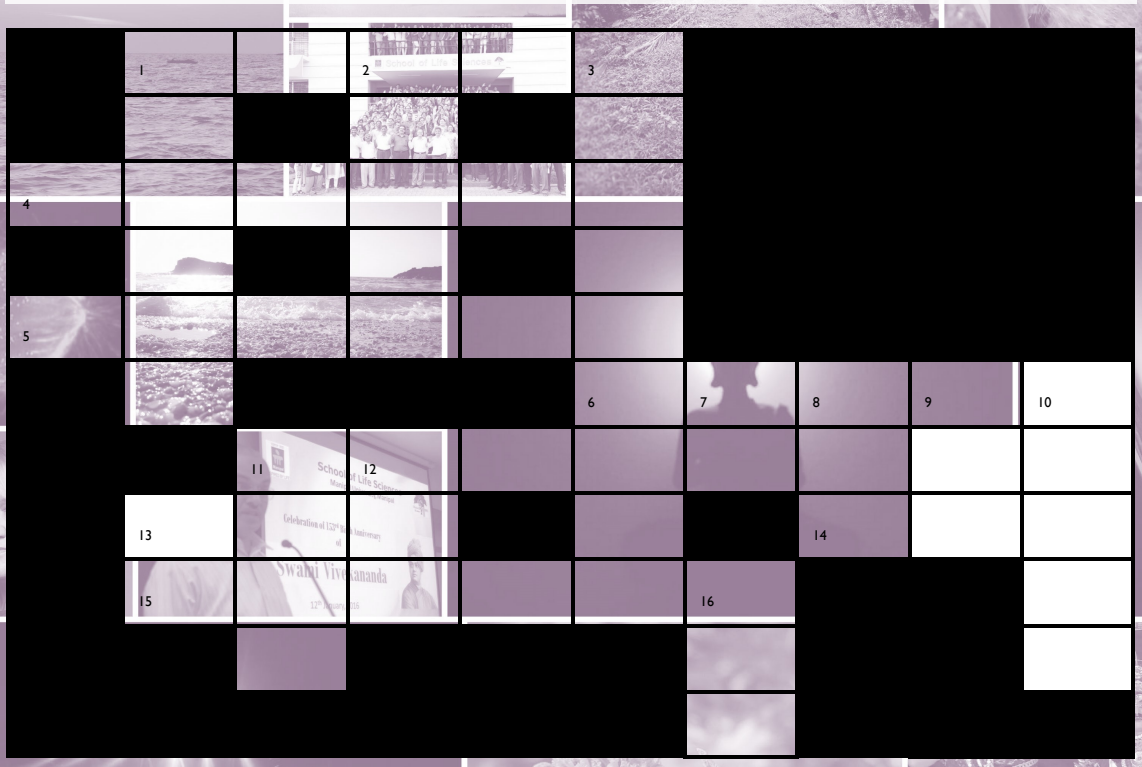


Fun and Games

Crossword Puzzle

-Anirudh Gupta, BSc II

Put on your thinking caps and harness your biological prowess to solve this quick brain teaser.



Across:

1. Audibly, a pair of denims, perhaps?
4. What society may determine; maybe based on a Barr Body?
5. The metallic thing that B12, RBC, and pancreas all have in common; also a striking shade of blue.
6. Bony; also, neighbours in a ring; prefix to a type of dentist.
11. Approximately 1 month 'new'; fresh outta amniotic fluid.
13. A stop codon; a spirited game you might remember from your childhood.
14. The first three letter of SLS's cultural week;18-22bp.
15. _____ pectoris; the kind of heartburn felt not only on V-Day.

Down:

1. Part-time friar and gardener, perhaps?
2. Code that doesn't have much to say, protein-wise. (Abbrev.)
3. The chemical 'Ode to joy'.
7. Autoimmune disease that leaves you grumbling about the stairs. (Abbrev.)
8. Third degree of 'overly attached' phosphates; to something unique to DNA. (Abbrev.)
9. 49 regions that set us apart from the apes(3 words). (Abbrev.)
10. _____ nucleotides; initially, not very long.
11. Too small, even when said nine times.
12. Perhaps the only thing breakfast and IVF have in common.
13. What happens when you give 'AT' a compliment.
16. Of iced water and challenges.

Results to be published in the next issue.

Opportunities

SLS's International Collaborations

- University of Queensland (Australia)
- Queensland University of Technology (Australia)
- Flinders University (Australia)
- Maastricht University (the Netherlands)
- Joseph Fourier University (France)
- Lancaster University (UK)
- Edinburgh-Napier University (UK)
- University of Nottingham (UK)

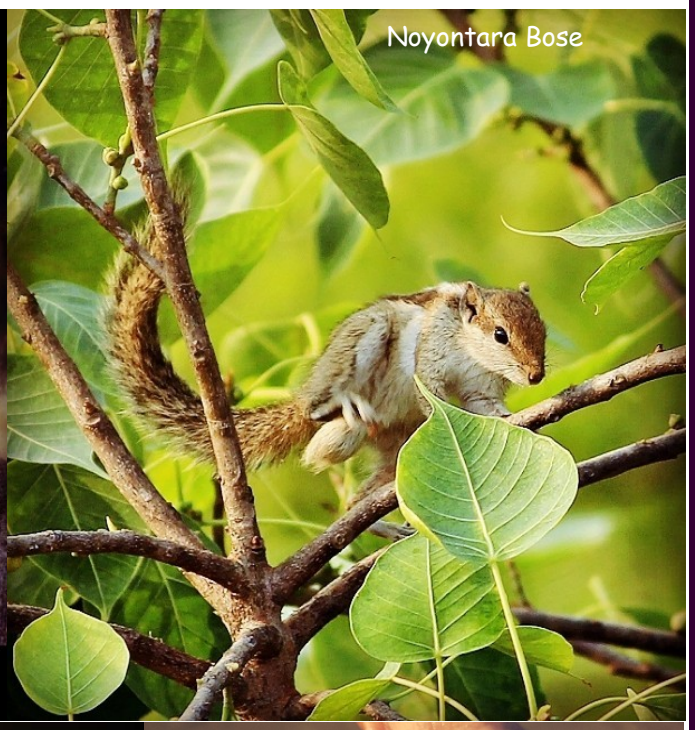
Indian Entrance Exams to Look Out For

- Joint Graduate Entrance Examination in Biology and Interdisciplinary Life Sciences (JGEEBILS)
- Indian Institute of Technology, Joint Admission Test MSc (IIT JAM)
- Combined Biotechnology Entrance Examination (CBEE) incl. Jawaharlal Nehru University (JNU)
- All India Post Graduate Biotechnology Entrance Test (AIPGBET)

Photo Gallery

Photo Gallery

Noyontara Bose

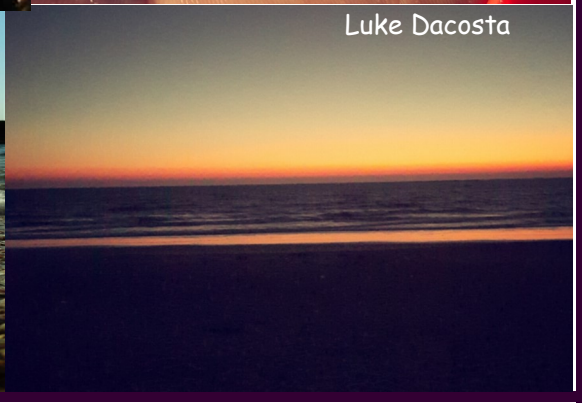


Noyontara Bose

Ramya Gupta

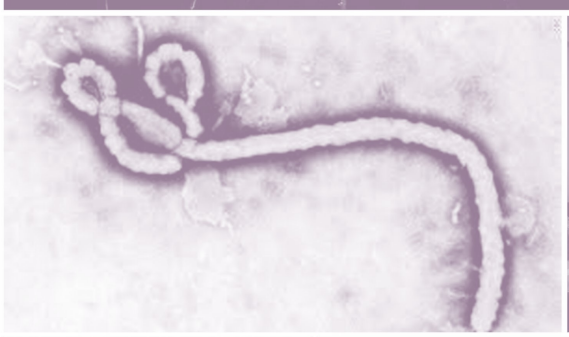
Luke Dacosta

Sagnik Pal



Luke Dacosta



We're on the Web!
manipal.edu/sls.html

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