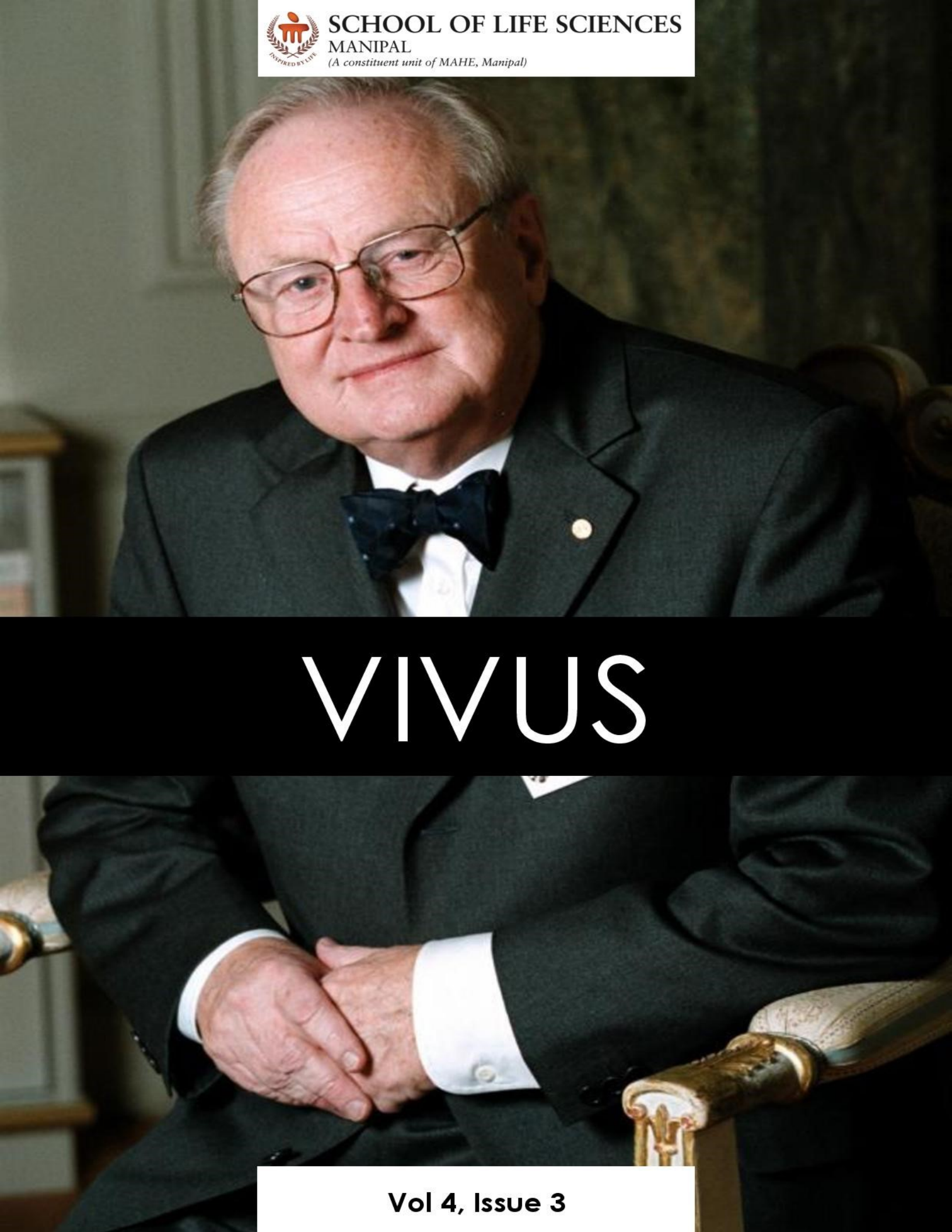




**SCHOOL OF LIFE SCIENCES
MANIPAL**
(A constituent unit of MAHE, Manipal)



VIVUS

Vol 4, Issue 3

EDITORS' NOTE

Hello!

We are pleased to present to you the third edition of VIVUS for the academic year 2017-2018.

The cover of this issue of VIVUS is dedicated to the memory of Sir Arvid Carlsson, a Nobel Laureate, renowned for his work on Dopamine and Parkinson's disorder, who passed away on June 29, 2018.

This edition also includes a broad range of submissions, from scientific ones on depressive disorders and newly discovered organs to creative ones showcasing the talent of our students. Along with our peers, we have had the pleasure to interview eminent personalities and are excited to present them to you. 'Know Your Labs' in this edition covers two departments— **The Department of Biotechnology** and **The Department of Cell and Molecular Biology**.

A lot has been going on in the college, and the 'Events' section will keep you in pace.

If you wish to listen to the interview podcasts, explore media from the events, or just know what are the students up to, visit our website at www.sites.google.com/site/everythingatsls

Do visit the **EdBoard** on the first floor to keep yourself updated of any student meetings!

We sincerely thank the authors of the articles for their contributions to make this issue a success and ***request more contributions from everyone for future issues***.

We would like to extend our gratitude to **Dr. K. Satyamoorthy** for his encouragement and guidance, **Dr. T. G. Vasudevan**, **Dr. Saadi Abdul Vahab** and **Dr. Vidhu Sankar Babu** for their supervision and advice and the **Student Council** for their support.

Lastly, we thank you, for having taken out the time to read through this issue and we welcome more participation, feedback and suggestions for the newsletter.

For any queries and suggestions, please contact us at sls.edboard@gmail.com

Thank You!

- **Harsh Ranawat and Tanaaz Khan**

III Year BSc Biotechnology, II Year BSc Biotechnology

Co-Editors

The Editorial Board

School of Life Sciences, MAHE

2017-2018

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SCIENCE

From Vitalism to Narcissism and more!

Satadal Roy, Deborah Bird, Anushka Ojha (1 Year, MSc MBHG)

In the 18th and 19th century, vitalism was an important topic of discussion among biologists, traditional physicians and other fields of life sciences. Rituals such as the mummification by Egyptians show that the philosophers of ancient Egypt and Greece had known about vitalism. Vitalism, with some modifications, was a topic of interest throughout early modern age also. This can be extended from the work of English anatomist Francis Glisson (16th century) to Louis Pasteur (19th century), who argued that only life could catalyse fermentation. Then, German chemist Fredreich Wohler provided evidence against the theory of vitalism. Using silver isocyanate and ammonium chloride he synthesized urea, which is an organic compound. The theory was rejected since an organic compound was synthesised by two inorganic compounds.

The book 'Organon of Medicine', 6th edition explained the role of vital principle and relationship between vital force and vital principle. In aphorism 10, it is considered that there is a role of vital force and vital principle in health and disease- "The material organism without the vital force, is capable of no sensation, no function, no self-preservation. It derives all sensation and performs all the functions of life solely by means of the immaterial being (the vital principle), which animate the material organism in health and disease". The author also writes, "It is dead, and only subject to the power of the external physical world; it decays, and is again resolved into its chemical constituents "

Now, considering vital principle as the whole genome, and vital force as gene expression, we will easily understand the role of vital force and vital principle in disease and sign and symptoms of disease. According to aphorism 11, "When a person falls ill, it is only this spiritual self-acting (automatic) vital force, everywhere present in his organism, that is primarily deranged by the dynamic influence upon it of a morbid agent inimical to life. It is only the vital force, deranged to such an abnormal state, that can furnish the organism with its dis-

agreeable sensations, and inclined it to the irregular process which we call disease. For, as a power invisible in itself, and only cognizable by its effects on the organism, its morbid derangement only makes itself known by the manifestation of disease in the sensation and functions of those parts of the organism exposed to the senses of the observer and physician, i.e. by morbid symptoms, and in no other way can it make itself known."

Thus, the role of vital force in disease is to produce signs and symptoms. It is the capability of vital principle to "make itself known" to the physician and attendants when the vital force is deranged. By observing the "outwardly reflected pictures of the internal essence of the disease, i.e. of the affection of the vital force physician can make out the totality of the symptoms." It is the only thing that can determine the choice of most appropriate remedy- the personalised medicine.

"Organon of Medicine" described vital force as unintelligent and instinctive. Therefore, when it is affected dynamically, by natural diseases it is not possible for vital force to get rid of by itself. There, physician plays the role, by giving appropriate medicine to influence in such a way that the instinctive vital force is directed in right direction to produce increased amount of energy against it for shorter duration (as now it is medicinally diseased); then the vital force soon overcomes it. Now the vital force is free from medicinal disease and from the previous natural disease as well. Again vital force is able to carry on healthily the vital operations of the organism.

Role of vital force in ageing and death can be explained by telomere theory. In population level studies, it is found that older people have shorter telomere length. Cells with shorter telomeres, can no longer replicate. This affects more and more cells over time, leading to tissue damage and signs of ageing. Shorter telomeres are also associated with several chronic preventable diseases such as hypertension, cardiovascular diseases, insulin resistance, type 2 diabetes, depression, osteoporosis,

sis, obesity, etc. Due to shortening of telomere vital force is deranged and it is not able to continue healthily, vital operations leading to morbid conditions and death.

In aphorism 9, of Organon of Medicine, it is stated that, “In the healthy condition of man, the spiritual vital force, the dynamics that animates the material body (organism), rules with unbounded sway, and retains all the parts of the organism in admirable, harmonious vital operation, as regards both sensations and functions, so that our indwelling reason-gifted mind can freely employ this living healthy instrument for the higher purposes of our existence.”

So, the first property of vital force, is that it is autocratic. It is the one that governs our biological system and there is nothing else above it. Vital force has unrestrained influence over the material organism. It maintains the normal functioning of our body parts. What happens when it stops holding together- things degenerate, they break, they disintegrate and all of this have been observed in relation to chromosome and DNA.

Vital force is responsible for maintaining our body together “as regards both sensation and function” which are the two primary characteristics of living organism that needs energy. The vital energy, that imparts this ability, to sense and function to our body parts and to the organism as a whole. Thus, they work together appropriately, and maintain the equilibrium. The system is so complex at the biological level that to explain it not only genome-wide study but also transcriptome-based and further study of clinical and translational proteomics and metabolomics are necessary.

Healthy vital force guides us to understand the “higher purpose of our resistance”. According to biology and theory of evolution, the primary purpose of all life is to ensure that the life form continues, the genes go to the next generation. But that cannot be the sole purpose of existence, because it means polygamy and lack of social sexual architecture. As we are not just animals, our duty is to be better human being by giving continuous effort. History of human evolution says they did so. Now it is in our hand to contribute some positive effort and it is only

possible when with the help of healthy vital force, “our reason-gifted mind can freely employ this living, healthy instrument for the higher purpose of our existence.”

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NARCISSISM

Shravya Hegde (I Year, MSc MBT)

Narcissism is a term that we are all (mostly) familiar with, but would not, perhaps, admit to possess. I have been pondering over this situation of late and wondering why being a narcissist is considered as a very negative thing, while self-love and self-worth are continuously intensified. Is narcissism not a part of self-love or should we really consider ourselves selfish and “not normal”?

Narcissism is the extreme selfishness, with a grandiose view of one’s own talents and a craving for admiration, as characterizing a personality type. Accordingly, if we take the phenomenon of self-interest and observe it in its most basic form (scientifically speaking), we come to the Darwinian concept that equates it to the survival of the fittest. Going further on this concept, a more severe form of self-interest, known as ‘selfishness’, produces excessive concern with oneself. The obsessive need to maintain a relatively positive self-image triggers a person’s need for validation and self-enhancement experiences from the environment. But, selfishness is not considered pathological. On the other hand, when self-interest reaches its peak, it is considered as narcissistic personality disorder (NPD), which represents a pathological complex that is self-reinforcing and causes a detrimental effect on the individual.

This said, just because we admire ourselves a little too much, do we become a pathological idiot? Over the years many psychologists and researchers have come up with various theories to help understand the principle behind narcissism. Now, without going into the details of the history behind the whole concept (because nobody got time for that, right?), but one interesting thing to note is the theory put forward by Heinz Kohut in the early 70s. According to this theory, narcissism helps people to suppress feelings of low self-esteem and develop a positive sense of self. It is like an escape from the reality. Along with all this, there is this thing called “grandiose self”, which is the feeling of the “I am perfect” self-image that people carry around on their

sleeves (and their selves). Now, this is possibly a serious mental sickness and is termed “malignant narcissism”, which is a more magnificent and behavioural regulation, lacking in conscience with characteristic demonstrations of joyful cruelty and sadism. While narcissists are common, malignant narcissists are less common. Though the narcissists take advantage of people for their benefit, they show guilt for doing so and regret for the harm they have caused. Maybe that makes all the difference.

Living in the generation of such massive upsurge of social media and the celebrity fashion models being deemed popular and significant, can we really blame ourselves for being narcissistic? This is the “Me Me Me Generation”, wherein we are made noteworthy based on the number of likes we get on our selfies and the right swipes on our Tinder profiles. In this world, where everyone is just competing and trying to get better than others, why not be a little narcissistic and make ourselves feel good?

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THE SCIENCE BEHIND DEPRESSIVE DISORDERS

Ramya Gupta (I Year, MSc MBHG)

“You can’t defeat measles by *thinking really positively*.”

A quick Google search – ‘is depression real?’ – will lead you to a wonderful article by JR Thorpe (in Bustle) titled ‘How to Explain Depression to People Who Don’t Believe It’s Real’. The aforementioned quote from this article summarizes what sufferers have to deal with for lack of societal awareness.

In 2017, The World Health Organization (WHO) estimated that more than 56 million people suffer from clinical depression (also called major depression) in India. In their 2016-17 report to the Union Ministry of Health and Family Welfare, the National Institute of Mental Health and Neurosciences (NIMHANS) pegged this statistic at an even higher 132 million people, which is about 10% of the Indian population.

Depression is not the equivalent of sadness. Every person, at some point in their lives has experienced negative emotions such as sadness or loneliness. While depression is a disorder characterised by these emotions, it negatively affects one’s daily functioning and ability to be productive. Symptoms of the disorder include insomnia/hypersomnia, lack of interest in activities that were previously enjoyable (also called anhedonia) and loss of appetite, headache, weakness and/or lethargy, chronic pain, weight loss/gain, emotional instability among others. Sufferers are often unable to care for themselves or maintain a basic routine, hygiene and cleanliness and an appropriate sleep/wake cycle. This makes them susceptible to several other illnesses including common skin infections, digestive imbalances, lowered immunity from lack of proper sleep and diet. Performance at work and interpersonal relationships could be affected, causing several financial and social implications for patients, making it difficult for them to talk about the illness.

Over the years, several psychological, social and biological theories have been put forward to explain the pathogenesis of this disorder.

The most commonly prescribed drugs to manage depression are SSRIs (selective serotonin reuptake inhibitors) and SNRIs (selective norepinephrine reuptake inhibitors). These are based on the monoamine deficiency hypothesis which states that depression is caused by a deficiency of the monoamine neurotransmitters serotonin and norepinephrine. SNRIs and SSRIs function by inhibiting the reuptake of these neurotransmitters by neuronal cells thereby, increasing their concentration in the brain.

However, in recent years, many have questioned the monoamine deficiency hypothesis because of the inability of SSRIs and SNRIs to have a therapeutic effect on all patients. It also takes a long time for them to exert this therapeutic effect once they have been administered. The monoamine deficiency hypothesis is unable to explain these phenomena, which has lead scientists to examine other possible causative mechanisms.

Some of the interesting theories that have been put forward involve neurogenesis, neuroinflammation and the involvement of even gut microbes. It has been seen that the rate of neurogenesis (formation of new neurons) is decreased in depressed people. Inflammation in certain parts of the brain may also have a role to play. In fact, some have even suggested that general immune system hyperactivity may have a connection with depression. Scientists are investigating the link between the intestinal flora and the development of depression. It is unclear whether these occurrences are causes of effects of the disease, or if they merely have an indirect association with them. These are some of the active areas of research to help develop medication and other therapeutics for the benefit of people with depression.

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A NEW ORGAN IN THE HUMAN BODY

Shravya Hegde (I Year, MSc MBT)

Science is funny at times. Science gives us the power and the knowledge to explain every single thing in this universe. However, the state of scientific knowledge does not always make much sense. We know more about the surface of Mars than we do about the bottom of our oceans. And yet we are more interested in sending more spaceships and figuring out the possibilities of Multiverses. Scientists have figured out almost every bizarre quantum force but still fail to completely understand gravity.

Recently, scientists stated that they are still discovering new human organs. Its kind of a weird situation that its about a million years of evolution of mankind and we are still not familiar with our own body. It got even uncanny when doctors recently found an organ that is literally everywhere inside us. It is called the **Interstitialium** and it could be the key to understand various medical mysteries such as skin wrinkles and the reason why cancer spreads.

Interstitialium is a large network of fluid-filled spaces that surround our lungs, digestive tract, blood vessels and various other organs.

Like most scientific discoveries, this was also an accident that came into light during a pCLE (probe-based confocal laser endomicroscopy) of a patient's bile duct for cancer.

With the help of this laser technology, the doctors noticed the presence of a series of interconnected, fluid-filled cavities in the surrounding tissue layer that did not match anything familiar. When these tissues were examined by a pathologist by slicing them into thin sections and viewed under a microscope, these cavities had disappeared. Strange huh?! This baffled the doctors into thinking, how can cavities that were visible in a laser microscope not be visible under a compound microscope.

Therefore, a research team was recruited, and the same tissues were extracted from the bile ducts of cancer patients. Again, these connective tissues were clearly visible in the endomicroscopy. Before observing under mi-

croscope, the tissues were frozen and later sliced into pieces and there it was, the fluid-filled cavities present and visible. Once visible, their presence was easy to uncover throughout the body. These were present in the fascia between muscles, around veins and arteries, below the surface of the skin, lining of the digestive tract, around lungs and urinary system.

Now, medical science has known about interstitial fluid for a long time, but to define the network which holds this interstitial fluid as an organ is a ground-breaking discovery. This also unlocks a few mysteries as to explain why cancer is more likely to spread to the lymph nodes once it has entered the spaces.

The interstitium is the source of lymph, a fluid that contains infection-fighting immune cells, which drains into the lymphatic system.

Such discoveries about our human body often remind us that Science does not go as planned, and more often than not the little chances, luck and mistakes made lead to some of the most interesting discoveries.

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INTERVIEWS

Of those who know better.

Dr. Elena de la Casa Esperón

Tanaaz M Khan (II Year, BSc Biotechnology)



Dr. Elena de la Casa Esperón is an investigator at the Castilla-La Mancha Science and Technology Park in the Regional Centre for Biomedical Research (C.R.I.B), Spain. She is also an Associate Professor at the School of Pharmacy of the University of Castilla-La Mancha, Spain. Dr. Elena visited SLS during May 7-17, 2018 through an Erasmus Mundus mobility program equipped with a Teaching Fellowship. She delivered seminars on “Studying and Research abroad” as well as a lecture on “Environmental exposures cause sperm changes with potential consequences on fertility and offspring health” to the research scholars and students of SLS. The Student Council of SLS had the opportunity to interact with Dr. Elena and here is a summary.

Dr. Elena began her scientific career at the University of Salamanca, Spain from where she completed her BSc, Masters and her PhD (1997). In 1997, she moved to Philadelphia, USA to pursue her interests in genetics at the Fels Institute for Cancer Research and Molecular Biology, Temple School of Medicine. She worked on phenomena that do not follow classic Mendelian genetics such as genomic imprinting, meiotic drive, transmission ratio distortion etc. During that period, she delved into the field of epigenetics as well. She was appointed as an Assistant Scientist in 2001 in the same institute. In 2005, she was hired by the Texas Arlington University, USA as an Associate Professor where she taught undergraduate and postgraduate courses. She carried on her work as an independent investigator continuing her studies in genetics using mice models in evolutionary studies. She moved back to Spain in 2010 where she currently works at the University of Castilla-La Mancha.

Her interest in epigenetics was sparked when she found out that some epigenetic changes could be transmitted

to several generations. This is an exception to the fact that most epigenetic changes are tightly regulated, and these modifications are usually reset. These exceptions are usually normal processes such as imprinting which occurs due to differential marks obtained during gametogenesis; such changes going beyond the exposed individual. Even though epigenetic changes were being researched adequately, the very idea of these exposures affecting multiple generations was relatively new and this is where her motivation to work in this field came from.

The main basis for her work in epigenetics began from her research years in the USA, wherein she studied the consequences of epigenetic changes during the formation of ovum and sperm (gametogenesis) and during the preliminary stages of embryogenesis and its long-term effect on the offspring. She found that recombination events are strongly influenced by exposure to endocrine disruptors such as bisphenol-A which is commonly found in plastic. Recombination failure could lead to aneuploid offspring. This is responsible for de-

crease in fertility in healthy individuals and these epigenetic changes do have a possibility of being transmitted to further generations resulting in the inheritance of phenotypic changes. Currently, her laboratory is involved in assaying diverse diets for their effect on meiotic recombination and fertility.

On asking her about her advice to upcoming research-oriented students, she suggests patience and perseverance in work because things may not always go well or to plan. She stresses the importance of reading a lot and discussing ideas with peers, which could lead to designing novel approaches and identifying pitfalls in work. She believes that a student must develop a scien-

tific mind to pursue a career in research, but which is also an important skill for life. She also says that developing the mind with wisdom and compassion would help in every aspect of their life.

Opportunities for studies abroad: There are many exchange programs for students through MAHE, Manipal to go to Spanish Universities such as the University of Castilla-La Mancha. Some programs are specific to Pharmacy students such as the Student Exchange Program (SEP) mostly for BSc students. Opportunities for PhD and Post-Doctoral fellowships can be found at the International Relations Office of Spanish universities and Research institutes itself.

KNOW YOUR LABS

An attempt to inform you of the history, research and people here at the School of Life Sciences, MAHE, Manipal

DEPARTMENT OF BIOTECHNOLOGY

Dr. Padmalatha Rai

Professor & HOD

Molecular Genetics & Pharmacogenomics

Dr. TG Vasudevan

Associate Professor

Industrial Biotechnology

Dr. TS Murali

Associate Professor

Microbiology

Dr. Saadi Abdul Vahab

Professor

Molecular diagnostics & Pharmacogenomics

Dr. Roopa Nayak

Assistant Professor

Chemical kinetics & Organic Synthesis



Deepika Bhat

PhD Scholar

Dipashri Patkar

PhD Scholar

Navya Prabhu

PhD Scholar

Pallavi Birajdar

PhD Scholar

Apoorva Jnana

Junior Research fellow

Sandhya

Technician

Manik Vohra

PhD Scholar

Anu Radha Sharma

PhD Scholar

Anjali Warriar

PhD Scholar

Vigneshwaran

Junior Research fellow

Anzil Bava

Research Assistant

Rajesh Rao

Technician

Harish U

Technician

Keerthi

Technician

The Department of Biotechnology was started in 2002, under Kasturba Medical College, MAHE and is thus an integral part of SLS, since its inception. Currently, the department is being headed by Dr. Padmalatha S Rai, who is also the Associate Director (Academics) of the School of Life Sciences. The department is involved in three major activities which include research, teaching and molecular diagnostics. In terms of research, the department is carrying out work on genomics and epigenomics of communicable as well as non-communicable diseases. Most of the programs within the department are focused on the identification and development of population specific biomarkers for disease predisposition and the drug response in malaria, diabetes, cardiovascular diseases and epilepsy.

Dr. Padmalatha S Rai and her team of researchers are working on Type 2 Diabetes, looking at allele specific gene expression signatures as biomarkers for metformin and sulfonyl urea drug response, in a project funded by SERB, Government of India. Her team is also working on elucidating the effect of bisphenol A, a chemical commonly found in plastics on the endocrine system and its related disorders especially Polycystic Ovary Syndrome. In addition to this, her team is also working on a DBT, Government of India funded project on marker generation and authentication of important medicinal plants in ayurvedic pharmacopoeia of India using Next Generation Sequencing technology. Dr. Saadi Abdul Vahab had been researching malaria and is currently investigation susceptibility and resistance factors to malaria, using variations arising due to genetic changes, in different populations through a project funded by ICMR, Government of India. He and his students are also working on studies looking into the variations associated with methylation signatures that affect the severity of disease in asthma patients. The disease specific research has yielded favorable results that have

been translated into quality molecular diagnostic tests. Dr. Roopa Nayak is working on the synthesis of heterocyclic compounds and screening for its cytotoxic and other biological properties.

Microbiology has been a recent endeavor of the department. Dr. TS Murali is associated with two types of research work based on funded projects. The first project looks at diabetic foot ulcers and its associated complications due to bacterial growth in the wounds. They have used next generation sequencing techniques to look at the antimicrobial resistance profiles of the associated pathogens. The other project involves fungal endophytes in plants. Since plants produce secondary metabolites, these fungi could be used to do the same without the need for extraction from the plant itself. This provides us with a novel and useful technique to obtain products of use from plants. Dr. Vasudevan is working on the characterization of flower extracts of *Ixora* species for its bio medicinal properties. He is looking to translate this research into beneficial scientific applications.

Research in the department involves a number of inter and intra-institutional collaborations, especially with clinicians and other related departments and companies both within and outside the country. There are many international collaborations with universities such as Flinders' University, University of New South Wales, University of Queensland, Australia as well as Stellenbosch University, South Africa.

On the academic side, the faculty members are actively involved in teaching students from the various courses that are being offered in the institute. The courses are BSc Biotechnology, MSc Molecular Biology and Human Genetics, MSc Medical Biotechnology, MSc by Research in Life Sciences, MSc in Bioinformatics, PG Diploma in Cellular and Molecular Diagnostics. Faculty members also teach other MAHE institution programs such as

BDS, MBBS, MDS, BSc and MSc Nursing and para-clinical MSc programs.

On-going Research Projects:

- Evaluation of the impact of allele specific gene expression on therapeutic response to oral hypoglycemic drugs in type 2 diabetes- Dr. Padmalatha Rai, Mr. Manik Vohra
- Marker generation and authentication of important medicinal plants in Ayurvedic pharmacopoeia of India Using next generation sequencing technology- Dr. Padmalatha S Rai, Ms. Dipashri Ramesh Patkar
- Elucidation of molecular mechanisms of bisphenol A in the pathogenesis of polycystic ovarian syndrome– Dr. Padmalatha S Rai and Ms. Navya Prabhu
- Pharmacoepigenetic modulation by miRNA’s of anti-platelet drug response in individuals with cardiovascular diseases- Dr. Padmalatha S Rai and Ms. Anuradha Sharma
- Effect of allele specific DNA methylation in folate pathway genes in type 2 Diabetes- Dr. Padmalatha S Rai, Mr. Manik Vohra
- Study of role of human factors for susceptibility and host parasite interaction during erythrocyte phase of infection by *Plasmodium falciparum* for diagnosis and therapy of malaria- Dr. Saadi Abdul Vahab, Mr. Anzil P Bava
- Variations associated with methylation in Asthma- Dr. Saadi Abdul Vahab
- Characterisation of antimicrobial resistance profiles in diabetic foot ulcers- Dr. TS Murali
- Functional role of endophytes in overcoming stress and in eliciting host derived secondary metabolites– Dr. Murali, Ms. Deepika Bhat
- Evaluation of the impact of allele specific gene ex-

pression on therapeutic response (Metformin therapy)- Dr. Padmalatha S Rai, Ms. Pallavi Arjun Birjdar

- Quorum sensing and multi drug resistance in polymicrobial films- Dr. TS Murali, Ms. Anjali Warriar
- Microfluidic based detection of microbial communities and antibiotic responses in the management of diabetic foot ulcers– Dr. TS Murali, Ms. Apoorva Jnana, Mr. Vigneshwaran Muthuraman
- Epigenetic alteration of endophytic fungi in continuous production of post-secondary metabolites– Dr. TS Murali, Dr. Sukesh (Post-Doctoral study)

“ You can be competent by doing well in your exams and not only exams but also by getting good publications. All of this requires dedication”

- Dr. Padmalatha S Rai

(Head, Department of Biotechnology, SLS)

DEPARTMENT OF CELL AND MOLECULAR BIOLOGY

Dr. K Satyamoorthy

Professor & HOD

Cancer Epigenetics & Diagnostics

Dr. Moka Rajasekhar

Professor

Human Cytogenetics & Diseases

Dr. Shama Prasada K

Associate Professor

Epigenetics & Molecular markers

Dr. Sanjiban Chakrabarty

Assistant Professor

Cancer Biology & Mitochondrial genetics

Dr. Sudharshan Prabhu

Assistant Professor

Molecular Biology



Sathvik Upadhyya

PhD Scholar

Guruprasad

PhD Scholar

Keshav Prasad

PhD Scholar

Ravi Prasad

PhD Scholar

Supriti Ghosh

PhD Scholar

Prabhod Kumar

PhD Scholar

Vinay K. V.

PhD Scholar

Divya Adiga

PhD Scholar

Jishnu P. V.

Junior Research Fellow

Shreesha Bhat

PhD Scholar

Neena George

PhD Scholar

Dinesh Ragunathan

PhD Scholar

Sundar

Senior Technician

Rajesh

Technician

Sandhya

Technician

Soumya

Technician

Geetha

Senior Technician

Shobha

Technician

Centre for Cell and Molecular Biology was established in 2001 under the “Science Centre”. Over the years the lab has grown from being one operational room to be an integral body of the institute. Initially backed by MAHE and funded by the US, work began on DNA genetic suppressor elements. Growing over time the lab started a diagnostic service and in 2004, it opened its doors to the first BSc Biotechnology batch for teaching.

The department, headed by our Director, Dr. K Satyamoorthy, primarily focuses on early diagnosis and treatment of various diseases. The varied collaborations the department has, allows exploration of new horizons. One of the important aspects dealt with is cancer and DNA methylation, wherein research work has identified 11 genes with diagnostic potential for cervical cancer. The work had identified DOC2B gene to be downregulated by DNA methylation, which could be an equivocal marker in early diagnosis of cervical cancer (patentable discovery). Currently, research in the department is focused on understanding why this gene is dysregulated and the functional and signaling pathways that are altered.

The characterization and evolution of miRNA, miRNA cluster dysregulation in cervical cancer and its functional significance are also being researched. The results are expected to facilitate identification of disease specific gene(s) discovery, evolve epi-pharmacogenomics principles and aid in future drug development.

The department also focuses on breast cancer and its associations with mitochondrial biogenesis (alteration in mitochondrial number) and mitochondrial alterations. Deciphering the various mechanisms and proteins such as T-fam, which regulate mitochondrial number, can result in diagnostic and therapeutic applications. Studying the role of mitochondria and associated proteins that play a role in chemoresistance in triple negative breast cancer has relevance and importance due to high inci-

dence of development of chemoresistance in women aged 20-30 years.

Another project looks at various DNA repair pathway proteins and their role in neurodegenerative disorders. This program is in collaboration with the University of Sheffield, UK.

Another integral part of the department is looking at Cytogenetics and Diagnostics. Various prenatal and post-natal samples are examined for karyotype whose results are used by clinicians for diagnosis to KMC. Thus, the lab looks at various numerical or structural abnormalities in the samples. Along with screening for chromosomal abnormalities the lab also looks at gene involved in Cardiomyopathy using Sanger Sequencing and use of NGS technology (Next Generation Sequencing). The research is of much appliance when looking at frequency of various chromosomal abnormalities on the population concerning infertility, abortions etc.

On-going Research Projects:

- Karyotyping and cytogenetics in human genetic disorders– Dr. Moka Rajasekar
- Mechanisms of mitochondrial biogenesis in breast cancer– Dr. Sanjiban Chakrabarty
- DOC2B and its functional significance in cervical cancer- Dr. Shama Prasada K
- Ferroptosis (ferrous induced programmed cell death) and its activation- Dr. Sudharshan Prabhu
- Deregulation of miRNA in cervical cancer: Control by DNA methylation- Dr. K Satyamoorthy, Mr. Vinay Koshy Varghese
- Characterisation and functional evolution of miRNA in cervical carcinogenesis- Dr. K Satyamoorthy, Mr. Vaibhav Shukla
- Functional and structural characterization of snake venom Proteins from *Bothrops sp.* with angiogenic

- potential- Dr. K Satyamoorthy, Mr. Shreesha Bhat
- Determination of the synergistic roles of viral coinfections in cervical neoplastic transformation- Dr. K Satyamoorthy, Ms. Supriti Ghosh
- Investigating the IGF-I signaling pathway in UV-B photoprotection using 2-D and 3-D skin models- Dr. K Satyamoorthy, Ms. Melisa J Andrade
- Mechanisms of differentiation by phytochemicals in brain tumors- Dr. K Satyamoorthy, Mr. Keshava Prasad
- Epigenetic antagonism oncogenicity and association with senescence of chromatin modifiers in human cancers- Dr. K Satyamoorthy, Ms. Neena George
- Influence of inflammation on epigenetics in cancer cells- Dr. K Satyamoorthy, Mr. Guruprasad
- Investigation of neurodegeneration associated with defective DNA break repair- Dr. K Satyamoorthy, Ms. Sima Chaudhari
- Genetics and clinical correlates of cardiomyopathies - Dr. Moka Rajasekar, Mr. Prabodh Kumar
- Role of double C2 like domain containing protein beta as a regulator of senescence and WNT signaling— Dr. Shama Prasada K, Ms. Divya Adiga
- Regulation of mitochondria by microRNAs in breast cancer- Dr. Sanjiban Chakrabarty, Mr. Raviprasad K V
- To study the structure and function of mitochondria in Intrauterine growth restriction (IUGR) pregnancy. - Dr. K Satyamoorthy, Mr. Akheel Anees
- Investigation of neurodegeneration associated with defective DNA break repair- Dr. K Satyamoorthy, Mr. Dinesh Regunathan

“You have probably been told about the need for hard work, sincerity of purpose and focus. In addition, be true to yourself and we are there to help you to best of our abilities.”

- Dr. K Satyamoorthy

(Head, Department of Cellular and Molecular Biology, SLS)

COMPILED BY:

Akash Rajagopal (II Year, BSc Biotechnology)

Tanaaz M Khan (II Year, BSc Biotechnology)

Mayukha Bathini (I Year, BSc Biotechnology)

Yash Goel (II Year, BSc Biotechnology)

Harsh Ranawat (III Year, BSc Biotechnology)

CREATIVE CORNER

Straight out of the right cerebrum.

A RESPONSIBILITY THAT YOU OWE

Luke Zeon DaCosta (III Year, BSc Biotechnology)

You owe it to yourself.

You owe it to the opportunities that you have.

You owe it to all the things that you're blessed with.

You owe it to all the people who have it worse.

You owe it to this world.

You owe it to your ancestors who hunted in the Savannah.

You owe it to future generations that will live among the stars.

You owe it to all the good you can do.

You owe it to all the kindness you can spread and you owe it to all the people waiting for you to do so.

You owe it to the places you can go and you owe it to the person you can become.

You owe it to all the success you can earn.

You owe it to all the greatness you can achieve.

You owe it to yourself.

Now go work for it.

PHOTOS



"To beautify the world, let your love bloom like a flower"

-Shiksha Saraogi
(1 Year, BSc Biotechnology)

"Reality is merely an illusion, albeit a very persistent one"- Albert Einstein

-Shiksha Saraogi
(1 Year, BSc Biotechnology)





Lighthouse, Kaup Beach

N Ram Sai (II Year, MSc Bioinformatics)

Perceptions



EVENTS

A lot has been happening.

SYMPOSIUM: *Advances in Biomedical Optics and Applications*"

Talitha Keren Kurian, Archica Gupta (II Year, BSc Biotechnology)



The Manipal Student Chapter of Optical Society of America (OSA) conducted a one-day Symposium on "*Advances in Biomedical Optics and Applications*" on March 22, 2018 at the Dr. TMA Pai Hall, KMC, Manipal.

The event was inaugurated by Dr. H Vinod Bhat (Vice Chancellor of Manipal Academy of Higher Education, Manipal), Dr. Fu-Jen Kao (Professor from National Yang Ming University, Taipei, Taiwan; Travelling lecturer from OSA) and Dr. K. Satyamoorthy (Director of School of Life Sciences, MAHE, Manipal) in the presence of Dr. MS Valiathan (National Research Professor, Government of India and former Vice-Chancellor, MAHE, Manipal). In his inaugural address Dr. Bhat stressed the importance of student chapters that are currently active in the university and lauded the outreach activities of the Manipal OSA Student Chapter with schools in the region. Dr. Kao listed the importance and role of the optics in biomedical applications and wished more students to become involved in studying this field. Earlier, Ms. Bhargavi Karna (President, Manipal OSA Student Chapter) welcomed the dignitaries and the delegates.

There were total of seven esteemed researchers who spoke on biomedical optics and its prospects in the field of biotechnology. Dr. Fu-Jen Kao spoke about 'Conceiving the Future of Optical Microscopy'. Dr. Siva Umopathy (Professor from IISc, Bengaluru) talked about 'Laser spectroscopy applications to biology and medicine'. Dr. Renu John (Associate Professor from IIT, Hyderabad) gave a talk on 'Biomedical Optical Imaging and Microscopy: Clinical Applications'. Dr. KK Mahato (Professor from School of Life Sciences, MAHE, Manipal) talked about the 'Scope of Autofluorescence in Biomedical Investigations'. Dr Naveen Balla (Research fellow from Trinity College, Dublin, Ireland) shared his views on 'Nonlinear Optical Microscopy for Functional Imaging'. The delegates also gained insight from the Young Professional Talks given by Dr. Khageswar Sahu (Scientific Officer, Raja Ramanna Centre for Advanced Technology, Indore) and Dr. Abhijit Roy (IISc, Bengaluru). In addition, the gathering also witnessed a talks by student members Ms. Priyanka Ashish (Winner of the poster presentation), Ms. Aadhyaa Setya and Mr. Yash Goel. Ms. Malavika Rajeev recapped the activities of the Manipal OSA Student Chapter since its conception in 2016.

The Manipal OSA student chapter, established in August 2016, is an independent student body with about sixty members at present. The purposes of the Manipal Student Chapter are scientific, technical and educational, and their commitment to long-term learning and advancing knowledge and technology is the driving force behind its initiatives, such as science displays and competitions.

The symposium was preceded by a workshop at the School of Life Sciences, where the attendees were given a demonstration and hands-on training in laser induced fluorescence, polarimetry, and quantitative confocal imaging.

CLOTHES DONATION DRIVE

Syeda Inaas (II year, BSc Biotechnology)



The social committee of School of Life Sciences headed to the Beedinagudde Slum (Near Just Bake) on the March 20, 2018. There were two motives: give away clothes to the needy and bring smiles on their faces! The social committee, along with Shiksha Saraogi, Anish Aithal (I Year, BSc Biotechnology) and Humaira Shah, Soumyabrata Banik (II Year, BSc Biotechnology) left the campus at 4:45 pm and reached the slum at 5 pm. The university vehicle entered the premises of the slum along with the smiles on the faces of the kids and the adults. The kids were curious about what we had brought along in the vehicle. We gave away clothes, bags and footwear collected from the faculty and students of the college over a period of one month. The recipients of the articles were excited and were seen trying on the articles. The happiness was contagious. We returned back to the campus with empty cartons and content hearts.

ANNUAL DAY 2018

Kanaya Bhattacharya (II Year, BSc Biotechnology)



The day every one awaits, Annual Day/College Day was celebrated on April 27, 2018. The venue for Annual Day was Fortune Inn Valley View., where the place was filled with the students, research scholars and faculty of the institution, the women dressed in different colours and the men dressed in elegant formals. The day commenced with reminiscence over the events that happened throughout the academic year, marked a lot of wins and a lot of new experiences. The guest speakers were Dr. Taslimarif Saiyed (CEO & Director, Centre for Cellular and Molecular Platforms, Bengaluru), Mr. Sathyadeep Vishwanathan (BigTec Labs, Bengaluru) and Dr. Vinod Bhat (Vice-Chancellor, MAHE, Manipal)

The cultural events featured a skit by the MSc first years, musical performances by the BSc second years, a flash mob by the third years of the UG students, a musical trio by the MSc folks and a comical skit by the research scholars. There were several beautiful individual dance performances by the students of SLS and the highlight of the evening was a hilarious adaptation of 'Bahubali' by our fun-loving faculty members. There was a grand feast arranged for all students, researchers, staff, faculty members and families at the venue. The evening was filled with a lot of fun and frolic and everyone left with smiles and memories, eagerly waiting for the next annual day.

UTSAV 2018

Kanaya Bhattacharya (II Year, BSc Biotechnology)

Utsav 2018 marked the 25th anniversary of the cultural event and thus was called 'Silver Utsav' held from April 2-6, 2018. This year, it was prepared for and arranged with, a lot of grandeur. The 5 day event included Student and Staff events of all sorts, introducing 2 new categories- Folk Dance Group and Stand Up Comedy. The participation of School of Life Sciences, in this year's Utsav was one of the largest and the students' efforts had reflected on and off stage. Utsav is not just a cultural event but a bonding opportunity for teachers and students of different institutions. The highlights of this year's group events were the endangered animal themed Fashion Show, the Indian Singing Group, the newest Creative Jam Group and the Lavani themed Folk Dance. Apart from this, students had participated in almost all the events of Utsav, being a college of a smaller population of students, this year's participation was a new milestone for us, creating memories and new experiences for everyone. The faculty and students are eagerly awaiting the next years Utsav with an even better approach and with a hope of an even better experience as well.



*“Not ignorance, but the ignorance of
ignorance, is the death of knowledge”*

-Alfred North Whitehead