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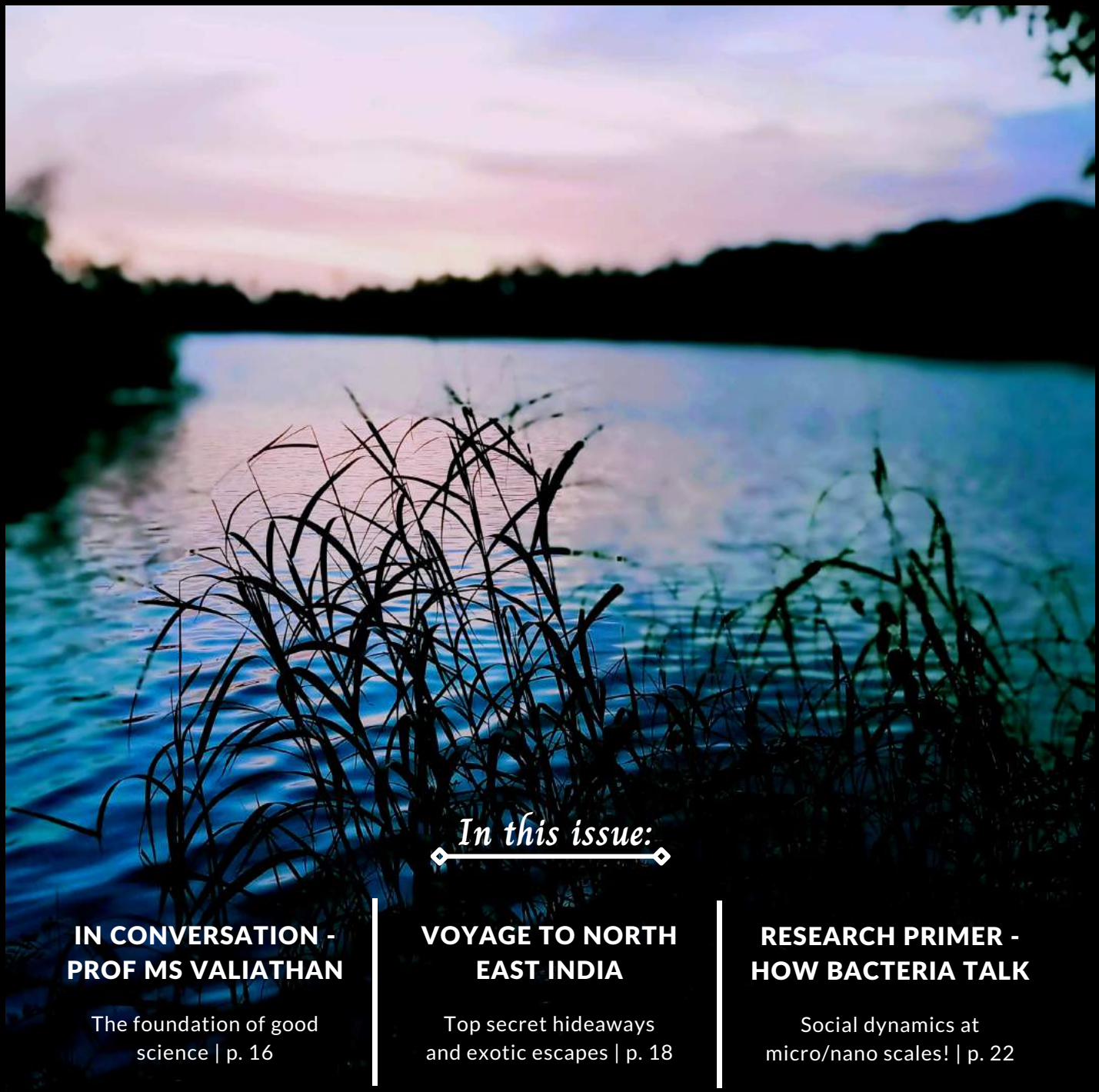
MANIPAL SCHOOL OF LIFE SCIENCES
MANIPAL
(A constituent unit of MAHE, Manipal)

SEP - DEC 2020

VIVUS

BUSY IN EXPRESSION | READY FOR TRANSLATION!



In this issue:

Crosswords, Art, Viral match game and much more!

Editor's note

Dear readers,

We hope this magazine finds you at your best, both physically and mentally. While a lot has happened all around us, here's our humble attempt in this brand-new edition of VIVUS to document the events, lectures and yearly celebrations that have taken place in MSLS in the months of September to December 2020. You will have noticed that we have included a tagline for this edition of magazine. As budding scientists, we are all continuously busy in expression, be it via words in an article or verbal exasperations at machines that are *definitely out to get us*, and often everything gets lost in translation. However, we believe that in the past year, we have done plenty of expression/introspection and are now fired up for our moment of translation! Hence the tagline "Busy in expression, ready for translation".

In this issue of VIVUS, you will find stunning art and photography, thought provoking articles, a cross word (p. 37) and even a fun, match the following game (p. 38). We begin with an inspiring conversation with Prof. M S Valiathan, National Research Professor (p. 16) who describes the cornerstones of good science and provides a scientific outlook on Ayurveda. We highly recommend reading this one for alleviating any research blues. Make sure to follow this up with a fun, light read that mentions about an important aspect of the scientific journey (p. 32). On the exasperating days, please remember to keep hope alive (p.28), tweak your learning strategy (p.33) and keep going because serendipitous help (p.26) might be just around the corner! We also invite you to try your hand at decoupage (p.31). Perhaps your creations could be the feature of the next issue :D

Our featured research focus for this issue is the fascinating mode of communication between tiny microbes. Head straight on to "How bacteria talk" (p.22) to learn how certain bacteriophages eavesdrop on bacterial "talk" to their advantage. Travel restrictions got you down? We invite you to vicariously travel through the beautiful North East of India (p.18). You will not be dissapointed! In the meantime, you may be considering international conferences or even internships at reputable institutions around the world. Want a sneak peek of the experience? We have got you covered with articles from our own who have had held internships at AIST, Japan (p. 24) and Scotland university (p. 29).

Staying topical, we have a highly relatable article that discusses the pandemic stress on students, teachers, parents alike and the commendable efforts by MAHE (p. 34) to address the demands of the "new normal". We end our "Zen pen" section with a lovely "Ode to MAHE" (p. 36) written in Kannada, with an English translation side by side.

"Little drops of water,
Little grains of sand,
Make the mighty ocean
And the pleasant land"
- Julia Carney

We happily present to you Issue 7.1 of VIVUS. This would not have been possible without the contributions, suggestions, time, and efforts of many. We primarily thank our dear Director sir, **Dr. K. Satyamoorthy** for all his enthusiastic ideas and suggestions on the content and design of the magazine. Thank you for your suggestions, sir! We are greatly indebted to our faculty advisors, **Dr T.G. Vasudevan, Dr Vidhu Sankar Babu** and **Dr Saadi Abdul Vahab** for all their helpful suggestions and advice throughout the entire process of bringing this magazine to life. Thank you for your support and time. We heartfully thank the entire editorial team, especially, **Ms. Anjali Warrier, Ms. Sowmya Prabhu, Mr. Ankit Singh Tanwar, Mr. Pradyumna Jayaram, Mr. Sathvik Upadhya** and friends, **Mrs. Debyani Samantray, Ms. Harsha Chandrashekhar** and **Ms. Sushmitha Srinivasan**, for all their support in collation, organization and editing of written content for "Events" and "Worldwide Science" sections. We are immensely grateful for your time and diligence. **Huge shoutout to all the authors, artists, designers, and photographers** for their valuable contributions that forms the "vivus" of the magazine. Thank you for your creativity and effort! We also extend our thanks to all the faculty, research scholars, students, and everyone for their words of encouragement and motivation *"Is it ready yet?"* x100 :D Thank you all, we sincerely hope you like what you see.

Magazine design: Apoorva Jnana
Presenting Vivus - Volume 7, Issue 1
Editorial Board 2020 - 2021
Manipal School of Life Sciences
MAHE, Manipal

VIVUS

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EVENTS

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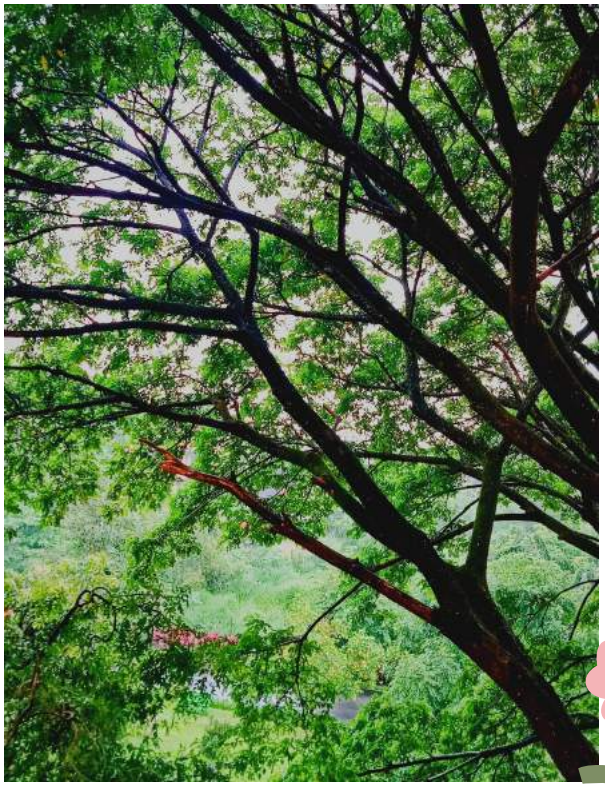


FEATURED

ZEN PEN

Creative nook

Visit
https://sites.google.com/site/everythingatsls/editorial/newsletters
to view/download previous issues

EVENTS

A lot has happened!

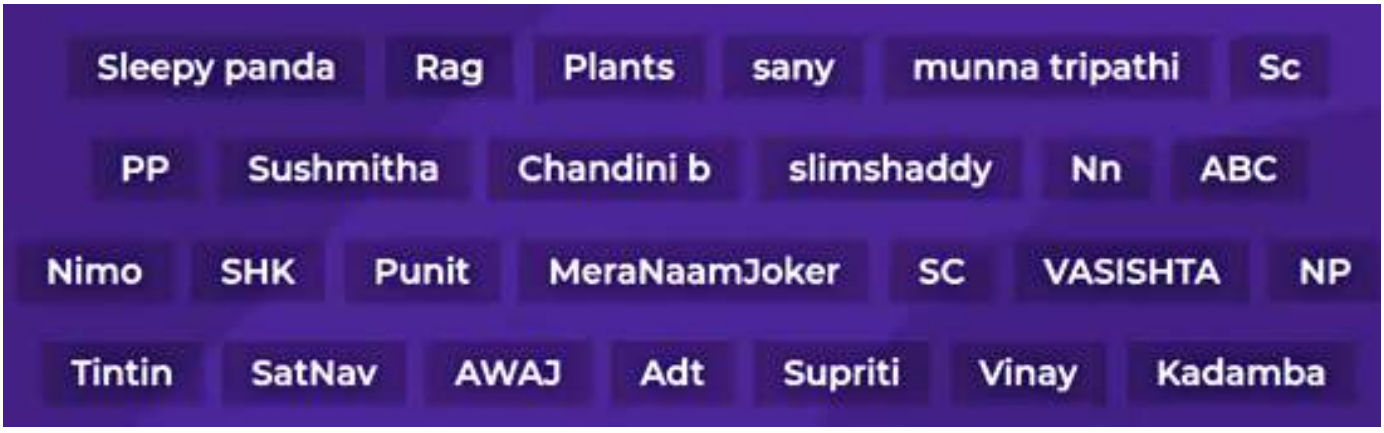
VIGILANCE AWARENESS WEEK

27/11/20 - 02/11/20

Vigilance Awareness Week was observed in the month of November with the theme **"Satark Bharat, Samriddh Bharat (Vigilant India, Prosperous India)".**

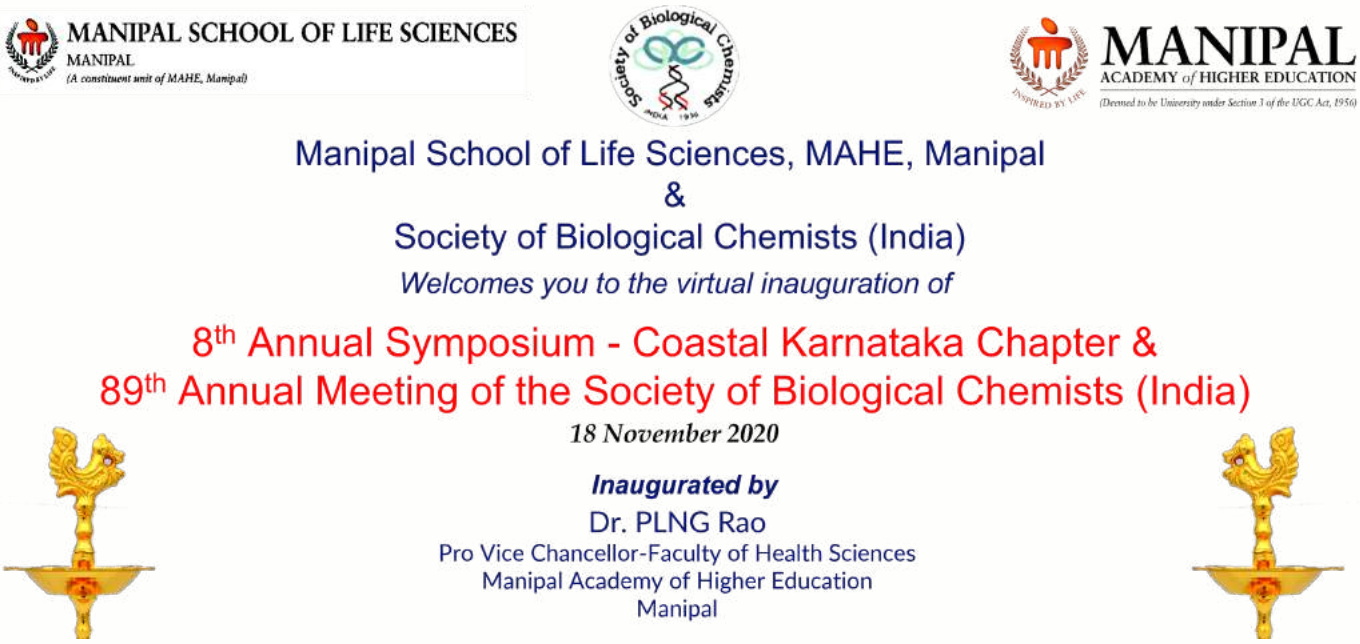
A vigilance awareness quiz was organized via Microsoft teams and Kahoot on October 31, 2020. Several players took part enthusiastically featuring "celebrity" players such as Nimo and even a Sleepy Panda. The quiz had several hard hitting questions (read, *difficult to google*) in a poll response format. Dr Sanjiban Chakrabarty won first place among the forty participants.

The awareness week culminated with an integrity pledge taken by teaching, technical and administrative staff and research scholars of MSLS on November 2, 2020, in the Annex Auditorium.



SOCIETY OF BIOLOGICAL CHEMISTS (INDIA) SYMPOSIUM

18/11/20



In his presidential address, Dr. PLNG Rao (Pro Vice Chancellor, Faculty of Health Sciences, MAHE, Manipal) underlined the importance of budding researchers in contributing to society through their research work, nurtured by senior scientists in the field. He stressed the role played by such symposia in facilitating interactions and inspiring young minds. Dr. Usha Vijayraghavan (Vice President SBC (I), Indian Institute of Science, Bengaluru) provided insight into the activities of SBC(I) and its chapters. Dr. K. Satyamoorthy (Director, Manipal School of Life Sciences) welcomed the gathering and reiterated the scientific community's contribution in unravelling the pathogenesis of the current pandemic as the need of the hour. He pointed out the crucial role played by local chapters of SBC(I) in promoting Indian science. Dr. Manjunath B. Joshi (Associate Professor, MSLS) proposed the vote of thanks.

The one-day symposium included a series of lectures and discussions on various topics related to biological sciences such as epigenetics of mycobacteria, organ-on-chip, host-pathogen interactions, neural mechanism of behaviors and several others delivered by renowned researchers from different parts of India including Dr. V. Nagaraja (IISc, Bengaluru), Dr. Uday Kumar Ranga (JNCASR, Bengaluru), Dr.Sanjiban Chakrabarty (MAHE, Manipal), Dr. Krishna Kumar (NITTE, Mangalore), Dr. Amit Singh (IISc, Bengaluru), Dr. Keshava Prasad (YRC, Mangalore), Dr. Smita Sudheer (CUK, Kasaragod), Dr.Deekshit (NITTE, Mangalore), Dr. S.B. Abraham (MAHE, Manipal), Dr.Gireesh Gangadharan (MAHE, Manipal) and Dr. Vidya Shetty (NITK, Suratkal).

As part of the 89th Annual Meeting of SBC(I), the symposium hosted several prestigious SBC(I) award lectures: Dr. N. Ganesh, IISc, Bengaluru (Sreenivasaya Memorial Award), Dr. M. Dasgupta, UoC, Kolkata (IS Bhatia Memorial Lecture Award), and Dr. S. Kar, CDRI, Lucknow (AN Bhaduri Award). Over 200 researchers and students from coastal Karnataka and various institutes all over India attended the prestigious virtual symposium.

26/11/20

CONSTITUTION DAY / SAMVIDHAN DIVAS

To celebrate the adoption of the Constitution of India, Constitution Day or Samvidhan Divas was observed by the Manipal School of Life Sciences, MAHE, Manipal. Prof. K. Satyamoorthy, Director, MSLS, faculty members, research scholars, students of MSLS, and other constituent colleges of MAHE joined the program on a virtual platform.

The distinguished speaker of the day was Sri Seshadri Chari , Secretary-General, Forum for Integrated National Security (FINS) and member of Planning and Monitoring Board, MAHE, Manipal. In his talk, he articulated the need for a country to have a constitution and briefly outlined the history of the constitution. He described the uniqueness and the flexibility of the Indian Constitution and echoed Dr. B.R. Ambedkar's sentiment that a united front is required to govern this country, in addition to the constitution. He emphasized and encouraged the students to learn about the constitution and pay homage to all the pioneers who worked on this solid framework. Ms. Apoorva Jnana (Ph.D. Scholar, Department of Biotechnology, MSLS, MAHE) introduced the speaker and rendered the vote of thanks.

12/12/2020

DESIGNING PERSONAL HEALTH & CARE - A MAHE-SPARC EVENT

MSLS and PSPH, MAHE Manipal, jointly organized a webinar titled 'Designing Personal Health & Care.' The primary objective of the webinar was to showcase the development in personalized medicine research and provide a platform for interaction between distinguished researchers and young investigators. Dr. K. Satyamoorthy (Director, MSLS) addressed the participants and briefly summarized the webinar agenda. The first talk of this session was delivered by Dr. Helmut Brand (Director, PSPH). He outlined the role of public health in the evolving field of personalized medicine. The advantages of incorporating empathy-centric Design Thinking into the modern healthcare system were astutely described by Dr. Laura Mählmann (Consultant, Health Design Lab, Berlin; Scientific Project Manager, Seerave Foundation; Adjunct Faculty, MSLS). She highlighted the importance of establishing a Health Design Lab that aims to research healthcare workers' and patients' challenges and formulate innovative solutions. The third speaker was Dr. Matthias Reumann (CEO, Connected Health Insights International, Germany; Adjunct Faculty, MSLS), who underscored the need for artificial intelligence in the public health sector to augment existing healthcare system. The last speaker for the afternoon, Dr. Lesley Ogilvie (Scientist,Max Planck Institute of Molecular Genetics, Berlin, Germany; Adjunct Faculty, MSLS) shifted focus to the human gut virome and summarized the role of human virome in health and diseases. At the end of the discussion session, all the speakers gave concluding remarks and summarized the importance of the public healthcare system in the current era.

22/12/20

WEBINAR: LIGHT-MATTER INTERACTION FOR BIOPHYSICS RESEARCH

Department of Biophysics, MSLS, MAHE, Manipal, organized a Webinar on "Light-Matter Interaction for Biophysics Research" to disseminate knowledge regarding the cutting-edge tools and techniques used in the ever-evolving field of Biophysics. It featured insightful talks by eminent speakers such as Dr. Asheesh Gupta (Scientist 'F', DIPAS, Defence Research and Development Organization, New Delhi); Dr. Yury V. Kistenev (Head, Laboratory of Biophotonics, Tomsk University, Russia); Dr. Fu-Jen Kao (Professor, Institute of Biophotonics, National Yang-Ming University, Taipei, Taiwan) and Dr. Salvatore Surdo (Post Doctoral Researcher, Department of Nanophysics, Italian Institute of Technology, Genoa, Italy).

The webinar began with the preamble address by Dr. K.Satyamoorthy, Director, MSLS, MAHE, Manipal, followed by Dr. Gupta's talk on the interaction of light with tissue and the role of photo-biomodulation in wound healing. In his talk, Dr. Kistenev highlighted medical imaging applications. Dr. Fu-Jen Kao added his perceptive discourse on the advances in non-linear microscopy. The webinar ended with Dr. Surdo's talk on the acousto -optofluidic system, a novel tool for the simultaneous shaping and parallelization of a laser beam. The session ended with concluding remarks from Dr. Krishna Kishore Mahato and Dr. Nirmal Mazumder, Department of Biophysics, MSLS, MAHE, and a Vote of Thanks from the MC of the webinar, Mr. Jackson Rodrigues (Ph.D. Scholar, Department of Biophysics, MSLS, MAHE).

ANNUAL AWARDS FUNCTION

23/12/20











Achievers for the year 2019 were rewarded with awards for their efforts in the field of academia, sports and research at the Annual Awards - 2020 function. This year majority of the awards handed were part of the "MSLS Endowment fund", created by pooling of endowments received over the past years with support from Prof. K Satyamoorthy, Director and contributions from primarily Prof. Satish Shetty (Former director of Blood bank, KMC, Manipal), family members of late Prof. J.V. Bhat (Former Head, Department of Microbiology, KMC, Manipal), all contributors to Prof. P.M. Gopinath Endowment Fund, contributed funds of Andrew Kumar Oerthur funds, AEI Endowment Fund, Manipal Academy of Higher Education that has contributed equally to the fund and several others.

BEST ATHLETE MEN	Mr. Shawn Jaison Miranda (B.Sc. Biotechnology)
BEST ATHLETE WOMEN	Ms. Ankitha (M.Sc. Medical Biotechnology)
BEST OUTGOING STUDENT (B.Sc. BIOTECHNOLOGY)	Ms. Sahina Mazumder
STUDENT SCHOLARSHIP (NEW SCHOLARSHIP INCORPORATED FROM 2019 ONWARDS)	
• Ms. Uchil Ashwini Uday	M.Sc. Medical Biotechnology
• Ms. Dharshini G	M.Sc. Bioinformatics
• Ms. Divya Kulala	M.Sc. System Biology
• Ms. Neha Acharya	M.Sc. Molecular Biology & Human Genetics

BEST OUTGOING STUDENT OF M.Sc MEDICAL BIOTECHNOLOGY RECEIVING THE PROF. JV BHAT MEMORIAL GOLD MEDAL FOR 2019: Ms. Apoorva BS (M.Sc. Biotechnology)

BEST RESEARCH SCHOLAR FOR 2019: "Enumeration of deregulated micro-RNA in liquid and tissue biophysics of cervical cancer" Dr. Vaibhav Shukla

BEST TEACHER AWARD FOR 2019: Dr. Shama Prasada

BEST SUPPORTING STAFF FOR 2019: Mr. Harish M

DR TMA PAI GOLD MEDAL FOR OUTSTANDING RESEARCH PROJECT FOR 2019: Mr. Raghushaker CR.

WORLDWIDE SCIENCE

ALUMNI ENGAGEMENT

Dr. SHYAMANTANU DATTA

M.Sc. MBHG 2006-2009

Dr. Datta (MSc-MBHG, 2006-2009), Gene Therapy (Bioassay) Expert Scientist, Roche, Basel, Switzerland, was invited to deliver a virtual lecture titled **"Gene therapy for curing blindness of bench to bedside" on 31st October, 2020.** His talk focused on role of nuclear hormone receptor gene Nr2e3 in modulating gene networks in retinal development, function, metabolism, and cell life span in mice. He emphasized the dependency of disease outcome on a permissive genetic background. He concluded the talk by foreshadowing the existence of a future where personalized medicine will be a prominent treatment modality.

Dr. MERU SHEEL

B.Sc. Biotechnology 2002-2005

Dr. Sheel, Senior Epidemiologist, and Westpac Research Fellow, National Centre for Epidemiology and Population Health, Australian National University, Canberra, delivered a lecture titled, **"What do outbreaks, and pandemics teach us: questions for operational research?" on 28th November, 2020**. She shed light on public health-system failures using two case studies, the COVID-19 pandemic and the 2019 outbreak of measles in the Pacific. She stressed that outbreaks are indicators of societal, economic, public health system failures and that they intersect with the principles of universal healthcare coverages.

Dr. PURI DEEPIKA RAVINDER

B.Sc. Biotechnology 2003-2006 and MSc-MBT 2006-2008

Dr. Ravinder, DST INSPIRE Faculty, National Centre for Cell Science, Pune, India, delivered a lecture titled **"Transcription factor-mediated regulation of repeat elements in stem cells" on 26th December, 2020.** She spoke on the role of FOXD3, a novel transcription factor that influences the expression of repeat elements. In the early stages of embryonic development, the upregulated expression of these elements and other zygotic genes coupled with clearance of maternal transcripts constitutes an intriguing phenomenon called zygotic activation. She elucidated the context-dependent, bimodal role of FOXD3 in mouse embryonic stem cells.

Dr. TOMOHIRO IGUCHI

TSUKUBA UNIVERSITY LIFE SCIENCE INNOVATION | TSUKUBA, JAPAN

Delivered a talk titled "Effect of Fms-like tyrosine kinase 3 (FLT3) ligand (FL) on antitumor activity of gilteritinib, a FLT3 inhibitor, in mice xenografted with FL-overexpressing cells" on 4th November, 2020.

FLT3 inhibitors have been utilized as therapeutic agents against acute myeloid leukemia, as *FLT3* mutations are found in nearly one thirds of AML patients. Dr. Eguchi addressed the complication of drug resistance in *FLT3*-mutated AML patients and elucidated the potential of gilteritinib in thwarting this critical issue.

"DAILAB CAFE Series – 51 via ZOOM"

by

Dr. Tomohiro Eguchi

Tsukuba University Life Science Innovation, Tsukuba, Japan

DAILAB - CAFE SERIES

DAILAB - CAFE (DBT-AIST International Laboratory for Advanced Biomedicine, Classroom for Advanced and Frontier Education) is held once in 6 weeks with an aim of providing a CAFE like environment for study and learning. Frontier topics are selected for CAFE talks that are presented by eminent scientists and are communicated to all the overseas participating institutions via Skype/Zoom. Participating institutions include AIST (Tsukuba, Japan), MSLS (Manipal, India), IIT (Delhi, India), Hanyang University (South Korea), Peking Medical University (China) and Brawijaya University (Indonesia).

Dr. AYANA YAMAGISHI

AIST-INDIA, DAILAB, AIST | JAPAN

Delivered a talk titled "Mechanical function of intermediate filament nestin in highly metastatic mouse breast cancer cell" on 30th November, 2020

Dr. Yamagishi described the relationship between nestin, a type VI intermediate filament protein, and the mechanism of cancer cell metastasis. She shed light on the role of nestin in reducing cell stiffness and promoting metastasis.

GUEST LECTURES

Dr. VANESSA HEARNDEN

LECTURER IN BIOMATERIALS AND TISSUE ENGINEERING, DEPT. OF MATERIALS SCIENCE AND ENGINEERING, UNIVERSITY SHEFFIELD | UK

Dr Hearnden was invited to deliver a talk entitled **"Understanding soft tissue wound healing using tissue engineering" on 30th September, 2020**. In her talk, Dr. Hearnden focused on human adipose tissue and its components and delineated the role of fat in soft tissue wound healing. She also gave us a succinct summary of her ongoing research on the utilization of autologous fat to prevent skin contraction in adult and pediatric burn patients.

Dr. RAVIKIRAN MAHADEVAPPA

POSTDOCTORAL RESEARCH ASSOCIATE, DEPT. OF MICROBIOLOGY AND IMMUNOLOGY, LOYOLA UNIVERSITY | CHICAGO

Dr Mahadevappa was invited to deliver a talk entitled **"DNA replication licensing proteins : Saints and sinners in cancer" on 21st October, 2020**. DNA replication licensing complex is a multi-subunit complex employed to control DNA replication. While their elevated expression is a hallmark of cancer, therapeutic approaches that repress them have shown increased sensitivity to anti-cancer drugs. In his talk, Dr. Mahadevappa delved deeper into this paradox.

RESEARCH HIGHLIGHTS

17/09/20

DINAX - A COMPREHENSIVE DATABASE OF INHERITED ATAXIAS

SIMA CHAUDHARI, RITAM NAHA, SRAVASTI MUKHERJEE, ADDITYA SHARMA, PRADYUMNA JAYARAM, SANDEEP MALLYA ET AL., 2020, COMPUTERS IN BIOLOGY AND MEDICINE

Background: Neurodegenerative disorders such as hereditary ataxia often manifest overlapping symptoms and are likely to be misdiagnosed based on clinical phenotypes. To identify the genes associated with such disorders for diagnostic purposes, geneticists often use high throughput technologies which generate an enormous amount of data on variants whose relevance can be unclear. Besides, analysis and interpretation of high throughput data require gleaning of several web-based resources which can be laborious and time-consuming. To overcome these, we have created a Database for Inherited Ataxia (DINAX), a repository of gene variants from publicly available information.

Methods: DINAX is implemented as a MySQL relational database using the PHP scripting language. Web interfaces were developed using HTML, CSS, and JavaScript. Variant and phenotype information was collected and manually curated from published literature and primary databases such as OMIM and ClinVar. These were further analyzed to decipher expression and pathway analysis.

Conclusion: The database is created to provide a single web source for obtaining information about ataxia related genes. Besides, the database facilitates easy identification of known and reported variants as well as the novel or unreported variants.

DINAX is freely available at http://slsdb.manipal.edu/dinax.

18/09/20

STOKES POLARIMETRY-BASED SECOND HARMONIC GENERATION MICROSCOPY FOR COLLAGEN AND SKELETAL MUSCLE FIBER CHARACTERIZATION

NIRMAL MAZUMDER, FU-JEN KAO, 2020, LASERS IN MEDICAL SCIENCE

The complete polarization state of second harmonic (SH) light was measured and characterized by collagen type I and skeletal muscle fiber using a Stokes vector-based SHG microscope. The polarization states of the SH signal are analyzed in a pixel-by-pixel manner and displayed through two dimensional (2D) Stokes vector images. Various polarization parameters are r**ec**o**ns**tructed using Stokes values to quantify the polarization properties of SH light. Also, the measurements are extended for different input polarization states to investigate the molecular structure of se**con**d harmonic generation (SHG) active molecules such as collagen type I and myosin.

23/09/20

SNPS IN SITES FOR DNA METHYLATION, TRANSCRIPTION FACTOR BINDING, AND MIRNA TARGETS LEADING TO ALLELE-SPECIFIC GENE EXPRESSION AND CONTRIBUTING TO COMPLEX DISEASE RISK: A SYSTEMATIC REVIEW

MANIK VOHRA, ANU RADHA SHARMA, NAVYA PRABHU B, PADMALATHA S RAI, 2020, PUBLIC HEALTH GENOMICS

Introduction: The complex genetic diversity among human populations results from an assortment of factors acting at various sequential levels, including mutations, population migrations, genetic drift, and selection. Although there are a plethora of DNA sequence variations identified through genome-wide association studies (GWAS), the challenge remains to explain the mechanisms underlying interindividual phenotypic disparity accounting for disease susceptibility. Single nucleotide polymorphisms (SNPs) present in the sites for DNA methylation, transcription factor (TF) binding, or miRNA targets can alter the gene expression. The systematic review aimed to evaluate the complex crosstalk among SNPs, miRNAs, DNA methylation, and TFs for complex multifactorial disease risk.

Methods: PubMed and Scopus databases were used from inception until May 15, 2019. Initially, screening of articles involved studies assessing the interaction of SNPs with TFs, DNA methylation, or miRNAs resulting in allele-specific gene expression in complex multifactorial diseases. We also included the studies which provided experimental validation of the interaction of SNPs with each of these factors. The results from various studies on multifactorial diseases were assessed.

Conclusion: The systematic review provides evidence for the interplay between genetic and epigenetic risk factors through allele-specific gene expression in various complex multifactorial diseases.

18/09/20

SIGNALING PATHWAYS PROMOTING EPITHELIAL MESENCHYMAL TRANSITION IN ORAL SUBMUCOUS FIBROSIS AND ORAL SQUAMOUS CELL CARCINOMA

SMITHA SAMMITH SHETTY , MOHIT SHARMA, FELIPE PAIVA FONSECA, PRADYUMNA JAYARAM , ANKIT SINGH TANWAR , SHAMA PRASADA KABEKKODU ET AL., 2020, THE JAPANESE DENTAL SCIENCE REVIEW

Epithelial-mesenchymal transition (EMT) is a critical process that occurs during the embryonic development, wound healing, organ fibrosis and the onset of malignancy. Emerging evidence suggests that the EMT is involved in the invasion and metastasis of cancers. The inflammatory reaction antecedent to fibrosis in the onset of oral submucous fibrosis (OSF) and the role of EMT in its malignant transformation indicates a hitherto unexplored involvement of EMT. This review focuses on the role of EMT markers which are regulators of the EMT mediated complex network of molecular mechanisms involved in the pathogenesis of OSF and OSCC. Further the gene enrichment analysis and pathway analysis supports the association of the upregulated and downregulated genes in various EMT regulating pathways.

RESEARCH HIGHLIGHTS

01/11/20

PLACENTAL MITOCHONDRIAL DNA MUTATIONS AND COPY NUMBERS IN INTRAUTERINE GROWTH RESTRICTED (IUGR) PREGNANCY

RITAM NAHA, AKHEEL ANEES, SANJIBAN CHAKRABARTY, PUNITKUMAR SHANKAR NAIK, MEGHA PANDOVE, DEEKSHA PANDEY, ET AL., 2020, MITOCHONDRIAN

Intrauterine Growth Restriction (IUGR) is a common and significant complication that arises during pregnancy wherein the fetus fails to attain its full growth potential. Mitochondria being one of the primary sources of energy, plays an important role in placentation and fetal development. In IUGR pregnancy, increased oxidative stress due to inadequate oxygen and nutrient supply could possibly alter mitochondrial functions and homeostasis. In this study, we evaluated the biochemical and molecular changes in mitochondria as biosignature for early and better characterization of IUGR pregnancies. We identified significant increase in mtDNA copy number in both IUGR ($p = 0.0001$) and Small for Gestational Age (SGA) but healthy ($p = 0.0005$) placental samples when compared to control. Whole mitochondrial genome sequencing identified novel mutations in both coding and non-coding regions of mtDNA in multiple IUGR placental samples. Sirtuin-3 (Sirt3) protein expression was significantly downregulated ($p = 0.027$) in IUGR placenta but there was no significant difference in Nrf1 expression in IUGR when compared to control group. Our study provides an evidence for altered mitochondrial homeostasis and paves a way towards interrogating mitochondrial abnormalities in IUGR pregnancies.

04/11/20

PHOTODYNAMIC THERAPY TO CONTROL MICROBIAL BIOFILMS

ANJALI WARRIER, NIRMAL MAZUMDER, SUDHARSHAN PRABHU, KAPAETTU SATYAMOORTHY, THOKUR SREEPATHY MURALI, 2020, PHOTODIAGNOSIS AND PHOTODYNAMIC THERAPY

Microorganisms thrive in well-organized biofilm ecosystems. Biofilm-associated cells typically show increased resistance to antibiotics and contribute significantly to treatment failure. This has prompted investigations aimed at developing advanced and novel antimicrobial approaches that could effectively overcome the shortcomings associated with conventional antibiotic therapy. Studies are ongoing to develop effective curative strategies ranging from the use of peptides, small molecules, nanoparticles to bacteriophages, sonic waves, and light energy targeting various structural and physiological aspects of biofilms. In photodynamic therapy, a light source of a specific wavelength is used to irradiate non-toxic photosensitizers such as tetrapyrroles, synthetic dyes or, naturally occurring compounds to generate reactive oxygen species that can exert a lethal effect on the microbe especially by disrupting the biofilm. The photosensitizer preferentially binds to and accumulates in the microbial cells without causing any damage to the host tissue. Currently, photodynamic therapy is increasingly being used for the treatment of oral caries and dental plaque, chronic wound infections, infected diabetic foot ulcers, cystic fibrosis, chronic sinusitis, implant device-associated infections, etc. This approach is recognized as safe, as it is non-toxic and minimally invasive, making it a reliable, realistic, and promising therapeutic strategy for reducing the microbial burden and biofilm formation in chronic infections. In this review article, we discuss the current and future potential strategies of utilizing photodynamic therapy to extend our ability to impede and eliminate biofilms in various medical conditions.

10/11/20

IDENTIFICATION OF CAFFEIC ACID PHENETHYL ESTER (CAPE) AS A POTENT NEURODIFFERENTIATING NATURAL COMPOUND THAT IMPROVES COGNITIVE AND PHYSIOLOGICAL FUNCTIONS IN ANIMAL MODELS OF NEURODEGENERATIVE DISEASES

ARPITA KONAR, RAJKUMAR SINGH KALRA, ANUPAMA CHAUDHARY, AASHIKA NAYAK, KANIVE P GURUPRASAD, KAPAETTU SATYAMOORTHY ET AL., 2020, FRONTIERS IN AGING NEUROSCIENCE

Cell-based screening of bioactive compounds has served as an important gateway in drug discovery. In the present report, using human neuroblastoma cells and enrolling an extensive three-step screening of 57 phytochemicals, we have identified caffeic acid phenethyl ester (CAPE) as a potent neurodifferentiating natural compound. Analyses of control and CAPE-induced neurodifferentiated cells revealed: (i) modulation of several key proteins (NF200, MAP-2, NeuN, PSD95, Tuj1, GAP43, and GFAP) involved in neurodifferentiation process; and (ii) attenuation of neuronal stemness (HOXD13, WNT3, and Msh-2) and proliferation-promoting (CDC-20, CDK-7, and BubR1) proteins. We anticipated that the neurodifferentiation potential of CAPE may be beneficial for the treatment of neurodegenerative diseases and tested it using the Drosophila model of Alzheimer's disease (AD) and mice model of amnesia/loss of memory. In both models, CAPE exhibited improved disease symptoms and activation of physiological functions. Remarkably, CAPE-treated mice showed increased levels of neurotrophin-BDNF, neural progenitor marker-Nestin, and differentiation marker-NeuN, both in the cerebral cortex and hippocampus. Taken together, we demonstrate the differentiation-inducing and therapeutic potential of CAPE for neurodegenerative diseases.

RESEARCH HIGHLIGHTS

10/11/20

DNA DEMETHYLATION OVERCOMES ATTENUATION OF COLCHICINE BIOSYNTHESIS IN AN ENDOPHYTIC FUNGUS DIAPORTHE

VISHWANATH BHAT DEEPIKA, MANIK VOHRA, SUMIT MISHRA, KAVITA DORAI, PADMALATHA RAI, KAPAETTU SATYAMOORTHY ET AL., 2020, JOURNAL OF BIOTECHNOLOGY

Fungal endophytes, a major component of the plant host microbiome, are known to synthesize plant-derived metabolites in vitro. However, attenuation of metabolite production upon repeated sub-culturing is a major drawback towards utilizing them as an alternative for plant-derived metabolites. In this study, we isolated Diaporthe perseae, a fungal endophyte from Gloriosa superba tubers, which showed the production of colchicine in axenic cultures. Mass spectrometry, Nuclear Magnetic Resonance spectroscopy, and tubulin polymerization assays confirmed the compound to be colchicine. Repeated sub-culturing of the endophyte for 10 generations led to a reduction in the yield of the metabolite from 55.25 µg/g to 2.32 µg/g of mycelial dry weight. Treatment of attenuated cultures with DNA methylation inhibitor 5-azacytidine resulted in increased metabolite concentration (39.68 µg/g mycelial dry weight) in treated samples compared to control (2.61 µg/g mycelial dry weight) suggesting that 5-azacytidine can induce demethylation of the fungal genome to overcome the phenomenon of attenuation of metabolite synthesis. Reduced levels of global methylation were observed upon 5-azacytidine treatment in attenuated cultures (0.41 % of total cytosines methylated) as compared to untreated control (0.78 % of total cytosines methylated). The results provide a significant breakthrough in utilizing fungal endophytes as a veritable source of plant-derived metabolites from critically endangered plants.

12/11/20

INTEGRATED COMPUTATIONAL APPROACH TOWARD DISCOVERY OF MULTI-TARGETED NATURAL PRODUCTS FROM THUMBAI (LEUCAS ASPERA) FOR ATTUNING NKT CELLS

VISHWA JYOTI BARUAH, RASANA PAUL, DHRUBAJYOTI GOGOI, NIRMAL MAZUMDER, SUBRATA CHAKRABORTY, APAROOPA DAS ET AL., 2020, JOURNAL OF BIOMOLECULAR STRUCTURE & DYNAMICS

A multi-omics-based approach targeting the plant-based natural products from Thumbai (Leucas aspera), an important yet untapped potential source of many therapeutic agents for myriads of immunological conditions and genetic disorders, was conceptualized to reconnoiter its potential biomedical application. A library of 79 compounds from this plant was created, out of which 9 compounds qualified the pharmacokinetics parameters. Reverse pharmacophore technique for target fishing of the screened compounds was executed through which renin receptor (ATP6AP2) and thymidylate kinase (DTYMK) were identified as potential targets. Network biology approaches were used to comprehend and validate the functional, biochemical and clinical relevance of the targets. The target-ligand interaction and subsequent stability parameters at molecular scale were investigated using multiple strategies including molecular modeling, pharmacophore approaches and molecular dynamics simulation. Herein, isololiolide and 4-hydroxy-2-methoxycinnamaldehyde were substantiated as the lead molecules exhibiting comparatively the best binding affinity against the two putative protein targets. These natural lead products from L. aspera and the combinatorial effects may have plausible medical applications in a wide variety of neurodegenerative, genetic and developmental disorders. The lead molecules also exhibit promising alternative in diagnostics and therapeutics through immuno-modulation targeting natural killer T-cell function in transplantation-related pathogenesis, autoimmune and other immunological disorders.Communicated by Ramaswamy H. Sarma.

18/11/20

MOLECULAR LANDSCAPE OF RECURRENT CERVICAL CANCER

DIVYA ADIGA, SANGAVI ESWARAN, DEEKSHA PANDEY, KRISHNA SHARAN, SHAMA PRASADA KABEKKODU, 2020, CRITICAL REVIEWS IN CRITICAL ONCOLOGY/HEMATOLOGY

Cervical cancer (CC) is a major gynecological problem in developing and underdeveloped countries. Despite the significant advancement in early detection and treatment modalities, several patients recur. Moreover, the molecular mechanisms responsible for CC recurrence remains obscure. The patients with CC recurrence often show poor prognosis and significantly high mortality rates. The clinical management of recurrent CC depends on treatment history, site, and extent of the recurrence. Owing to poor prognosis and limited treatment options, recurrent CC often presents a challenge to the clinicians. Several in vitro, in vivo, and patient studies have led to the identification of the critical molecular changes responsible for CC recurrence. Both aberrant genetic and epigenetic modifications leading to altered cell signaling pathways have been reported to impact CC recurrence. Researchers are currently trying to dissect the molecular pathways in CC and translate these findings for better management of disease. This article attempts to review the existing knowledge of disease relapse, accompanying challenges, and associated molecular players in CC.

RESEARCH HIGHLIGHTS

25/11/20

INFLUENCE OF VDR AND HFE POLYMORPHISMS ON BLOOD LEAD LEVELS OF OCCUPATIONALLY EXPOSED WORKERS

MONICA SHIRLEY MANI, AMITHA PURANIK, SHAMA PRASADA KABEKKODU, MANJUNATH B JOSHI , HERMAN SUNIL DSOUZA, 2020, HUMAN & EXPERIMENTAL TOXICOLOGY

Lead is a ubiquitous heavy metal toxin of significant public health concern. Every individual varies in their response to lead's toxic effects due to underlying genetic variations in lead metabolizing enzymes or proteins distributed in the population. Earlier studies, including our lab, have attributed the influence of ALAD (δ-Aminolevulinate dehydratase) polymorphism on blood lead retention and ALAD activity. The present study aimed to investigate the influence of VDR (Vitamin D receptor) and HFE (Hemochromatosis) polymorphisms in modulating blood lead levels (BLLs) of occupationally exposed workers. 164 lead-exposed subjects involved in lead alloy manufacturing and battery breaking and recycling processes and 160 unexposed controls with BLLs below 10 µg/dL recruited in the study. Blood lead levels, along with a battery of biochemical assays and genotyping, were performed. Regression analysis revealed a negative influence of BLLs on ALAD activity ($p < 0.0001$) and a positive influence on smokeless tobacco use ($p < 0.001$) in lead-exposed subjects. A predicted haplotype of the three VDR polymorphisms computed from genotyping data revealed that T-A-A haplotype increased the BLLs by 0.93 units ($p \leq 0.05$) and C-C-A haplotype decreased the BLLs by 7.25 units ($p \leq 0.05$). Further analysis revealed that the wild-type CC genotype of HFE H63D presented a higher median BLL, indicating that variant C allele may have a role in increasing the concentration of lead. Hence, the polymorphism of genes associated with lead metabolism might aid in predicting genetic predisposition to lead and its associated effects.

27/11/20

PHOTOBIOMODULATION INVIGORATING COLLAGEN DEPOSITION, PROLIFERATING CELL NUCLEAR ANTIGEN AND KI67 EXPRESSION DURING DERMAL WOUND REPAIR IN MICE

VIJENDRA PRABHU, BOLA SADASHIVA SATISH RAO, ANURADHA CALICUT KINI RAO, KEERTHANA PRASAD, KRISHNA KISHORE MAHATO, 2020, LASERS IN MEDICAL SCIENCE

The present investigation focuses on understanding the role of photobiomodulation in enhancing tissue proliferation. Circular excision wounds of diameter 1.5 cm were created on Swiss albino mice and treated immediately with 2 J/cm2 and 10 J/cm2 single exposures of the Helium-Neon laser along with sham-irradiated controls. During different days of healing progression (day 5, day 10, and day 15), the tissue samples upon euthanization of the animals were taken for assessing collagen deposition by Picrosirius red staining and cell proliferation (day 10) by proliferating cell nuclear antigen (PCNA) and Ki67. The positive influence of red light on collagen synthesis was found to be statistically significant on day 10 ($P < 0.01$) and day 15 ($P < 0.05$) post-wounding when compared to sham irradiation, as evident from the image analysis of collagen birefringence. Furthermore, a significant rise in PCNA ($P < 0.01$) and Ki67 ($P < 0.05$) expression was also recorded in animals exposed to 2 J/cm2 when compared to sham irradiation and ($P < 0.01$) compared to the 10 J/cm2 treated group as evidenced by the microscopy study. The findings of the current investigation have distinctly exhibited the assenting influence of red laser light on excisional wound healing in Swiss albino mice by augmenting cell proliferation and collagen deposition.

01/12/20

THE EMERGING ROLE OF MIRNA CLUSTERS IN BREAST CANCER PROGRESSION

AMOOLYA KANDETTU, RAGHU RADHAKRISHNAN, SANJIBAN CHAKRABARTY, S SRIHARIKRISHNAA, SHAMA PRASADA KABEKKODU, 2020, BIOCHIMICA ET BIOPHYSICA ACTA (BBA) - REVIEWS ON CANCER.

Micro RNAs (miRNAs) are small non-coding RNAs that are essential for regulation of gene expression of the target genes. Large number of miRNAs are organized into defined units known as miRNA clusters (MCs). The MCs consist of two or more than two miRNA encoding genes driven by a single promoter, transcribed together in the same orientation, that are not separated from each other by a transcription unit. Aberrant miRNA clusters expression is reported in breast cancer (BC), exhibiting both pro-tumorogenic and anti-tumorigenic role. Altered MCs expression facilitates to breast carcinogenesis by promoting the breast cells to acquire the various hallmarks of the cancer. Since miRNA clusters contain multiple miRNA encoding genes, targeting cluster may be more attractive than targeting individual miRNAs. Besides targeting dysregulated miRNA clusters in BC, studies have focused on the mechanism of action, and its contribution to the progression of the BC. The present review provides a comprehensive overview of dysregulated miRNA clusters and its role in the acquisition of cancer hallmarks in BC. More specifically, we have presented the regulation, differential expression, classification, targets, mechanism of action, and signaling pathways of miRNA clusters in BC. Additionally, we have also discussed the potential utility of the miRNA cluster as a diagnostic and prognostic indicator in BC.

RESEARCH HIGHLIGHTS

01/12/20

ROS-DEPENDENT DNA DAMAGE AND REPAIR DURING GERMINATION OF NACL PRIMED SEEDS

KODSARA RAMACHANDRA KIRAN, VISHWANATH BHAT DEEPIKA, PUTHANVILA SURENDRABABU SWATHY, KESHAVA PRASAD, SHAMA PRASADA KABEKKODU, THOKUR SREEPATHY MURALI ET AL., 2020, JOURNAL OF PHOTOCHEMISTRY AND PHOTOBIOLOGY B: BIOLOGY

Reactive oxygen species (ROS) generated during rehydration of seeds is a major source of cellular damage. Successful germination depends on maintaining the oxidative window and ability of the cells to repair the DNA damage accumulated during seed developmental process, maturational drying, and germination. We explored the role of DNA damage, repair, cell cycle progression and antioxidant machinery in germination of seeds of Solanum melongena L. primed with 0, 320, 640 and 1200 mM sodium chloride (NaCl). The expression of antioxidant genes such as ascorbate peroxidase (APX), superoxide dismutase (SOD), catalase2 (CAT2), and glutathione reductase (GR) was upregulated to maintain the oxidative window required for germination in seeds treated with 320 mM NaCl. ROS generated upon treatment with 320 mM NaCl resulted in minimal DNA damage and activated non-homologous end joining (NHEJ) and mismatch repair (MMR) pathway genes such as KU70 and mutS homolog 2 (MSH2) respectively. Treatment with higher concentrations of NaCl resulted in increased DNA damage despite lower ROS, without evoking DNA repair mechanisms. Uncontrolled rehydration resulted in higher levels of ROS and DNA damage, but activation of homologous recombination (HR) pathway gene, Nijmegen breakage syndrome 1 (NBS1), and genes involved in repairing oxidized guanine, such as oxoguanine DNA glycosylase (OGG1) and proliferating cell nuclear antigen (PCNA). In summary, controlled rehydration with 320 mM NaCl decreased the DNA damage, reactivated the antioxidant and DNA repair machinery, and cell cycle progression, thereby enhancing the seed germination

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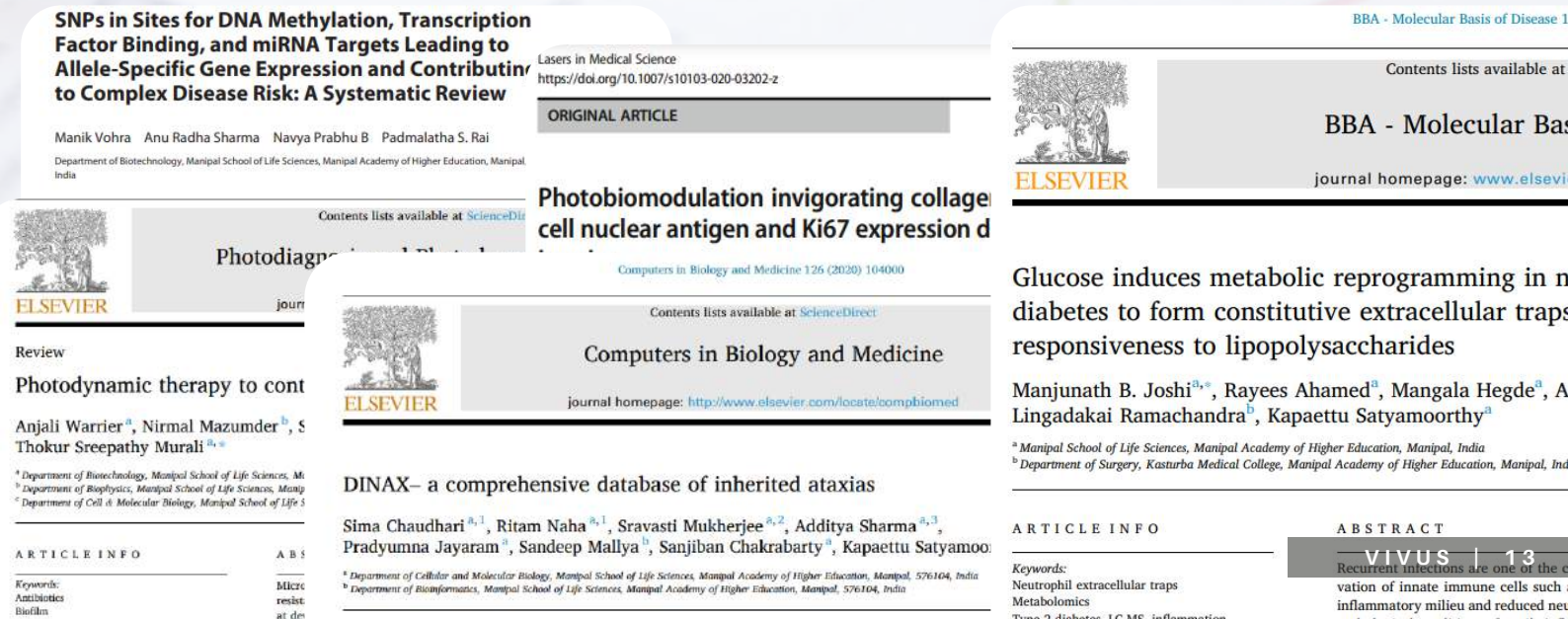
01/12/20

GLUCOSE INDUCES METABOLIC REPROGRAMMING IN NEUTROPHILS DURING TYPE 2 DIABETES TO FORM CONSTITUTIVE EXTRACELLULAR TRAPS AND DECREASED RESPONSIVENESS TO LIPOPOLYSACCHARIDES

MANJUNATH B JOSHI, RAYEES AHAMED, MANGALA HEGDE, ASWATHY S NAIR, LINGADAKAI RAMACHANDRA, KAPAETTU SATYAMOORTHY, 2020, BIOCHIMICA ET BIOPHYSICA ACTA - MOLECULAR BASIS OF DISEASE

Recurrent infections are one of the common morbidities in Type 2 Diabetes (T2D) subjects. Bidirectional activation of innate immune cells such as neutrophils and glucose metabolism in T2D conditions leads to a pro-inflammatory milieu and reduced neutrophil function, which can be a potential cause for recurrent infections. In pathological conditions of sterile inflammation associated T2D, neutrophils form constitutive extracellular traps (NETs) due to hyperglycemia and respond poorly to infections. The present study was aimed at understanding the cellular and metabolic consequences, and NETs formation in T2D. We show that glucose induces NADPH oxidase derived reactive oxygen species and further citrullinates the histones to form weaker NETs leading to reduced response to lipopolysaccharide (LPS). Untargeted metabolomics analysis in neutrophils cultured under high glucose and from T2D subjects revealed enrichment of polyol pathway intermediates (1-anhydrosorbitol) and reduced glutathione metabolism products (cysteinylglycine). NADPH is an absolute requirement for three independent pathways of formation of 1-anhydrosorbitol via aldose reductase under excess glucose, induction of glutathione synthesis and glucose induced NETs formation. During T2D and in presence of high glucose, there is a competition for NADPH between these processive reactions, which leads to its insufficiency to produce NETs in response to LPS. Interestingly, supplementation of NADPH and pharmacological inhibitor of aldose reductase, ranirestat, restored NETs formation in presence of LPS. Our study provides novel insights on the metabolic reprogramming of neutrophils, which may lead to susceptibility of T2D subjects to infections.



RESEARCH HIGHLIGHTS

01/12/20

BERBERINE, A NATURAL ALKALOID SENSITIZES HUMAN HEPATOCARCINOMA TO IONIZING RADIATION BY BLOCKING AUTOPHAGY AND CELL CYCLE ARREST RESULTING IN SENESCENCE

GAUTHAM RAMESH, SHUBHANKAR DAS, SATISH RAO BOLA SADASHIVA, 2020, JOURNAL OF PHARMACY AND PHARMACOLOGY

Objective: To study the radiosensitizing potential of Berberine and the underlying mechanism in human hepatocarcinoma (HepG2) cells.

Methods: HepG2 cells were challenged with X-rays in combination with Berberine treatment and several in vitro assays were performed. Alteration in cell viability was determined by MTT assay. Changes in intracellular ROS levels, mitochondrial membrane potential/mass, intracellular acidic vesicular organelles as well as cell cycle arrest and apoptotic cell death were analysed by flow cytometry. Induction of autophagy was assessed by staining the cells with Monodansylcadaverine/Lysotracker red dyes and immunoblotting for LC3I/II and p62 proteins. Phase-contrast/fluorescence microscopy was employed to study mitotic catastrophe and senescence. Cellular senescence was confirmed by immunoblotting for p21 levels and ELISA for Interleukin-6.

Key findings: X-rays + Berberine had a synergistic effect in reducing cell proliferation accompanied by a robust G2/M arrest. Berberine-mediated radiosensitization was associated with elevated levels of LC3II and p62 suggesting blocked autophagy that was followed by mitotic catastrophe and senescence. Treatment of cells with X-rays + Berberine resulted in increased oxidative stress, hyperpolarized mitochondria with increased mitochondrial mass and reduced ATP levels.

Conclusions: The study expands the understanding of the pharmacological properties of Berberine and its applicability as a radiosensitizer towards treating liver cancer.

10/12/20

THE MOLECULAR MECHANISMS OF ACTION OF PHOTOBIOMODULATION AGAINST NEURODEGENERATIVE DISEASES: A SYSTEMATIC REVIEW

MAYUKHA BATHINI, CHANDAVALLI RAMAPPA RAGHUSHAKER, KRISHNA KISHORE MAHATO, 2020, CELLULAR AND MOLECULAR NEUROBIOLOGY

Neurodegenerative diseases might be slow but relentless, as we continue to fail in treating or delaying their progression. Given the complexity in the pathogenesis of these diseases, a broad-acting approach like photobiomodulation can prove promising. Photobiomodulation (PBM) uses red and infrared light for therapeutic benefits, working by stimulating growth and proliferation. The implications of photobiomodulation have been studied in several neurodegenerative disease models. It has been shown to improve cell survival, decrease apoptosis, alleviate oxidative stress, suppress inflammation, and rescue mitochondrial function. In in vivo models, it has reportedly preserved motor and cognitive skills. Beyond mitochondrial stimulation, the molecular mechanisms by which photobiomodulation protects against neurodegeneration have not been very well studied. This review has systematically been undertaken to study the effects of photobiomodulation at a molecular level and identify the different biochemical pathways and molecular changes in the process. The data showed the involvement of pathways like extracellular signal-regulated kinase (ERK), mitogen-activated protein kinase (MAPK), and protein kinase B (Akt). In addition, the expression of several genes and proteins playing different roles in the disease mechanisms was found to be influenced by PBM, such as neurotrophic factors and secretases. Studying the literature indicated that PBM can be translated to a potential therapeutic tool, acting through a spectrum of mechanisms that work together to decelerate disease progression in the organism, which is difficult to achieve through pharmacological interventions.

14/12/20

THE ROLE OF CALCIUM SIGNALING IN REGULATION OF EPITHELIAL-MESENCHYMAL TRANSITION

DIVYA ADIGA, RAGHU RADHAKRISHNAN, SANJIBAN CHAKRABARTY, PRASHANT KUMAR, SHAMA PRASADA KABEKKODU, 2020, CELLS, TISSUES, ORGANS

Despite substantial advances in the field of cancer therapeutics, metastasis is a significant challenge for a favorable clinical outcome. Epithelial to mesenchymal transition (EMT) is a process of acquiring increased motility, invasiveness, and therapeutic resistance by cancer cells for their sustained growth and survival. A plethora of intrinsic mechanisms and extrinsic microenvironmental factors drive the process of cancer metastasis. Calcium (Ca2+) signaling plays a critical role in dictating the adaptive metastatic cell behavior comprising of cell migration, invasion, angiogenesis, and intravasation. By modulating EMT, Ca2+ signaling can regulate the complexity and dynamics of events leading to metastasis. This review summarizes the role of Ca2+ signal remodeling in the regulation of EMT and metastasis in cancer.

RESEARCH HIGHLIGHTS

15/12/20

LEAD EXPOSURE INDUCES METABOLIC REPROGRAMMING IN RAT MODELS

MONICA SHIRLEY MANI, MANJUNATH B JOSHI, RASHMI R SHETTY, VENZIL LAVIE DSOUZA, M SWATHI, SHAMA PRASADA KABEKKODU, HERMAN SUNIL DSOUZA, 2020, TOXICOLOGY LETTERS

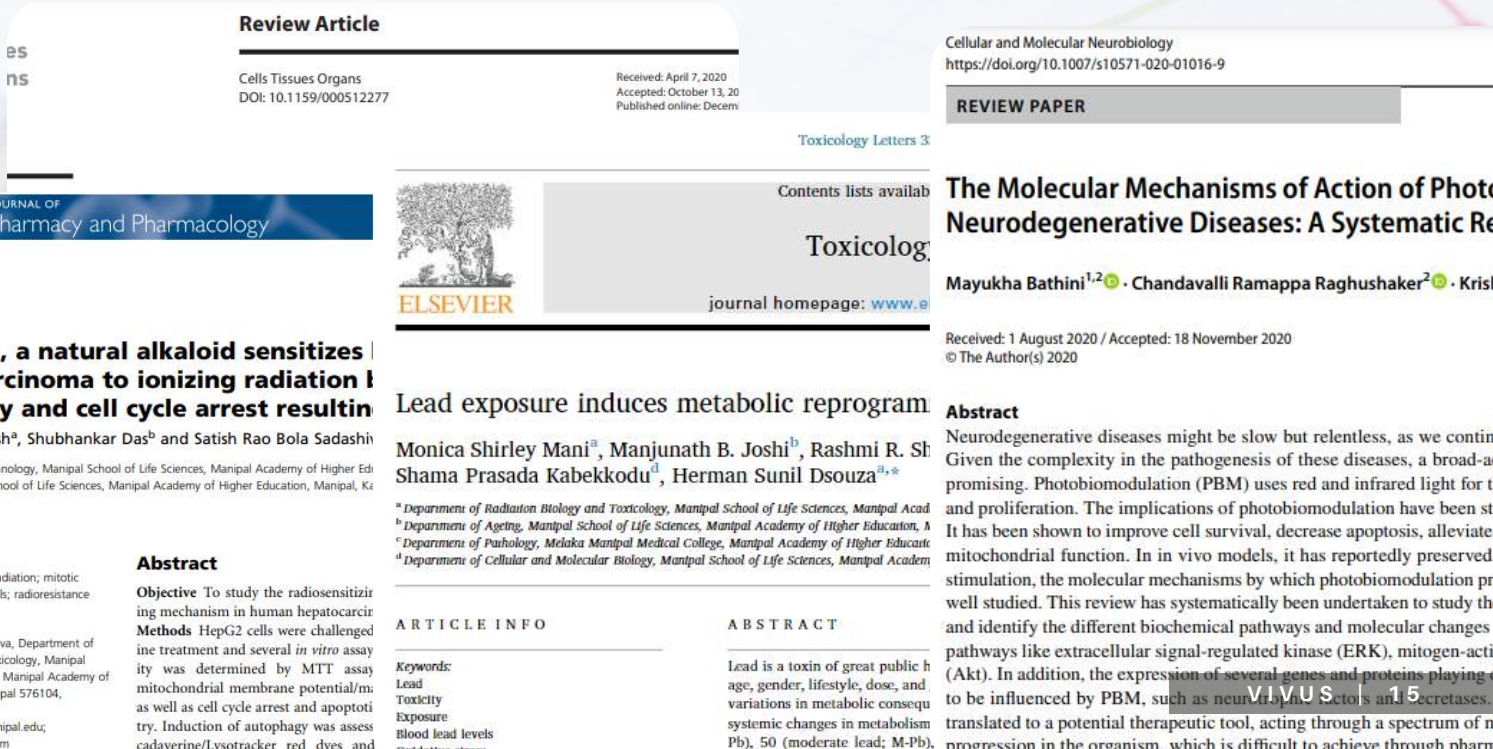
Lead is a toxin of great public health concern affecting the young and aging population. Several factors such as age, gender, lifestyle, dose, and genetic makeup result in interindividual variations to lead toxicity mainly due to variations in metabolic consequences. Hence, the present study aimed to examine dose-dependent lead-induced systemic changes in metabolism using rat model by administering specific doses of lead such as 10 (low lead; L-Pb), 50 (moderate lead; M-Pb), and 100 mg/kg (high lead; H-Pb) body weight for a period of one month. Biochemical and haematological analysis revealed that H-Pb was associated with low body weight and feed efficiency, low total protein levels ($p \leq 0.05$), high blood lead (Pb-B) levels ($p \leq 0.001$), low ALAD (δ-aminolevulinate dehydratase) activity ($p \leq 0.0001$), high creatinine ($p \leq 0.0001$) and blood urea nitrogen (BUN) ($p \leq 0.01$) levels, elevated RBC and WBC counts, reduced haemoglobin and blood cell indices compared to control. Spatial learning and memory test revealed that H-Pb exposed animals presented high latency to the target quadrant and escape platform compared to other groups indicating H-Pb alters cognition function in rats. Histopathological changes were observed in liver and kidney as they are the main target organs of lead toxicity. LC-MS analysis further revealed that Butyryl-L-carnitine ($p \leq 0.01$) and Ganglioside GD2 (d18:0/20:0) ($p \leq 0.05$) levels were significantly reduced in H-Pb group compared to all groups. Further, pathway enrichment analysis revealed abundance and significantly modulated metabolites associated with oxidative stress pathways. The present study is the first in vivo model of dose-dependent lead exposure for serum metabolite profiling.

24/12/20

MIRSNPS IN CLOPIDOGREL METABOLISM GENES PREDICT CARDIOVASCULAR DISEASE RISK: A CASE-CONTROL STUDY AND META-ANALYSIS

ANU RADHA SHARMA, SOURAV PATAGI, ABDUL RAZAK UK, RANJAN SHETTY, SHASHIKIRAN UMAKANTH, KAPAETTU SATYAMOORTHY, PADMALATHA S RAI, 2020, PHARMACOGENOMICS

Aim: The present study was conducted to decipher the inter-relationship of SNPs and miRNAs involved in pharmacogenomics of clopidogrel on predisposition to cardiovascular diseases (CVDs).
Materials & methods: A case-control study was conducted on 410 cases and 386 controls to analyze the association of 13 mirSNPs on CVDs risk. Genotyping was performed by tetra-primer amplification refractory mutation system PCR and validated using Sanger DNA sequencing. miRNA expression analysis was performed using TaqMan assays. A meta-analysis was performed for PON1 rs662 with coronary artery disease.
Results & conclusion: PON1 rs662, PON1 rs3917577, CYP3A5 rs15524, COL4A1 rs874204 and PTGIR rs1126510 polymorphisms showed association with CVDs. The miRNA hsa-miR-224-5p showed differential expression in the PON1 rs3917577 GG genotype. The meta-analysis showed the population-specific impact of PON1 rs662 on South Asian and Middle East populations.



ZEN PEN

FEATURED STORY

THE FOUNDATION OF GOOD SCIENCE

AN INTERVIEW WITH PROF. M.S. VALIATHAN

BY APOORVA JNANA AND JACKSON RODRIGUES

Dr. Marthanda Varma Sankaran Valiathan, a National Research Professor of Government of India was the first Vice Chancellor of Manipal Academy of Higher Education, Manipal. Dr. M. S. Valiathan, a former President of the Indian National Science Academy, is an eminent cardiac surgeon recognized for his pioneering research in the integration of medicine with technology. He and his team were the first in India to develop cost-effective prosthetic heart valves and blood bags spearheading the field of biomedical research. He gradually shifted towards the study of Ayurveda, driven by the lack of a globally accepted contribution towards modern science by an Indian. This eventually led to his study of the three savants in the field of Ayurveda, Charaka, Sushrutha and Vaghbata. In his illustrious career, Dr. Valiathan has received several honors and accolades, including the Hunterian Professorship of the Royal College of Surgeons of England, Senior Fellowship by the Homi Bhabha Council for the study of Charaka, leading to the book 'The Legacy of Charaka, Sushrutha and Vaghbata'. Of note, in 2005, he was awarded the Padma Vibhushan, the second most prestigious civilian award in India, for his exemplary contributions to the field of health technology. Dr. M. S. Valiathan currently resides in Manipal, actively supporting research in the field of medicine and Ayurveda. In a brief, spontaneous interview, Dr. M. S. Valiathan described the cornerstones of good science and provided a scientific outlook on Ayurveda. Excerpts below:

The very first thing that sets apart a true researcher from the rest is humility. If one starts with a feeling of superiority that one knows everything, then there will be no science, since good science is essentially a pursuit of knowledge.

ON AYURVEDA

In terms of Ayurveda, certain connoisseurs would claim it to be superior to that of modern medicine and make tall claims with no evidence. One must realize that all ancient civilizations were advanced for their time in their fields. Some more than others. That is a fairer statement. We must take pride in our achievements. The musings of Charaka, the father of Ayurveda, Sushruta, and Vaghbata, represent a creative and innovative time in India's history that is inspirational. It represents a time when we had intellectual debates comparable to those of great overseas scholars such as Plato. Hence, we should be proud of our heritage and our ancestors but there can be no scientific progress in the presence of hubris. One must always practice humility and celebrate the achievements as well and accept the shortcomings and persevere to improve upon them. A common trait of the misguided scholar is the spouting of tall claims with no evidence. For example, of late, there has been a lot of growing interest in the practice of Yoga. Banking on this increased interest, there are many who claim that one can live 500 years if they practice Yoga, or that one can see through objects. Such ideas should be immediately discarded. The singular purpose of Yoga is to enhance consciousness and experience a realm beyond the senses. There is no evidence that one would gain "superpowers". These are beliefs and many beliefs have no scientific basis.

Science must always be evidence-based. If there is no evidence, it cannot be a scientific claim. Of course, evidence is not just proof in a test tube and not everything needs evidence to be true. For example, love. We know a mother would go to great lengths for her children, but we cannot ask for scientific evidence to prove this, just as we cannot judge one's belief in god. Here, the evidence of the unseen is faith. Therefore, there are different kinds of evidence. However, evidence of the unseen cannot be Ayurveda, which is the realm of spirituality. Hence, it is damaging and futile to claim sensational headlines promising longevity and miraculous eyesight. One must instead revere Ayurveda for its true purpose, to live a healthy life. Ayurveda is a lifestyle that offers a disciplined way of living. However, contrary to most opinions, an Ayurvedic lifestyle does not involve a vegetarian diet solely. There is mention of consumption of several types of meats, fish and even alcohol. Ayurveda does not condemn liquor; there are detailed sections on how wine should be prepared and served in the ancient texts. However, all are subject to ethical standards and must be consumed in moderation as mentioned in the scriptures.

There is no bar for joy in Ayurveda. Ayurveda deals with the aspects of an object that is not immediately visible, but which is vital to the purpose of the object. For example, one can only see the tree, but the unseen processes happening below ground within the seed and subsequently the sapling gives rise to the tree. Food, for example, is essential for our survival, but that is not its only purpose. There can be variations in the food, even in the way it is prepared and served. Guidelines for these are available in exquisite detail. There are texts that further explain how the utensils must be set and how the food tastes better when had in good company. **These guidelines on how to live a healthy life is the essence of Ayurveda. Hence, the strength of Ayurveda in the field of medicine is in the treatment of chronic degenerative diseases.** If one follows the guidelines proposed by Ayurveda, one can manage chronic degenerative diseases effectively. However, claims regarding the treatment of acute diseases such as typhoid, tuberculosis and several others needs to be proved with rigorous scientific evidence.

The process of gathering evidence to support scientific arguments must begin with a hypothesis. The moment one starts asking questions, the moment one starts forming a hypothesis to test these questions, interesting science is born. Ayurveda is ripe with hypotheses. There is no lack of intellectually enriching hypotheses in the ancient scriptures. For example, several scholars have noted the increase in strength when consuming rasayanas, and there has been significant discourse on why this could be. This, here, is the beginning of science. This was the foundation for the establishment of guidelines for a healthy life that can be used in the treatment of chronic diseases. However, for acute diseases, the evidence required is that of a controlled randomized clinical trial. This would involve testing a group of patients with diseases such as Typhoid and Tuberculosis. 50% should be treated with purely Ayurveda, and the rest should be treated with "modern medicine". If there are quantitative results such as the disease was cured in 70% of the patients that received Ayurvedic treatment as opposed to 30% in the group that received modern medicine, there is undisputed evidence of the efficacy of Ayurvedic treatment.

However, such evidence is nearly impossible to produce since there is no pure Ayurveda anymore. Majority of the patients suffering from a disease, be it chronic or acute, often consult Ayurvedic physicians following treatment with modern medicine when the symptoms are more severe. There is also the interference of modern diagnostic services such as X-ray, CT scan etc… that confounds such studies. Hence, it is not possible to do rigorous clinical trials to test the efficacy of Ayurvedic treatments.

ON THE BRANCHES OF SCIENCE

In essence, there are two types of research/science. One involves the pursuit of knowledge purely. Individuals on this quest are often not looking for a product but are driven by the thirst to know more about their subject simply. They see beauty in objects that may not be considered beautiful by any other. For example, mathematicians talk about truth and beauty in their work. However, they do not speak of a flower or a bee, but of equations and theorems. Their aesthetics lie in finding elegant solutions to complex mysteries or complex problems that needs undivided focus. One must be exceedingly good, patient, and keen to excel in such a path. There are several people in the West and East, who have embarked on such journeys and excelled. It is an exciting journey. However, in India, we need a different kind of science. The kind that can create valuable products such as cost-effective medical marvels and efficacious drugs that can make life healthier and happier. This spectrum of science is broadly termed as "applied science". These are the innovations much needed for our nation.

For those on the quest for knowledge, the discovery itself is a tremendous joy. If one has the aptitude for it, one can go for it. However, even in this, the research should be oriented towards making useful things that can make lives happier and simpler. "I personally feel that if you can do something to improve the life of anyone, be it that of a human, animal or even a plant, that is Good Science."

Apoorva Jnana, PhD Scholar, Department of Biotechnology

Jackson Rodrigues, PhD Scholar, Department of Biophysics

> **If you can do something to improve the life of anyone, be it that of a human, animal or even the environment, that is Good Science.**
>
> **- Dr. M.S. Valiathan**

FEATURED STORY

TRAVELOGUE

NORTH EAST INDIA

ARTICLE & PHOTOGRAPHS BY:
DHANRAJ SB

There might not be many individuals, of any age group, who do not like travelling to new places. It may be for religious purposes or just for the fun of travelling around with friends or family. We all would have been to one such trip, which we would remember even now. Mine was my visit to the North-East India. The North East (NE) of India has eight states; Arunachal Pradesh, Mizoram, Manipur, Meghalaya, Nagaland, Tripura, Sikkim and Assam. Each state is rich with its own cultural heritage and has a varied flora and fauna. They have several sights, some of which I have described here.

GUWAHATI, ASSAM

We began from Guwahati, Assam. This city is situated besides the great Brahmaputra River and is known for the holy temple dedicated to Kamakhya, one of the 51 Shakti Pithas in India. The city hosts a cultural institution locally referred to as 'Kalakshetra'. This consists of cultural museum, library and hosts facilities for preserving and demonstrating the cultural items of the state. One can then take a bus in the evening from Guwahati to the Kaziranga National Park, which is around 200 km away. Several lodging facilities are available, who can also book safari rides if informed in advance.

Kaziranga National Park, Assam:

Kaziranga National Park is one of India's UNESCO World Heritage Sites and is known for the Great Indian one horned Rhinoceros (2/3rd of their total world population lives here). It is spread across 430 sq. km and is split into four ranges which can be visited via the Jeep safari.

The National Park has two safari services: Elephant Safari and the Jeep Safari. Timings for the elephant safari is from 05:30 to 07:30 AM, for which booking

SHILLONG, MEGHALAYA
David Scott Trail

needs to be done in advance to avoid getting left out. Beyond this, one can only avail the Jeep safari, for which booking can be done on the spot. The experience of elephant safari is the best, as it is the right time and best way to observe the animals in the national park. If you are lucky you will be able to spot the rhinos, water buffalo, swamp deer, monitor lizard and a few migratory birds. The national park, also declared as a Tiger reserve, consists of other animals like leopards, sloth bears, elephants and several others.

The National Park is closed from May to October every year during the monsoon season when chances of flooding are high. The best time to visit then would be between the months of November to April. Another beautiful location from this place is Majuli, the world's largest river island situated on the Brahmaputra River. It is situated 150 km from Kaziranga National park.

SHILLONG, MEGHALAYA

The next stop was in Shillong, Meghalaya. As the name says, Meghalaya is an abode of clouds. Shillong is 100 km from Guwahati city. Several buses and taxi services are available for commuting between these cities. During this journey, the exciting part was that sunset occurs almost by 6 PM and it would be dark as night by 6:30 PM. Almost one hour earlier to our usual sunset timings. Meghalaya has several trekking destinations. Listed are a few underrated but breathtaking places.

The David-Scott Trail:

The David-Scott Trail is one of the oldest trails of Meghalaya and is around 16 kilometers. This trek route is the best for beginners and is untouched by urbanization. The route passes beside the Umiam River and one can witness a suspension bridge on the way. The lush greenery with beautiful flowers and pine trees makes the journey joyful.

Mawsawa falls, Wei sawdong falls and Dainthlen falls:

These three waterfalls are close to the David-Scott trail. They are very beautiful, with crystal-clear water and scenic locations. The

Wei-sawdong falls is a tiered cascade and you will really enjoy the adventure of reaching the bottom as you get down on a staircase made of bamboo by the local villagers.

Nohkalikai falls, Rainbow falls, Double-decker living root bridge:
Nohkalikai falls is the third tallest plunge waterfall in India with a height of 340 meters. It is situated in the East Khasi Hills of Meghalaya and is 54 kilometers from Shillong city. The falls has a legend of a lady (feminine gender in Khasi is referred as Ka) named Likai. The term Nohkalikai is a grim reminder of the tragedy that an unfortunate woman met with. It is said that she jumped to death from the edge of the plateau as she could not bear the thought of cannibalizing on her daughter unknowingly. The second husband who hated the daughter, killed the infant and had cooked her flesh.

From this viewpoint, starts a staircase that reaches the Rainbow falls and the Double-decker living root bridge. After a tiring trek down these stairs you will reach the Rainbow falls. The Rainbow falls gets its name from the rainbow created near the falls throughout the day. After witnessing the falls, **one can trek some more distance to reach the Living Root bridge**. It is called so because the roots of a tree were entwined to create the bridge by the villagers. The main attraction is that of the double-deckered root bridge. It is made naturally from the roots and nothing more. These places allow one to understand the various difficulties people face and how they come up with solutions for these problems over time.

Mawmluh caves, Mawsmai caves, Arwah Lumshynna caves:
There are lot of caves that can be explored in Meghalaya, such as the sandstone caves and limestone caves. People who want to get the real experience of exploring caves can visit the Mawmluh caves, around 55 kilometers from Shillong city. These caves are being studied for stalagmites and their relation to climate change. The cave entrance is behind the Mawmluh cement factory. The cave has waist-deep, ice-cold water. One needs to walk carefully in such calcite formed regions to avoid getting hurt. Guides are available to explore the cave as well. The cave is not lit by any artificial lights and hence gives us the true adventure of our lifetime.

The other two caves (Mawsmai and Arwah Lumshynna) are lit up by artificial lights and one can easily go around and come out without any difficulty. Mawsmai cave is around 58 kilometers from Shillong city. It is a limestone cave and you can see different shapes

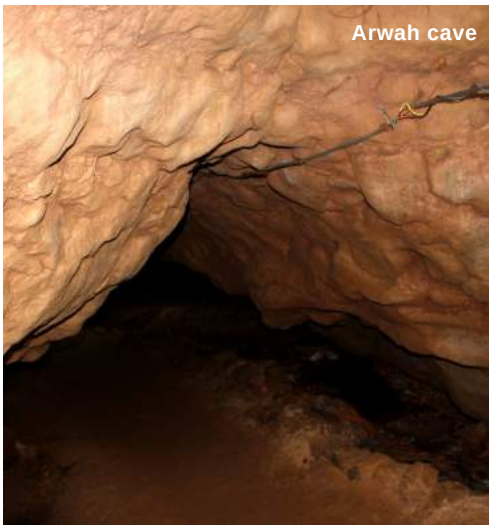

Mawsawa falls


Dainthlen falls


Nohkalikai falls


Rainbow falls

formed by the water flow. The Arwah caves is a sandstone cave **and has the fossil imprints of fishes and crustaceans preserved.** The cave has different sections to explore as well, with some regions requiring you to crawl. Water keeps flowing in this cave naturally and is a great add on to the experience. Artificial lights are put up in few sections but is not completely lit.


Arwah cave

Few important points:

- The water in the rivers of these parts are very clean and could be consumed without any fear
- These places witness a lot of rain during the monsoon season and approach very cold temperatures during nighttime. Better be prepared for it.
- Mawlynnong village, the cleanest village in the world is in Meghalaya and one must visit the village to get a real experience of the place and how they keep the village clean. It is situated 78 kilometers from Shillong city.
- Shnongpdeng is a village near Dawki. The Umngot River passes through this place and has sports facilities such as rafting, snorkeling, boating, tent facility and zip-line adventure. The river is crystal clear, and one can even see the riverbed. It is situated 88 kilometers from Shillong city and is most sought after by young adventurers. On the way, one can also see the Bangladesh borders.
- Cherry Blossom festival in Shillong is organized every year in the month of November to celebrate the blossoming of cherry trees. During this time, the city would be filled with mesmerizing pink cherry flowers. Several cultural activities are organized in celebration and stalls featuring local cuisine, arts and craft are put up.

With its rich culture, heritage and beautiful sights, North East India is a haven offering serenity, adventure, beauty and much more with something for everyone. As J R Tolkien has said, “Still round the corner, there may await, a new road or a secret gate”. Still round the corners, you may fall in love at a waterfall here or a beautiful bridge made of living root trees there; the adventures are endless.

Dhanraj S.B
PhD Scholar, Department of Cell and Molecular Biology

FEATURED STORY

HOW BACTERIA "TALK"

SOCIAL DYNAMICS AT MICRO/NANO SCALES! - A BRIEF PRIMER ON QUORUM SENSING

ARTICLE BY
ANJALI WARRIER

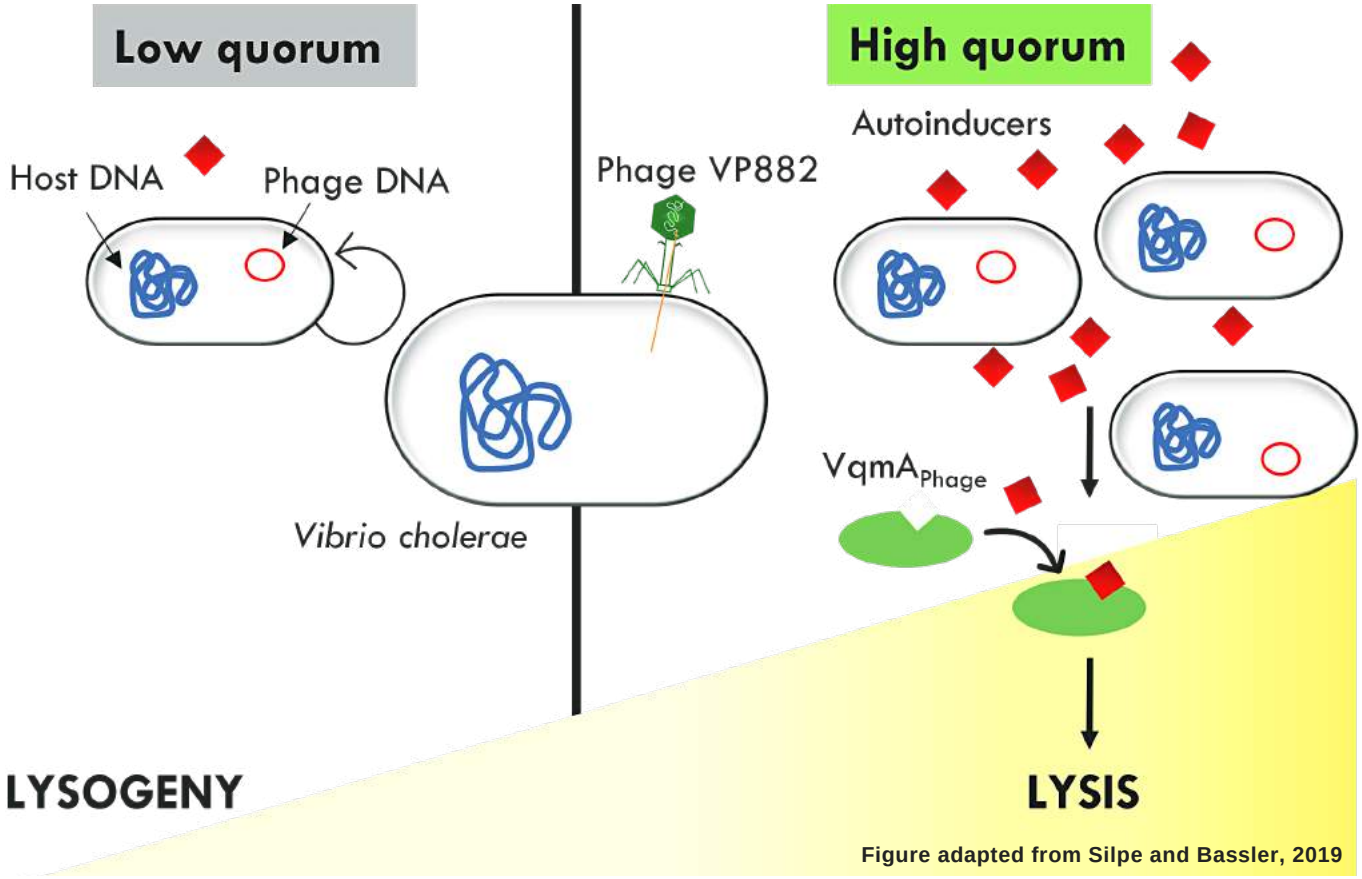


Figure adapted from Silpe and Bassler, 2019

Reference paper - "A Host-Produced Quorum-Sensing Autoinducer Controls a Phage Lysis-Lysogeny Decision"
Silpe and Bassler | 2019 | Cell

Bacteria are tiny, primitive microbes that are one of the oldest living organisms on our planet. They have the potential to either keep us alive with benefits like protection, digestion, detoxification, immunity and several others or turncoat as pathogens, often when opportunity strikes. How they get this superpower is through excellent communication.

Bacteria communicate using a chemical language. When bacteria grow and divide, each cell produces these chemicals. They count their numbers (quorum) based on the amount of chemical present around them, and when they have the right number of bacteria locally (threshold quorum), all of them change their behavior in unison, and thereby perform tasks they could never accomplish individually due to their extremely small size. That is, they respond to the chemical and the whole quorum alters its gene expression synchronously so as to act as a multicellular organism. This process of cell-to-cell communication and orchestration of collective behaviors is referred to as **quorum sensing (QS).**

When the bacteria seek to carry out a successful infection in a host, one of the ways they do so is by creating biofilms, which are communities of bacteria adhering to surfaces. They attach to human body surfaces such as intestine or skin, colonize and start living in these groups, which is a QS controlled behavior. Another example of QS controlled behavior is the bioluminescence seen in oceans (also known as "Mareel"), and there are many more.

What is remarkable about this cross talk is that these molecules produced by the bacteria for communication are incredibly precise. Bacteria can decipher this mixture of molecules produced by other bacteria and determine whether the bacteria in their neighborhood are their kin or enemy. Based on this recognition, they tailor i.e. determine the set of QS-regulated genes to switch on or off. Thus, QS is not just dependent on the number of bacteria present, but also on who is in the neighborhood, just as humans do.

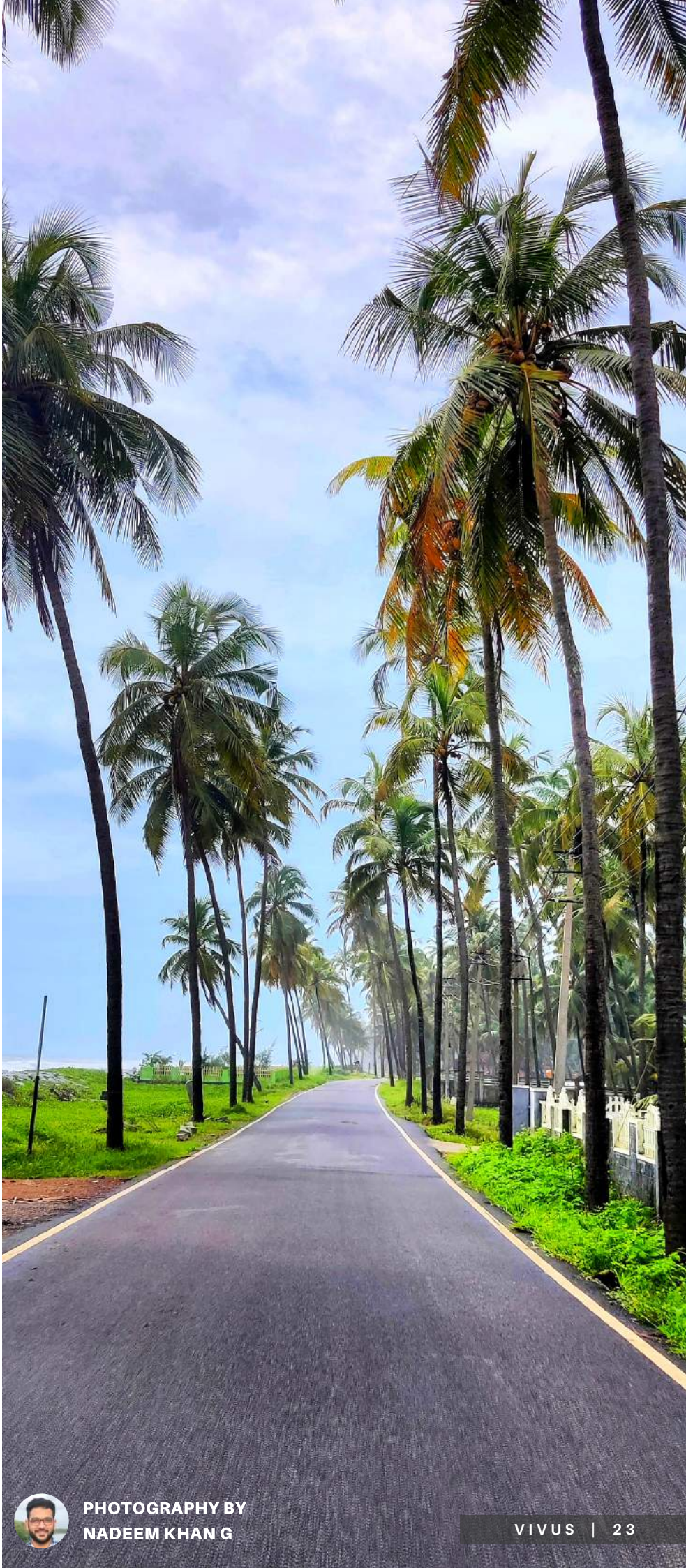
"The bugs are getting bugged"
Recent research by Bonnie Bassler (a molecular microbiologist at Princeton

University) and team in 2019 shed light on the chemical intelligence employed by viruses to detect the chemical language used by bacteria for communication. Viruses, that do not belong to any kingdom as they are technically not living outside the host, are breaching kingdom boundaries, and stealing information from the bacteria so as to destroy their bacterial hosts. The team studied a novel QS system in *Vibrio cholerae* that involves the use of an autoinducer 3,5-dimethylpyrazin-2-ol (DPO) and a receptor VqmA (VqmAVc), which together regulate genes for biofilm formation and virulence. Now starts the war where the virus that infects these bacteria (vibriophage VP882) encodes the same receptor VqmAPhage to which the host produced signal DPO can bind, initiating the phage lysis program.

Thus, they found that viruses closely monitor the bacterial population density around them, and launch their lysis program solely at high bacterial densities, which maximizes infection of adjacent cells. Additionally, it was found that VqmAPhage activates the host VqmAVc regulon, whereas the reverse condition does not work resulting in an imbalance enabling the phage to eavesdrop on the host QS while executing its lytic-lysogeny phases without encountering any retaliation or interference from the host. This was the first demonstration of cross-kingdom eavesdropping and the team then found many new instances. While not all of these are dependent on QS information, it is now evident that viruses can listen to what bacteria talk and then use this information to destroy them.

It is incredible to learn that organisms that we think of as primitive are capable of superior communication. Even viruses, much smaller beings than bacteria have genes devoted to QS. Therefore, communication is an evolved trait, it is most emphatically not something created by the higher organisms.

Anjali Warrier
PhD Scholar, Department of Biotechnology



PHOTOGRAPHY BY NADEEM KHAN G

FROM NAMASTE TO KONNICHIWA!

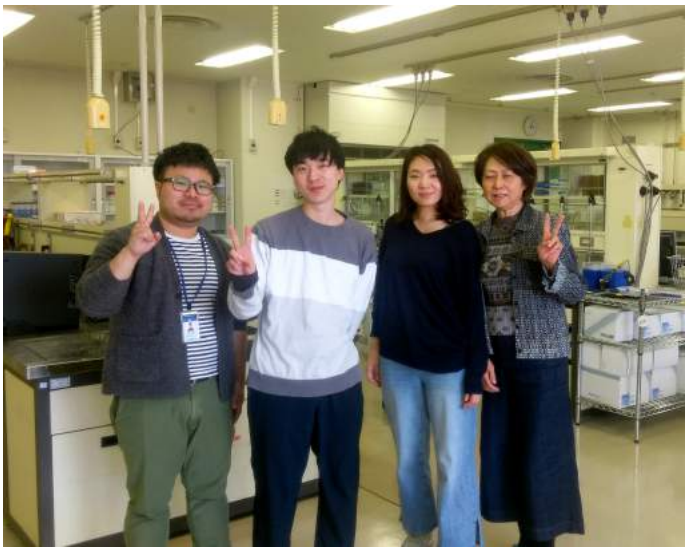
ARTICLE AND PHOTOGRAPHY BY SIMA CHAUDHARI

Someone said, “PhD is not just a degree, it is a journey of self-exploration”. I’ve found this to be entirely true and this journey becomes much more interesting when accompanied by opportunities to explore other worlds and laboratories different from home. I have been fortunate to obtain the experience to explore international laboratories and I am extremely grateful to my supervisor, Dr K Satyamoorthy and Manipal School of Life Sciences, Manipal Academy of Higher Education for these opportunities.

It all started on December 14, 2018 when I was woken up by a call from Dr. Sunil Kaul, Chief Senior Research Scientist in National Institute of Advanced Industrial Science & Technology (AIST), Tsukuba, Japan. He informed that I was selected for advanced training in Biotechnology under STAR Program at the DBT-AIST International Laboratory for Advanced Biomedicine (DAILAB), Biomedical Research Institute, AIST for two months. *Seriously?!* I was extremely shocked as well as super excited for the upcoming international trip.

AIST is a huge institute with different departments spread across different buildings (although, all the buildings looked the same to me). Upon my arrival to “Sakura-Kan” where I was accommodated, Dr. Raj visited me. Dr. Raj is a researcher in Dr. Renu Wadhwa and Dr. Sunil Kaul’s lab. Dr Raj took me to AIST Central 6.5 (their research group) to be welcomed by Dr. Kaul, who also introduced me to his lab members. Everyone was welcoming and friendly. Post lunch, Dr. Kurita and Dr. Kato from Biomedical research group came to Dr. Renu’s lab and I was introduced to them. I was assigned to Dr. Kurita’s lab and Kato-san was to be my mentor in Biomedical research group (Central 6.9). When I reached Dr. Kurita’s lab, every lab member was very fascinated to see me. I was their first international student, who was going to be there for 2 months. This was going to be a completely new experience for me, not only because their research field was different from mine but also because I was going to be in a lab where all lab members and administrative workers were Japanese. It took me almost a week following polite introductions to remember all of their names. I was called as Sima-san (san is added to each person’s name to express respect).

Language was definitely an obvious challenge to overcome. While Kurita-san and Kato-san could communicate in English, the others were much more comfortable talking in Japanese than English and I, well, did not know the “ABC” of Japanese at all. I was given a cubicle with a computer and my first task was to complete the biosafety and bioethics course and complete my test before I could begin any wet lab experiments. With much enthusiasm I sat at my cubicle and opened my computer to start my course. However, the moment my computer turned on; I was met with strings of Japanese letters. Exasperated, I asked Minamiki-san (scientist in Kurita-san lab) and Tanaka-san (M.Sc. student who was in Kurita-san’s lab for project) for



help. While they were figuring out how to change the language setting and Wi-Fi settings for my computer, I was taken to AIST office by Kanika-san (Secretary in Kurita-san lab who took care of all administrative work) for making my identity card. Kanika-san was the elderly secretary of our department who was to retire soon. She does not know any English at all, but was very much eager to communicate with me and so was I. During our tea break we both used to sit with coffee and try to communicate with each other. We tried using google translate, photographs and other lab mates to convey our message to each other. This was a challenging but enriching and fun experience.

Next day, after completing the necessary documentation, we discussed about the project I was supposed to work on. The project was on detection of hydroxymethyl cytosine in DNA from rat brains using nanocarbon as a detector in HPLC. The objectives framed were such that my experience in the field of molecular biology was employed along with their field of expertise in chemistry and biomaterials. I learned several methods such as assembly of electrochemical detectors, HPLC, bioanalyzer, ELISA and other techniques in due course. One day when we were running HPLC, Kato-san explained me the protocol and demonstrated how to run HPLC.

However, unsurprisingly, the software of the HPLC was in the Japanese language, both for running as well as for analysis of output data. However, I was not deterred. Next day, I requested Kato-san if I could operate the software for HPLC operation. He agreed. He guided me on each step, explaining to me what each icon of software means while operating the software. In our next attempt, I operated the software independently under Kato-san's observation. He was pleasantly surprised and asked me how I understood what is written on software. I explained my trick gleefully, "Oh, I just remembered the icon to be pressed during each step".

After my experiments were done for the day, I would spend my time observing others' experiments. Tanaka-san was working on 3D-printing and microfluidics. I was very fascinated by those techniques and wanted to learn them as well. I used to ask Tanaka-san about them and he would try to explain but most of the terms he used would be in Japanese so I didn't understand completely. Hence, when my planned objectives were completed, Kato-san helped me by teaching me the basics of 3D printing and microfluidics. This helped me out immensely and I was even able to make a few basic microfluidics devices on my own. During my stay in Japan, I used to routinely visit Dr. Renu's lab. I used to learn their techniques of doing various experiments as well as attend their "Journal club" presentations. This used to be quite a good discussion session. AIST conducts regular workshops on confocal microscopy during which students from different institutes from across the DAILAB sister institutes visit AIST for a week and get hands-on training on the microscopy technique. Although I was there for other training purposes, Sunil-san and Renu-san were generous enough to allow me to attend the workshop and be part of training session. This was incredibly helpful and rewarding.

In addition to my research experience, another astonishing experience of Japan that added to my international experience was the food. I am an eggetarian i.e. I mainly follow a vegetarian diet with a few egg products. This was helpful because finding a pure vegetarian meal in Japan is… well… let me just say finding a lost needle in a haystack would be faster. In fact, they don't consider egg, chicken and fish product as nonveg at all! Kato-san used to accompany me to the food court for lunch where I tried different flavour of noodles (Miso, Udon, Ramen) and "vegetarian" food which include egg. Thankfully, Sakura-kan has a shared kitchen and every guest is provided with a separate set of utensils to use for cooking. Hence, at night, I usually used to cook Indian style food for myself. A bonus to the "common kitchen" design was that I was able to meet many guests who had visited AIST for training purposes in Sakura-kan's kitchen. This included a researcher from Sri Lanka working in the field of electronic devices, two geologists from Europe, interns from Thailand working in computer science and Slavia, an intern from Belfast working in the Physics department. Slavia used to identify my presence in the kitchen by the aroma of Indian spices. Well, the aroma of Indian food is definitely a beckoning one! I also cooked Indian food for my lab mates in Japan. They enjoyed it with water in their eyes as it was too "Karai" (spicy) for them however, they still loved the taste and were always eager to have more.

Altogether, my trip to Japan was full of educational experiences. This trip made me realize that while language can make comprehension hard, it's nothing that a little perseverance, desire to learn and enthusiasm to communicate cannot overcome. If nothing, you can at least use google translate and try and remember the icons eh? :)

SIMA CHAUDHARI
PhD Scholar, Department of Cell and Molecular Biology

LEGACY OF SCIENTIFIC SAGACITY

ARTICLE BY NEENA GEORGE

"Serendipity" is a word representative of luck involving an intersection of chance and wisdom. Louis Pasteur said, "In the field of observation, chance favors only the prepared mind". A perfect blend of chance i.e. serendipity and "prepared mind" i.e. sagacity is the Nobel Prize winning discovery of penicillin by Sir Alexander Fleming that revolutionized medical practices worldwide. Robert K Merton, a sociologist was very intrigued by the origin of the word "serendipity" and its relevance in research. He fiercely argued against any definition of science that did not appreciate the complex interweaving of perspiration, inspiration, mistakes and "educated guesses" i.e. "serendipity" that, he contended, was essential in any research. Towards this, he was sent many excerpts of accidental discoveries by his collegial network to aid his research. His subsequent archives are a good reference for those in search of heterogeneity in serendipity. There are various elements involved in serendipitous episodes.

According to Ohid Yaqub, in his publication on distinct types and mechanisms of serendipity, serendipity is classified into at least four types; Walpolian, Mertonian, Bushian and Stephanian, based on the motivation and the outcomes observed in the discovery.

WALPOLIAN

Walpolian, named after Horace Walpole who coined the word "serendipity" after being impressed by the fairy tale "The Three Princes of Serendip"; describes the discoveries made when not in quest of.

One of the brilliant examples for **Walpolian serendipity** include the discovery of enzymes by Eduard Buchner from cell-free extract of yeast that can produce alcohol from fermented sugar, regarded as the central dogma of biochemistry that brought forth the branch of enzymology. World War II witnessed many reformations in the political and social structure across the globe, but what is more interesting is that the end of this disastrous war ignited a war on cancer. The breakthrough discovery of cancer chemotherapy was the observation that the soldiers exposed to mustard gas after air raid by the German military on Bari port had white blood cells with a much slower growth rate than unexposed soldiers. There is confusion on when this use of gas as a chemotherapeutic agent to combat rapidly growing white cells first originated (scholars cite both World War I and II) but it is an exciting tale of serendipity combined with a perceptive mind.

Similarly, Pfizer's blue pill revolution, "sildenafil" initially discovered as a cure for hypertension and angina pectoris, accidentally turned out to be a blockbuster for erectile dysfunction and even received the 2007 'Ig' Nobel Prize for its ability to induce faster recovery of jet-lag in hamsters.

MERTONIAN

The Walpolian episodes restrict this category only to accidental discoveries on the unasked question.

Mertonian elaborates the theory by giving solutions through an unexpected route. In simple words, these are the accidental discoveries that find the solution to a problem that was not expected to happen in scientific research. The famous discovery that suits the Mertonian category is the vulcanization of rubber, which was purely an accidental observation by Charles Goodyear that put an end to the long-time research on making rubber thermostable and waterproof. This is more closely related to an accidental resolution for a targeted search.

BUSHIAN

Elaborating on the definition of Merton's concept, where the research questions are yet to be framed gives a **Bushian** type. According to Vannevar Bush, "in many instances, relevant discoveries come from unexpected sources".

The discovery of sugar substitute was indeed a sweet encounter when Constantin Fahlberg tasted the insoluble particles spilt during an experiment involving oxidization of coal-tar sulfobenzoic derivative. This led to the discovery of artificial sweetner o-benzosulfimide. Similarly, the discovery of X-rays by Wilhelm Roentgen while studying the cathode rays from Crookes tube covered with a thick black cover is a fine example of Bushian serendipity. He observed phosphorescence in the object kept at least one foot away from the cathode tube. He learned that the unknown invisible rays emitted from the cathode tube could penetrate through the thick cover. Later he discovered that these rays could pass through human tissues and can provide imprints of the internal structure. This shorter wavelength radiation opened unexplored avenues in physics.

STEPHANIAN

The **Stephanian** type describes the discovery of something before the problem exists. It reflects one's curiosity about a matter that does not exist yet. Have you ever wondered why the windshield does not shatter on accident? The serendipitous moment behind this discovery was the accidental dropping of a flask by Edouard Benedictus. He observed that the glass did not shatter but rather despite being broken, remained intact. He then learned that the flask previously contained cellulose nitrate

and had undergone evaporation and deposited a thin layer of bioplastic inside the flask. In 1907, Benedictus patented “Triplex”, the first safety glass. Hans Christian Oersted reported his discovery in 1820 on the relationship between electricity and magnetism. He observed a deflection in the compass, which was kept near a wire conducting electricity. At the time of his observation, there was no relevance for the idea but a decade later, Michel Faraday discovered electromagnetic induction and in 1835, Samuel F.B. Morse patented the electromagnetic telegraph.

Serendipitous discoveries always bring forth great advantages in scientific research. The chance of occurrence of unexpected results and the curiosity to trace their cause is fundamental for taking advantage of the unexpected opportunity. **Allowing curious minds to explore without restriction may be the best way to encourage the generation of accidental discoveries.**

The search for the importance or relevance of the experimental mistakes or coincidences, combined with perseverance, can offer new insights. For example, in a study to understand the hierarchical system in wasps, Liz Tibbetts manually painted dots on the back of the wasps and videotaped them. Unfortunately, she missed marking a few wasps. This created a significant problem in identifying and following the individual wasps. However, on closer observation of the video, she was able to differentiate the insects as she realized that each wasp had distinct facial colour and shapes. She further researched their ability to recognize each other, and surprisingly demonstrated that they are evolved to recognize each other, aiding in their social behaviour.

As Isaac Asimov once wrote, "The most exciting phrase to hear in science, the one that heralds new discoveries, is not 'Eureka!' but 'That's funny”.

So, let’s do some fun research!

Neena George
PhD Scholar, Department of Cell and Molecular Biology

PHOTOGRAPHY BY POOJA N

PHOTOGRAPHY BY
PRADYUMNA JAYARAM

Hope

POEM BY HANNAH CHRISTINA

Each and every flower tells
That life is a battlefield,
Each night that comes by tells
That there is always a day.

Hope is a must for everyone,
You tell your mind this often.

Without a defeat, you'll never know
The meaning of victory.

No stone becomes a sculpture
Without facing the brunt of a chisel,
Each pain that you encounter
Will make you someone to remember.

No history is without a defeat,
No war is ever won without a sacrifice,
Every problem will end in its time,
So, life is all that you need to hope for.

Hannah Christina
PhD Scholar, Department of Radiation Biology and Toxicology

A LIFETIME IN 4 MONTHS: MY STINT AT ABERDEEN

ARTICLE AND PHOTOGRAPHY BY SUPRITI GHOSH

When I applied in 2018 for the prestigious Newton-Bhabha Ph.D. Placement Fellowships, I only had a little hope of being selected. When the final list of DST-INSPIRE fellows was out, I was ecstatic to find my name among the selected 27. What followed thereafter was to become one of the most significant milestones in my PhD journey.

We had opted for the University of Aberdeen (UoA), Scotland, UK, where Prof. Margaret (Maggie) Cruickshank, instrumental in initiating the national human papillomavirus (HPV) immunisation programme in Scotland, has been working with her group on the management of women with lower genital tract intra-epithelial neoplasia and the impact of human papillomavirus (HPV) vaccination on HPV-related diseases. Prof. Maggie, in fact, wears many hats. She is an Honorary Consultant Gynaecologist at the ARI, Director of Research and Development for NHS Grampian, has a personal chair in Gynaecology at UoA, is President-elect of the European Federation of Colposcopy and Cervical Pathology (EFC), and Co-Director at Aberdeen Centre for Women's Health Research (ACWHR).

After a three-leg journey (Manipal-Bangalore-London-Aberdeen) that lasted over 24 hours, I arrived at Aberdeen on a cold and windy weekend at the end of February 2019. I was met at the airport by Prof Maggie's daughter (just the beginning of the incredible hospitality extended to me by my gracious host) and dropped at my hotel for the night. She also volunteered to take me to the university housing office the next morning to pick up the keys to my rented solo accommodation (called a "bedsit"), provided by the UoA, in Old Aberdeen.

On the Monday after my arrival, I took a shuttle bus to my department, ACWHR, a part of The School of Medicine, Medical Sciences and Nutrition, which was housed in the Aberdeen Maternity Hospital in the Foresterhill campus – as opposed to the Old Aberdeen campus, which was closer to my apartment.

UoA is the third oldest university in Scotland and the fifth oldest in the English-speaking world. It was founded in 1495 and consistently ranks among the 200 best universities in the world. It is made up of three colleges: King's College (pictured), Marischal College and Christ's College. King's College (the oldest) is located in Old Aberdeen and the new campus constituting the School of Medicine and Dentistry and School of Medical Sciences located in the new Foresterhill campus close to the Aberdeen Royal Infirmary (ARI). Five Nobel Laureates and numerous renowned personalities have been associated with the university. Aberdeen is a port city in the northeast coast of Scotland. It is called the "granite city" as most of the buildings (old ones) are built of granite. The new buildings are painted grey to match all others. Between the buildings and the overcast sky, it is always "grey", but not in a gloomy way. I used to enjoy the grey landscape a lot; felt it was strangely peaceful. Interestingly, so much about Aberdeen reminded me of Manipal! Just like the Manipal monsoon, you can never trust Scottish weather: I used to wake up to bright sunshine but by the time I got ready and stepped out of the house, it would have started raining! So, you always need to carry a waterproof coat with you - umbrellas do not help with the wind; I learnt that the hard way after breaking two!

King's College, University of Aberdeen, Scotland, UK

Like Manipal, Aberdeen has a major university in town; the UoA is similar to MAHE in terms of courses offered; and their sport complex is like our MARENA. After work, you can walk around the city admiring the architecture, go to the beach, explore the many museums, watch movies, plays and musicals, feast on the cuisines of the world, hang out at the pubs with your friends or spend your time at one of the most spectacular libraries in the world, Sir Duncan Rice Library. On weekends you can visit the neighbouring cities and countryside to explore the castles, camp in the highlands, take sight-seeing tours, do walking tours in all the major cities, or go on a guided tour to explore the world of Harry Potter or Outlander -among the many movies that have been shot in different parts of Scotland!

Since Prof. Maggie is a gynae-oncology surgeon and does not have a lab per se, I did not have any lab-mates or colleagues pursuing Ph.D. at that time: my colleagues were basically all medical doctors who were responsible for running each arm of the centre. Prof. Maggie took me to colposcopy clinics and operating rooms with her where I observed her do surgeries for cervical lesions, cancers and other lower genital tract diseases. I learnt a lot from those sessions. Every conversation with her was highly informative and cerebral, be it about our work, other possible research ideas or about the history and geography of Scotland. She arranged for me to visit the cytology and pathology labs and observe their workings. I attended many meetings and conferences and presented my work to Global Health students, medical and dental students and professionals. I also made two trips to Edinburgh for my experiments. I worked with the HPV Research Group at the Queen's Medical Research Institute (QMRI). The group is led by Dr. Kate Cuschieri (Director) and managed by Dr. Ramya Bhatia, who conducts various projects related to HPV surveillance and HPV-related diseases and run the Scottish HPV Archive; a collection of over 40,000 clinically annotated cervical cytology and DNA samples for research use by anyone in the European Union. Through the fellowship, we worked on an exploratory study to determine the persistence of HPV infection among young women who were immunized against the virus. The study helped us to compare our findings among rural Indian women with minimal screening and vaccination with women who have access to regular cervical screening and prophylactic immunization.

The four months I spent at Aberdeen was incredibly fulfilling from a learning and growing perspective: I feel blessed to have been given this opportunity by MSLS-MAHE, DST-India and the British Council. The professional satisfaction apart, the personal enrichment was so immersive that Scotland in general and Aberdeen in particular, became an integral part of my DNA when I was there; I cannot imagine not going back someday. I can honestly say that I experienced an entire lifetime in Aberdeen in the four months that I lived there.

Supriti Ghosh
PhD Scholar, Department of Cell and Molecular Biology

PHOTOGRAPHY BY POOJA N

DECOUPAGE: AN ART OF TINKERING

ARTICLE & CRAFTWORK BY ARYA K

"Decoupage" comes from the French word "decouper" which means "cut" or "cut off", and as the name says, it is an art/craft of cutting out papers, fabrics and incorporating them in multiple layers along with embellishments, painting effects, onto a surface (wood, tin, plastic, metal etc.) with the purpose of decorating/beautifying. This art runs its roots through the Chinese cutwork techniques and drives inspiration from East Siberian tombs. The Polish folk art of decoupage is thought to have originated in France during 17th century and widely preferred to decorate cabins, cutleries, furniture etc. Later it spread throughout Europe and gained popularity by the 18th century.

The process of decoupaging has acquired several variations along its journey of evolution along with the civilization, but in general, involves 4 basic steps:

- Preparing the surface
- Cutting out the elements needed to be arranged to complete the subject/story
- Gluing the cutout elements one after the other in desired patterns, in the order desired and adding any extra detailing to complete the design
- Sealing the whole work with several thin coats of varnish

Surface of choice could be anything from glass, wood, terra cotta, tin and cardboard. Prior to the process, these materials have to be cleaned appropriately to remove dust and dirt, or even painted as per the requirement of final output. Cut elements can be derived from unique decoupage papers, fabrics that are readily available in the commercial market or even from old calendars, magazine, greeting cards, paper napkins, origami papers etc... Mod podge is one of the widely used decoupage mediums to add layers to the surface. Once all the elements are added, as a final step,

decoupage varnishes (glossy or matte) are used to seal the whole artwork to protect it from dust and moisture ensuring its long life without fading.

Decoupaging is all about creativity, patience, and practice. With these traits and some bit and pieces of the ingredients, you too can be a "Tinker Bell" and master this artform!

Arya K
PhD Scholar, Department of Plant Sciences

SEEKING THE SCIENTIFIC TRUTH

ARTICLE BY
DINESH REGHUNATHAN

Truth always lies in the minute details of the facts. The more you ignore these details the greater the chances of deception. Without attention to details, your ideas and actions will deviate from the scientific and sound hypothesis to murkier waters and in no time, you will be lost and wandering in the mysterious forests of mere scientific jargon. The world has witnessed the sharpest of minds falling prey to planned marketing gimmicks, usually when solutions to everlasting problems are offered on a silver platter without any credibility with the promise of being 100% accurate and rapid. Don't believe it? Allow me to narrate a short story that inspired me to pen this article.

It was a fine evening, the rain had paused for a while and the sun was trying hard to peep through the clouds. One could still feel the chill in the air and yet it was just sunny enough, enticing everyone to indulge themselves in some "outdoor time". Perfect weather for sipping a hot tea and treating ourselves with some hot fritters. It's often said cafeterias are the platforms for great discussions, be it political, economic or life-changing, and people usually emerge enlightened and entertained. My story too, emerges from one such discussion, jury's out on whether it was enlightening but it was certainly quite interesting.

Isaac had an interesting story that evening, discovered via a random scroll through his Instagram reels. You could see he had chanced upon something really wild because his excitement was quite contagious. As Albert, Nicholas, Charles and Aristotle settled around him with hot ginger tea, Isaac immediately began sharing the details. The four keenly listened, pausing only to have more sips of the tea. The video might have originated in South East Asia. It showed a self-proclaimed miracle man in his late 40s addressing a small crowd and convincing them of a brand new cure for the latest viral sensation DaViD-19BC. He claimed that his way of living gave him extraordinary immunity, immunity that could withstand any amount of toxins. As proof, he goes on to drink a green liquid much to the confusion of the audience since the identity of the liquid is unknown. He then engages himself in a 30-minute vigorous stretching exercise, involving bending his body into difficult angles and finally rests in a seated position. Now his assistants come on to the "stage" much like in a performance and show the crowd a "poisonous" snake and collect the "poison" through its fangs into a beaker. The showman, oh, sorry, I mean, the miracle man gulps the contents of the beaker; emptying it into his mouth, unscathed and unfazed with no sign of fear. This act is very convincing as the crowd erupts in mad claps of ecstatic delirium. Isaac and his friends are entertained, of course but this crowd is no ordinary crowd. No, it's a crowd of scientists (drumroll). There's 4 scientists walk into a bar/cafeteria joke in the air, perhaps you can think of one for me :P And so naturally, these minds have a lot of questions. They immediately start thinking of possible explanations. "Maybe he injected an antidote" says Charles, "they could have diluted the "poison" with some chemical!". Several theories were drawn and erased in the air without any scientific explanation. Aristotle said no word though. He didn't draw any theories, *yet.* Instead, he sipped his tea quietly with a cheeky smile and following a lull, addressed the crowd, "Friends, I feel you have missed the tiniest of details." He went on to explain the concept of "misterming". "The snake is venomous, not poisonous. It's a venomous snake, not a poisonous snake". For you see, when the showman told the venom is poison, that was deception. Did you notice it too, dear reader?

Of course, the group knew the difference between venom and poison. It's a critical one too. Even though venom and poison are often interchangeable, they are not the same. Poison is a toxin that harms you, if inhaled, absorbed or swallowed and are mainly chemical compounds. Venom however, is made of mainly proteins and polypeptides and it needs a wound to enter the body. "So unless you are suffering from any forms of ulcer, i.e. *theoretically* anyone could drink "venom" and they too, would be relatively unharmed and make extravagant claims! If the miracle man had even a hint of ulcer within him, the cheers from the crowds would immediately have been of horror and tears!" Aristotle laughed. Reader please note, the "venom" aspect may not be dangerous but people have died even with contaminated water so there's definitely a lot of confounding factors involved. However, the point made by Aristotle is definitely a powerful one. The miracle man was indeed very lucky or perhaps well versed in this point of distinction himself. Venom, unlike a poisonous chemical would get broken down easily by acids in the stomach before it is absorbed or at least, this is the working theory in the scientific circles at the moment. So, there was arguably, no real threat to the miracle man. He was not alive because of his lifestyle but rather because of well, factual science.

There was silence in the cafeteria. They all had all learned an important aspect of life/science. The lies/truth always lie in the details. Attention to detail is the greatest lesson one needs to learn on the great quest of the scientific journey. May the details be with you always, okay?

The sun had finally emerged from the clouds. As comfy and perfect as the weather previously was, the cafeteria sudenly looked just a bit brighter. It could definitely have been due to the sun or perhaps it was the aura of the enlightened souls.

Dinesh Reghunathan
PhD Scholar, Department of Cell and Molecular Biology

DID YOU LEARN CORRECTLY?

ARTICLE BY
CHANDNI SACHDEVA

Comparison is the first approach to ascertain the performance of individuals. And, it starts early, by comparing a child's grades with others and then determine whether that kid's academic achievements are normal, better or excellent. We resort to giving an example of another child's accomplishment to motivate our own child. Comparison and competitiveness are a driving force towards performance. But is this the correct approach? Sometimes this feeling can push the child to perform at par with his/her capabilities and excel. However, does this work for every child? 'Not all fingers of your hand are equal; neither would be your students'. Years back, my tutor had given me his experience as a
piece of wisdom when I was starting my teaching career; it has stayed and helped in my long run of teaching.

It is as simple as it can be, when our bodies grow at different rates, why should our brains be any different?!

How can we expect all twelve-year olds to have the same learning efficiency when their bodies do not grow at same rate? We start walking at different times, we start talking at different times, this means we are growing at different rates and hence, our brains develop at different speeds. An obvious example that connects brain and body development would be that of attaining puberty at different ages.

It is important to understand and accept that although the brain continues to mature throughout most of life, it does not mature at the same rate in everyone.

As a teacher, I have always made sure to understand each of my students mentally and emotionally. I agree, it is time consuming but not impossible. The fruits of these efforts are rewards enough. Watching each student strengthen his/her skills and working on his/here weaknesses and eventually excelling at what they want to do is incredibly satisfying. It does not matter if they are scoring good or bad, what matters is 'did they improve?' Children learn in different ways. Although the maturity of the brain is an essential factor when it comes to learning differences, the real story is more complicated than that. The way children learn depends on age, level of development and brain maturity. Learning differences are also related to genetics, temperament and environment.

No two children are the same. They have different talents, interests, develop at different rates and have different strengths.

So, it is important as an individual, for both parent and teacher, to push their children accordingly. The focus should always be on improvement rather than excellence. Appreciating children for minute achievements, may it be 0.1%, affects children immensely. Mental peace and emotional balance spread out to their physical well-being. Eventually, they start getting better in all arenas. It is also essential for us to understand that skills such as working memory, planning, organization and attention develop over time with brain maturation and practice. So, encouragement works wonders than competition. Competition might give them academic excellence, but encouragement gives them happiness and satisfaction. Aren't we aiming for that?

Chandni Sachdeva
PhD Scholar,
Department Biotechnology

COVID-19 AND ACADEMIA: MAHE'S CARE TO IMMUNIZE ITS FRATERNITY

ARTICLE BY
SAMPARA VASISHTA

Holidays do not always seem to be good for students (applicable only for COVID-19 holidays). COVID-19 pandemic is a double-headed arrow, that proved to be beneficial for some and worse for other students. When it comes to the higher education segment, the majority of the students have been habituated to the blackboard/presentation mode of teaching for about 15-20 years. This viral pandemic has brought a dramatic shift in academia. Let us scroll down and take a snapshot of the virus-infused changes in the education system.

The teachers' setting

Teachers play a vital role in nurturing the character and career of the student. One of the key factors affecting the progress of the students is the absence of the student-teacher interaction. We have seen videos in social media that went viral, showing the struggles of teachers while making use of the online platforms. Due to vision- related health concerns, few of them left their jobs as well. Most of the teachers did not feel comfortable with the online teaching mode. Some were forced to cope up with e-teaching to continue their livelihood. Conducting examinations with often changing timetables, academic structures along with troublesome personal environments took a toll on the mental health of the teachers. But still, they did and are doing their best to teach students. Respect for them!

The students' scenario

Students who had the luxury of staying at home with feasible internet facilities had a contrasting mindset to that of those residing in rural India, as the latter suffered the worst due to this pandemic. Lack of digital infrastructure and inadequate communication systems has led to decreased student-teacher interactions. This has brought down the academic progress of students. It was a stroke of hard luck for many of the students who never had the taste of online education. For some, the loss of their near and dear ones had an adverse effect on their education. Privileged ones have their own issues where they don't want to spend a lot of time at home and are upset that they can no longer involve in their regular social activities. Frequent postponement of the examinations affected the students badly. The final year students had a different worry about their entrance examinations, chances of overseas education and campus interviews. Altogether the situation was and still is very tough.

The parents' worry

The wellbeing of the student is influenced by various socio-economic factors, their friendships and the environment at their home. As the economy tumbled, most companies did (or could) not pay their employees, while some companies opted to lay-off employees. Thus, financial worries increased on the parents and family, which reflected on the progress of the students.

A total mix-up

"Hello, hello! Am I audible? I cannot hear you, I cannot see you", "Error 404: Not found, 50%, 90% Data alerts", "Your up/download is pending", "No internet connection", sound of utensils, children crying, birds chirping, honking horns of automobiles in the background – several factors lead to distractions during online classes. One must note that not every student might have the luxury of having an independent room in their home or uninterrupted electricity and Wi-Fi. This seemed to be worrisome especially during online examinations. Pity the students!

Loopholes exist

We need to accept that loopholes exist at the ground level; at the same time, we need to move on and adjust to the adverse nature of this virus. Everyone needs some or the other source of income for their survival. There is a socio-economic difference within the society. Monitoring agencies and governments should aim to address the issues at the earliest and ensure that every child will have an educated life irrespective of social and economic factors.

Back on the track by bringing back the beauty of teaching – MAHE's initiatives

Students are the pillars of the nation. They represent literacy and skill, which reflects on the development and progress of the country. The alumni bring pride to the universities where they studied. Manipal Academy of Higher Education (MAHE), the world-class university with

PHOTOGRAPHY BY
NADEEM KHAN G

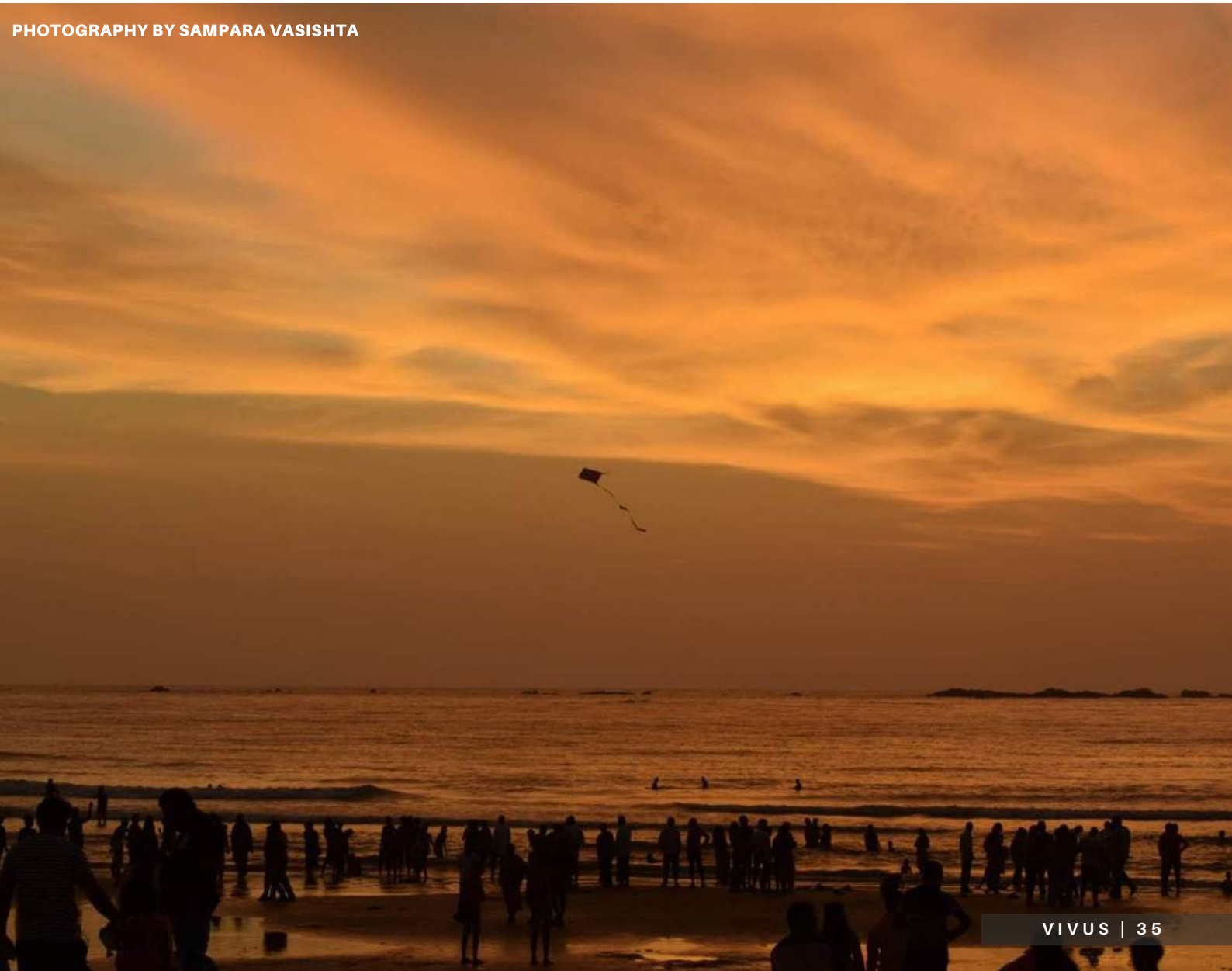
the “Institute of Eminence” tag came up with different strategies to overcome the crisis. With the roller coaster rides of the infection taking a toll on the education sector, MAHE came up with “Lecture-Capture facilities”, “Learning Management System” enabling the students to continue their studies at their own pace.

MAHE’s Care

With a whopping student strength (30,594), teaching staff (3,070) and almost 9000-strong workforce from several departments, MAHE is almost a beautiful mini township on a hilltop. To be in the driver’s seat and to handle this kind of pandemic is a daunting task for any administration. Dr. T.M.A. Pai, founder of MAHE, said, “It is my firm conviction that one man can only struggle, but it requires the “co-operation” of thousands to make his efforts succeed.” This is apt for the current situation. MAHE is not just a university, it is a source of livelihood for the thousands of people employed and residing in the nearby hamlets and towns. Hence, MAHE started vaccinating its employees and students on a war footing basis, free of cost, which is a touching gesture. The staff and students were provided with free-of-cost RT-PCR testing for, contact tracing and free quarantine facilities. One of its constituent units, the Dr. T.M.A. Pai Hospital has been dedicated to treating the COVID-19 affected individuals. Employees of the essential and support service departments worked throughout the lockdown. Overall, the front-line warriors from MAHE sacrificed themselves to save the stakeholders i.e. students, who are the strength of the university.

It is impossible to turn every wave of this pandemic into a "holiday". There is no doubt at all that we managed the two waves well somehow, but we will be tested again and again in due course. It appears that the Darwinian “Survival of the fittest” is starting to work again. Hence, it is important to get accustomed to the prevailing situations. Cooperation from the students is highly necessary to move ahead. At the same time, the institutions should have a soft corner towards those students who are struggling because of various reasons to match the existing learning modalities. In the current scenario, to prevent is to live and that should be our motto.

Sampara Vasishta
PhD Scholar, Department of Ageing Research



PHOTOGRAPHY BY SAMPARA VASISHTA

PHOTOGRAPHY BY
NADEEM KHAN G

AN ODE TO MAHE

KANNADA POEM BY
DARSHAN C M

ENGLISH TRANSLATION BY
APOORVA JNANA

ಪಾಠಶಾಲೆ

ಪಡುವ ಕಡಲತಡಿಯ ಮೇಲೆ
ಬೆಳೆಯುತಿಹುದು ಪಾಠಶಾಲೆ
ಗಗನ-ಗಿರಿಗೂ ಎತ್ತರ, ಬಾನ ಎಲ್ಲೆ ಹತ್ತಿರ

ನಿತ್ಯ ಸೂರ್ಯ

ಸೂರ್ಯನ ಬೆಳಕದು ಅರ್ಧ ದಿನಕೆ
ಮೂಡುವನು ಮೂಡಣದಿ ಮಲಗುವನು ಪಡುವಣದಿ
ಪಡುವಣದ ಸೂರ್ಯ ಇಲ್ಲಿಹುದು ತೀರದಲಿ!
ಹೊತ್ತಿಸುತಿದೆ ಜ್ಞಾನ ದೀಪವ ಅನುದಿನವು
ಬೆಳಗಲೆಂದು
ಗುರಿಯರಸಿ ಹೊರಟವರ ಹಾದಿಗೆ ಬೆಳಕಾಗಲೆಂದು

ಮಳೆಗಾಲದ MAHE

ತೆರೆಗಳಂದ ನೋಡಲಂದ, ಸುರಿವ ಮಳೆ ಎಂಥ ಚೆಂದ
ಅಚ್ಚ ಹಸಿರು, ಸುತ್ತ ನೀರು, ನೋಡೋ ಕಣ್ಣಿಗಬ್ಬ
ಜೋರು!
ಮಳೆಯ ಮೋಡ, ದಟ್ಟ ಮಂಜು, ಸಿಡಿಲು-ಗುಡುಗು
ಬೆಂಕಿ ಪಂಜು!
ಮಳೆಗಾಲದ ಮಾಯೆಯು, 'ಮಣಿಪಾಲದ
ಮಾಹೆ'ಯು
ನೋಡಿದಷ್ಟು ನೋಡಿಯೂ,
ಸಾಲದೆಂಬ ಚಿಂತೆಯು.

Darshan C M
PhD Scholar, Department of Biophysics

By the sea, along the west coast,
There stands an ambitious institute,
Growing higher than the tallest mountain
Reaching well into the horizon

Acquiring sunlight for half a day,
Following the sunrise in the east and sunset in the west
It arrives here, by the school along the shore!
Here to ignite the lamp of knowledge, day in and day out
To serve as a beacon, illuminating the paths of those with an aim,
of those on the determined pursuit of knowledge

Enter: the playful monsoon,
Oh, how beautiful to watch the waves
How enchanting is the fall of rain
Lush greenery, water everywhere, what a mesmerizing sight!
The dark clouds hidden in the thick fog
And suddenly, a flash asunder
A boisterous cackle of thunder,
Lightning here, a thunderous rebuttal there, oof, what a fiery battle!

The magic of the rain and the MAHE of Manipal
No matter how much it sees,
the heart yearns for more,
Worrying it could never, ever be enough.

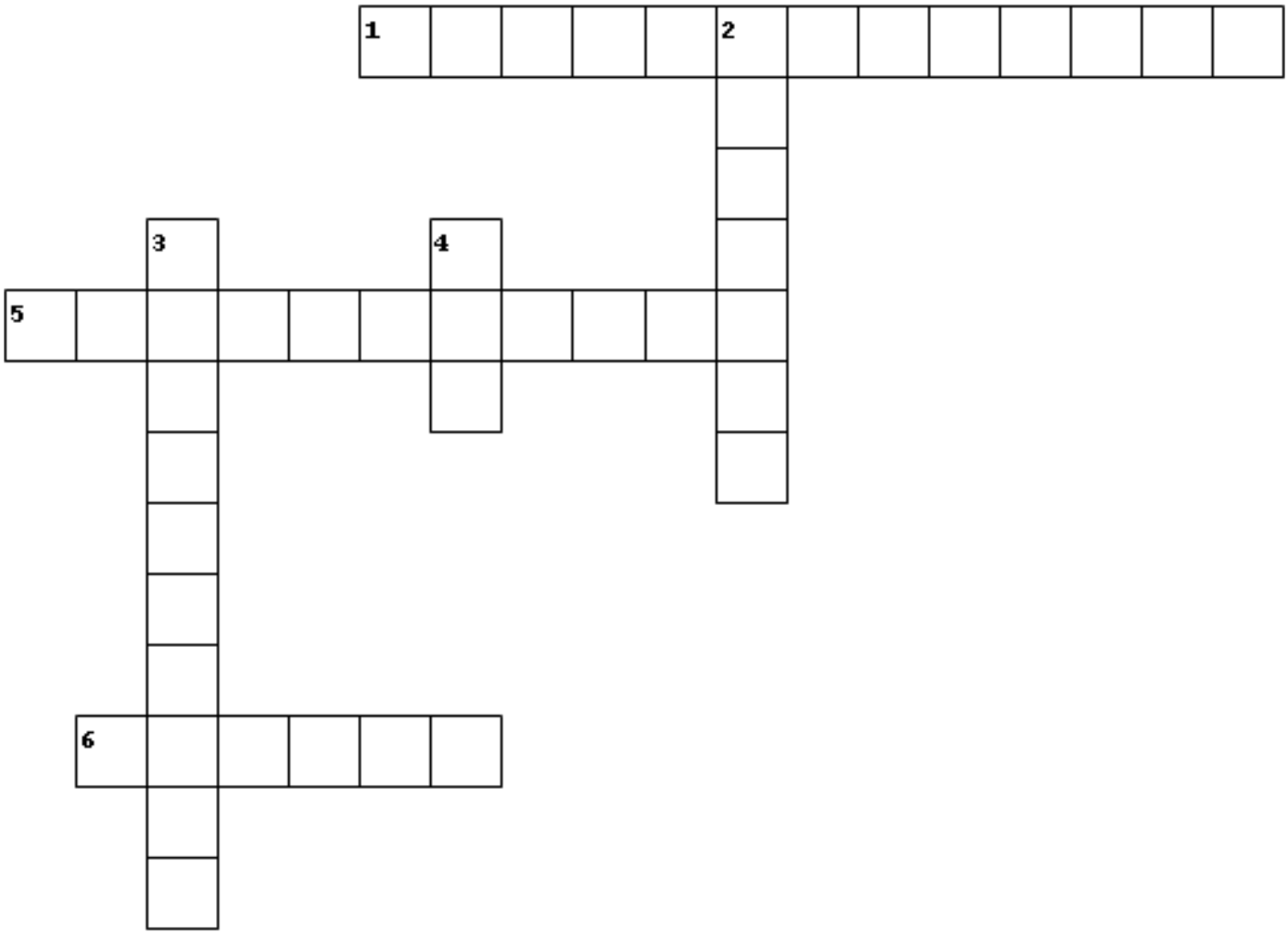
Apoorva Jnana
PhD Scholar, Department of Biotechnology

Creative nook

'TIS THE TIME FOR A

CROSSWORD!

DESIGNED BY CHANDINI B NAIDU
RESEARCH ASSISTANT
DEPARTMENT OF CELL AND MOLECULAR BIOLOGY



ACROSS

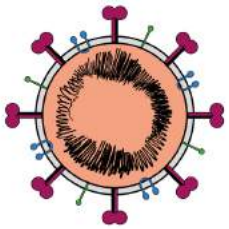
1. My superpower- I can read the script of a cell
5. We are the bond breakers floating in the fluid of a cell
6. I may be responsible for the abnormal behavior of a cell

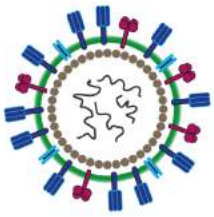
DOWN

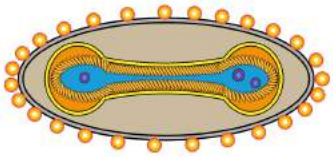
2. I am the fluid in the fundamental unit of life
3. I am the master of following equation: 1+1+1...n = 2
4. I am the thread of life

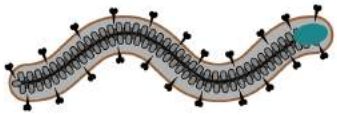
MATCH THE VIRUS!

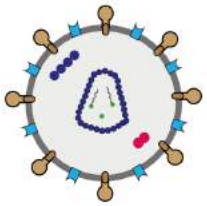
DESIGNED BY ANKIT SINGH TANWAR
PhD STUDENT
DEPARTMENT OF PUBLIC HEALTH GENOMICS

[1] 

[2] 

[3] 

[4] 

[5] 

[6] 

(A) NIPAH 

(B) HIV 

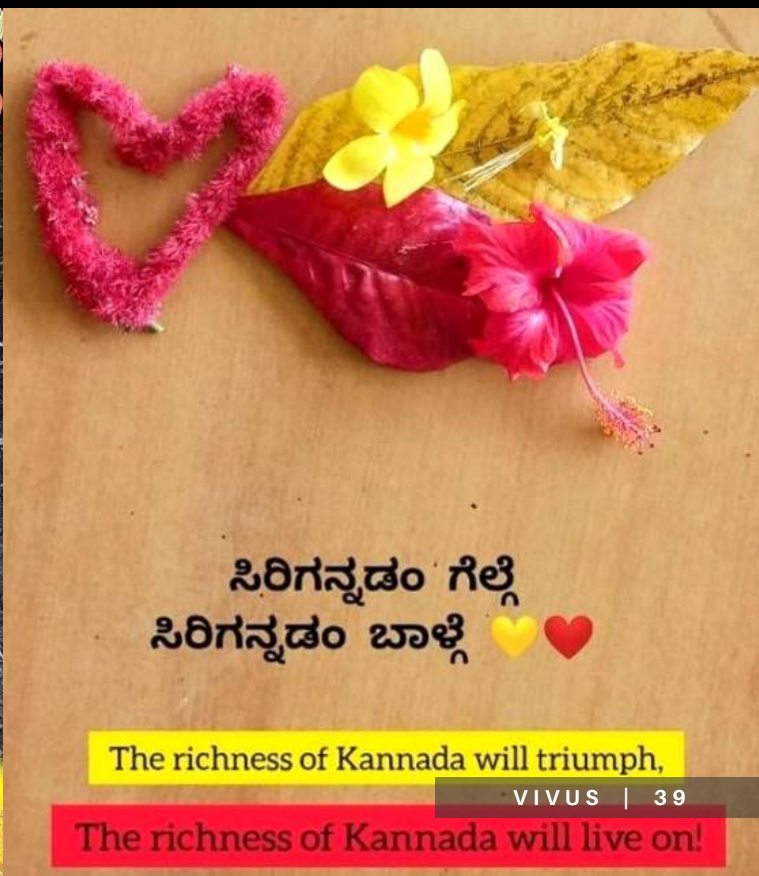
(C) EBOLA 

(D)  SARS-COV2 

(E)  SMALL POX 

(F)  INFLUENZA 

Karnataka rajyotsava celebrations



Deepavali celebrations

OIL PAINTING BY DEBYANI SAMANTRAY
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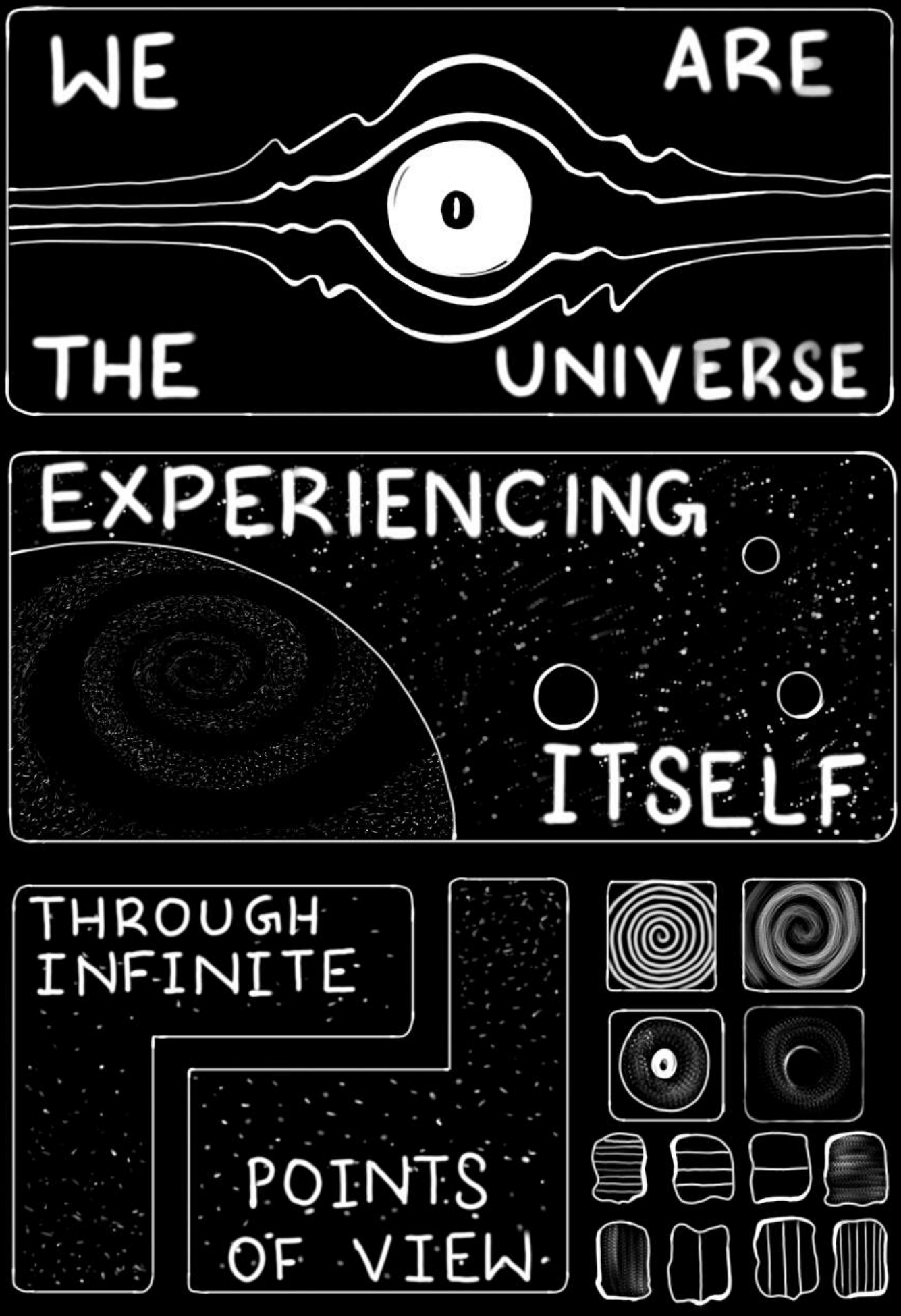
DEPARTMENT OF BIOINFORMATICS



CONCEPT / PENCIL SKETCH BY SANJAY K. U.
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DIGITIZED BY SONAM MEHAK
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DEPARTMENT OF CELL AND MOLECULAR BIOLOGY

PHOTOGRAPHY BY NADEEM KHAN G (MOBILE PHONE - ONEPLUS NORD)
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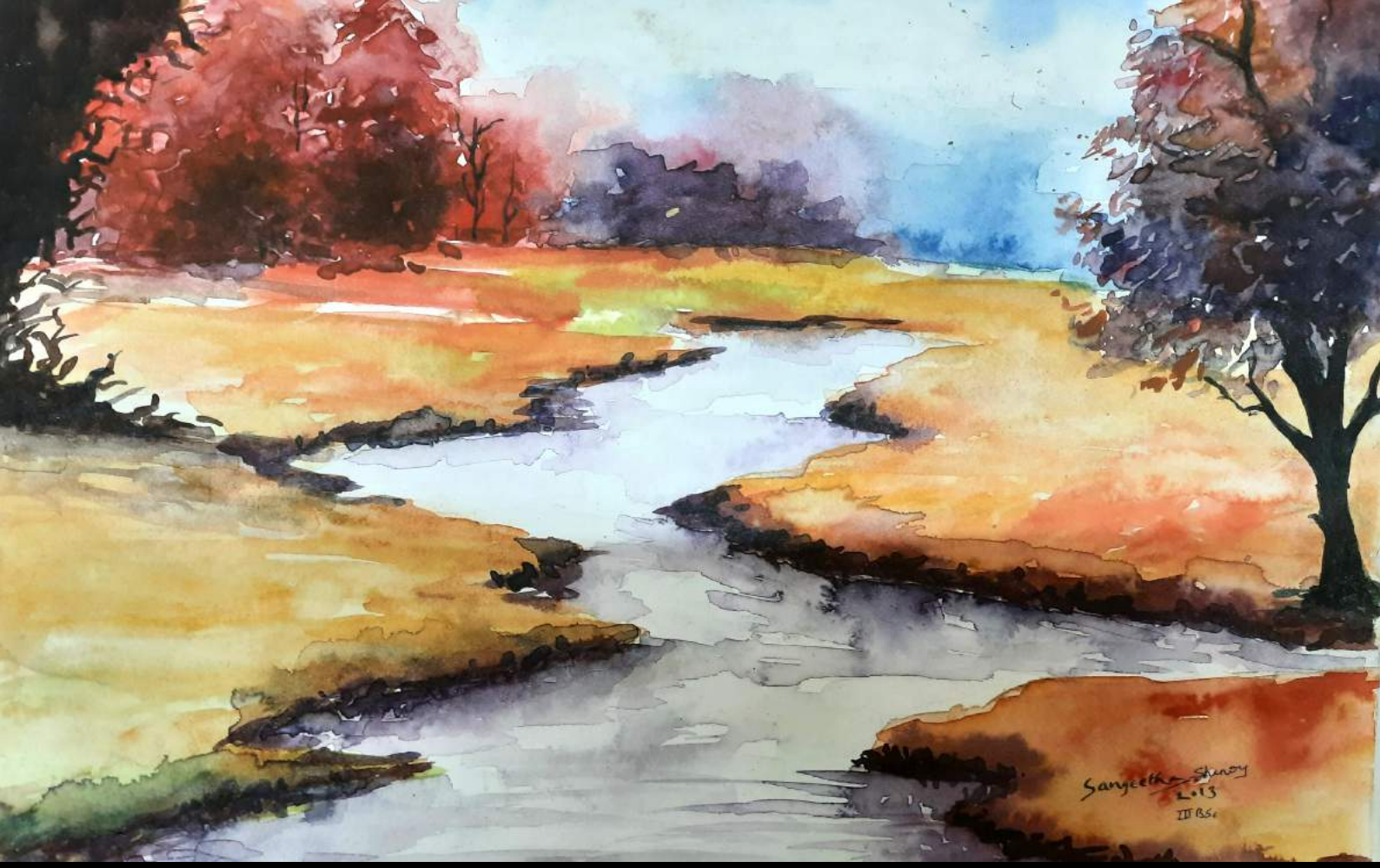

WATERCOLOR PAINTING BY U SANGEETHA SHENOY
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MANDALA ART BY VAISHNAVI K
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PHOTOGRAPHY BY JACKSON RODRIGUES (MOBILE PHONE - IPHONE SE 2020)
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FLOWER RANGOLI BY APOORVA JNANA
PhD STUDENT
DEPARTMENT OF BIOTECHNOLOGY

" For in my opinion, the most ordinary things, the most common and familiar, if we could see them in their true light, would turn out to be the grandest miracles of nature " - Michel de Montaigne