AMRITA VISHWA VIDYAPEETHAM | School of Biotechnology

JULY 2019

FEATURED ARTICLES

NEWSLETTER

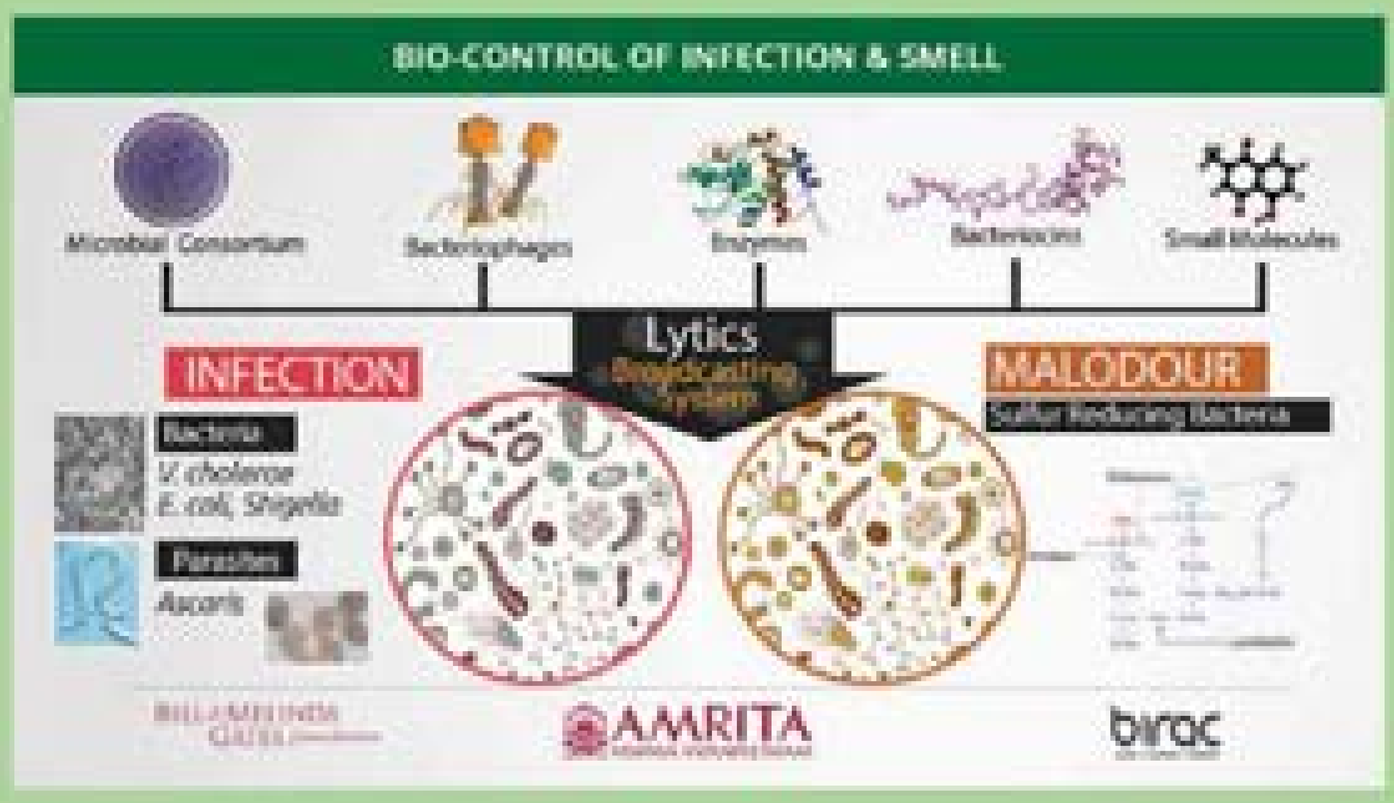
DEAN'S MESSAGE

Dr. Bipin Nair
Dean, School of Biotechnology

As Amrita Vishwa Vidyapeetham continued its inspired march towards higher peaks of excellence in all spheres of activity during the past academic year, the School of Biotechnology maintained its status as a prominent player in the progress of the University. With senior faculty members being invited to present talks at meetings both at the national and international level, to setting up collaborations and partnerships with international groups and institutions, to significant publications in international journals of respectable impact factor ratings and recognition, to having seven Ph.D. students completing the defense of their thesis to be awarded their Ph.D. degrees this year, the School has certainly maintained its long-standing reputation as a premier institution for undergraduate and post-graduate training and research in the Life Sciences domain.

As we move forward fully invigorated to strive and achieve greater pinnacles of excellence, we hope to capture the essence of the mission of the University in imparting, imbibing and inculcating "Education for Life".

BIO-CONTROL OF INFECTION & SMELL



Sanitation Biotechnology Lab works on different aspects of sanitation issues involved with faecal contaminants in wastewater. We deploy different microbiological and ecological control strategies to reduce the load of biogenic smell and pathogens and make the wastewater suitable for re-use and valorisation. Two major pilot models are being tested: vertical garden where space is a constraint and horizontal garden where space is not a constraint. In both cases, wastewater passes through a different biological filter to reduce nutrient load (biochemical oxygen demand = BOD) and pathogen load. It involves growth of chosen algae, bacterial consortia, bacteriophages against enteric pathogens and aquatic plants. In the vertical garden, with a linear flow rate of 0.3 m/h, we could reduce the pathogen load by >3 log, biogenic smell to acceptable limit and making them safe for fertigation (irrigation with fertilizer) for horticulture and run the system for about 3-weeks. A preliminary estimation shows with a garden space of 2mx 2m area, the horizontal toilet model can possibly generate revenue of more than seven thousand rupee by cultivation of banana & Colocasia. Currently it is exploring different methods of fecal sludge management as well where the fecal sludge can be safely and quickly treated to be used as fertilizer or seed bed.

DIFFERENT STAGES OF HORIZONTAL GARDEN

Without wastewater

Irrigated with filtered wastewater (after 3 months)

SELECTED PUBLICATIONS:

1. Salim A, Babu P, Mohan K, Moorthy M, Raj D, Sonia S, Suresh S, Madhavan A, Nair BG, Chattopadhyay A, Pal S. **Draft Genome Sequence of an Escherichia coli Sequence Type 155 Strain Isolated from Sewage in Kerala, India. Microbiology Resource Announcements Jul 2019, 8 (27) e01707-18**

2. Chandni P, Amrita Salim, Archana PV, Pradeesh Babu, Bipin Nair, Ajith Madhavan, Sanjay Pal. **Characterization of the bacteriophages binding to human matrix molecules. International Journal of Biological Macromolecules 110: 179-184.**

3. Nagarajan, P., Sruthy, K.S., Lal, V.P., Devan, V.P., Krishna, A., Lakshman, A., Vineetha, K.M., Madhavan, A., Nair, B.G., and Pal, S. (2017). **Biological treatment of domestic wastewater by selected aquatic plants. In 2017 International Conference on Technological Advancements in Power and Energy (TAP Energy), pp. 1–4.**

AMRITA'S VIRTUAL LABORATORIES PROJECT CROSSES A DECADE & WITH OVER 382700+ REGISTERED USERS

The national Virtual Laboratories project of Amrita Vishwa Vidyapeetham, along with IIT Delhi; IIT Bombay; IIT Kanpur; IIT Kharagpur and others, has been enhancing the laboratory education of students online for more than a decade. Launched in 2009, Amrita's VALUE Virtual Laboratory initiative has developed and deployed more than 360 online laboratories for undergraduate and postgraduate students and teachers. This was part of National Mission on Education through ICT, funded by Ministry of HRD, Government of India, and was coordinated for Amrita by the Dean of Post Graduate programs, Dr. Krishnashree Achuthan.

At a review meeting on April 26, 2019, at IIT Delhi, all institute coordinators commemorated the world's largest virtual laboratories project and its 10th year. Dr. Shyam Diwakar, Co-investigator of the Virtual Labs project represented Amrita Vishwa Vidyapeetham for this 10th year in review.

Several Amrita faculty members and centers were directly involved in the project. The initial platform for virtual labs across India was developed by Amrita CREATE led by Dr. Prema Nedungadi and Dr. Raghu Raman. Amrita CREATE had developed the animations and simulations for the Phase 1 and 2 of this project. Amrita School of Biotechnology professors made the largest biotechnology virtual labs contribution in this project and Dr. Bipin Nair, Dean, faculty of Sciences, was the discipline-wise National Coordinator of Biotechnology and Biomedical Engineering Virtual Labs.

With over 1000+ online laboratories freely available for learners, a virtual laboratory is a tool for distance learning and/or experimentation that allows students and teachers to share knowledge, data, voice, video, tools, and many other resources. It provides a suitable environment to extend, improve, integrate, refine, and assist the learning and/or experimentation process of many subjects, thus contributing to an increase of the effectiveness of scientific research and widening the use of scarce or costly equipment.

Amrita Virtual Labs has

382704

registered users.

ROLE OF NOTCH AND INSULIN SIGNALING PATHWAYS IN MAINTENANCE OF QUIESCENCE IN MUSCLE STEM CELLS

Dr. Rajaguru Aradhya, Assistant Professor, School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri campus, was invited to deliver a talk on "Role of Notch and Insulin Signaling Pathways in Maintenance of Quiescence in Muscle Stem Cells" to members of Life Science Unit Labs, ShanghaiTech University, Shanghai, China, on May 8, 2019.

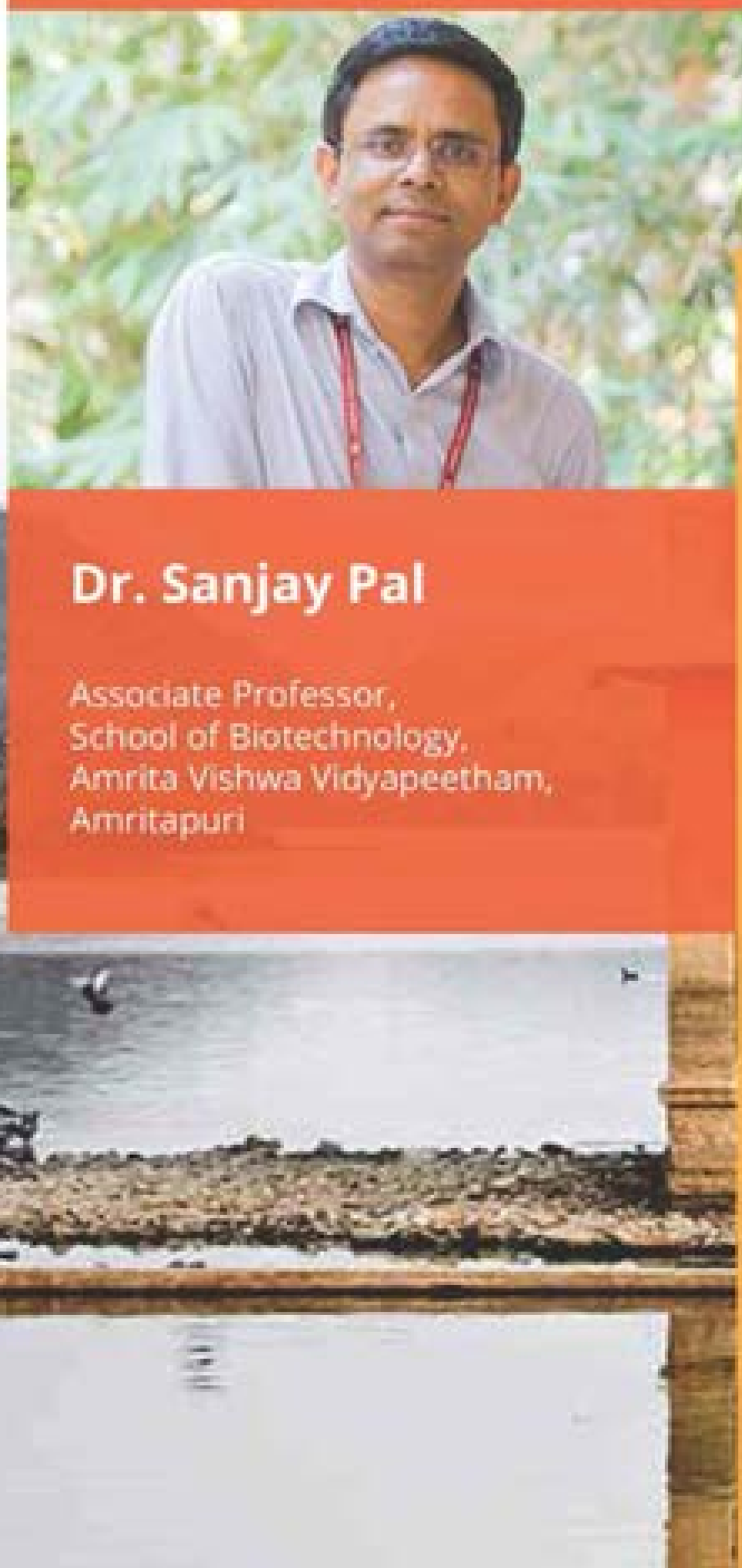
During the talk, Dr. Aradhya discussed how different signaling pathways control quiescence in adult stem cells and how we could exploit this information in treating diseases that require reactivation of stem cells.The delegation and visit were facilitated by the Life Science Department of ShanghaiTech University to establish possible collaborations with the School of Biotechnology, Amrita Vishwa Vidyapeetham. The research background of Dr. Aradhya coincided with the main theme for several labs and the visit was successful in establishing at least one initial collaboration that will include an exchange of technical resources and man power, etc.

ShanghaiTech is a small-scale research university with a beautiful modern residential campus in the heart of Shanghai Pudong's Zhangjiang Hi-Tech Park. With an academic focus on STEAM research, ShanghaiTech is committed to carrying out China's national development strategy and nurturing a new generation of innovative scientists, inventors and entrepreneurs. ShanghaiTech is a young resource-rich university with the backing and support of the Shanghai Municipal Government and China Academy of Science. ShanghaiTech's five schools and three research institutes seek cutting-edge solutions to address the challenges that China and the world is facing in the fields of energy, material, environment, human health, and artificial intelligence.

INVITED TALK AT INDO-UK CONFERENCE ON EMERGING AND RE-EMERGING

Dr. Sanjay Pal, Associate Professor, Sanitation Biotechnology Lab, School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri Campus, was invited to present a talk titled, "Complementary Approaches to Combat Antibiotic Resistance in Bacteria" at the Indo-UK Conference on Emerging and Re-emerging Infectious Diseases, held at Inter University Centre for Biomedical Research and Super Speciality Hospital (IUCBR & SSH), Kottayam, Kerala, from February 25-26, 2019.

In his talk, Dr. Pal highlighted the major drivers of the rise of antimicrobial resistance, particularly the "factory farms" (dairy/aquaculture/poultry). He emphasized that traditional, large, centralized effluent/sewage treatment plants (ETP/STP) are proving to be the breeding ground for antibiotic resistant bacteria, and hence, a decentralized sanitation system is most appropriate for both developed and developing nations. He showcased Amrita Sanitation Lab's research projects on application of bacteriophages and other biocontrol strategies in different contexts of sanitation to address antimicrobial resistance in bacterial population in the environment.



Dr. Sanjay Pal

Associate Professor,
School of Biotechnology,
Amrita Vishwa Vidyapeetham,
Amritapuri

INVITED TALK AT CSE KNOWLEDGE CONCLAVE, RAJASTHAN.

Dr. Sanjay Pal, Associate Professor, Sanitation Biotechnology Lab, School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri Campus, was invited to deliver a talk titled, "Biocontrol of Infection and Smell in Wastewater for Use in Agriculture and Aquaculture" at the Centre for Science and Environment (CSE) Knowledge's Conclave on "Designing and Implementing Affordable and Sustainable Sanitation for All", organized by the Centre for Science and Education, held on the beautiful campus of CSE's Anil Agarwal Environment Training Institute in Nimli, Rajasthan, on April 4, 2019.

In his talk, Dr. Pal emphasized that traditional, large and centralized effluent/sewage treatment plants (ETP/STP) are proving to be un-sustainable from both economical and environmental perspectives, particularly with respect to the recent findings of the breeding and spreading of antimicrobial resistance in centralized treatment plants. He suggested that decentralized sanitation systems with biocontrol strategies are most appropriate for both developed and developing nations. He showcased Amrita Sanitation Lab's various projects on application of bacteriophages and other biocontrol strategies in different contexts of sanitation to address foul smell and enteric pathogens in the wastewater.

AMRITA PARTNERS WITH 14 INTERNATIONAL INSTITUTIONS IN "WENET -THE INTERNET OF Us"

Amrita Vishwa Vidyapeetham is partnering with 14 other institutions from EU, UK, China, Mexico, Mongolia, Paraguay in the 'WeNet-The Internet of Us.' Dr. Shyam Diwakar, Director, Computational Neuroscience and Neurophysiology and Associate Professor, School of Biotechnology, Amritapuri, leads Amrita's role in this project. Amrita Vishwa Vidyapeetham is the only partner from India.

The Horizon 2020 funded WeNet research project officially kicked off during a three-day meeting that started January 30, 2019 at the Department of Information Engineering and Computer Science, University of Trento, Italy. WeNet is a multidisciplinary project – using computer science, sociology and engineering – that will create a platform that enables people to support each other in a way that transcends geographical and cultural backgrounds. Diversity is a key enabler of the WeNet platform. It will use machine-learning algorithms to build user-profiles based on behavior and other key factors. The profiles will then be matched to positively exploit the diversity of users, allowing them to help one another. By connecting people from diverse backgrounds and skill sets, WeNet will enable them to interact and incentivize them to assist one another in ways that would not formerly have been possible.

The WeNet platform will be the basis of a series of studies within universities worldwide with diverse student populations to improve students' quality of life inside and outside the academic environment, taking into consideration ethical and privacy guidelines.

Apart from Amrita Vishwa Vidyapeetham, other partners of the WeNet research project include Università degli Studi di Trento, Italy; London School of Economics and Political Science, UK; Anoikto Panepistimio Kyprou (Open University of Cyprus), Cyprus; Ben-Gurion University of the Negev, Israel; Martel Innovate, Switzerland; U-Hopper Srl, Italy; Agencia Estatal Consejo Superior de Investigaciones Cientificas, Spain; Idiap Research Institute, Switzerland; Aalborg Universitet, Denmark; Eberhard Karls Universitaet Tuebingen, Germany; Universidad Catolica Nuestra Senora de la Asuncion, Paraguay; National University of Mongolia, Mongolia; Instituto Potosino de Investigacion Cientifica y Tecnologia, Mexico and Jilin University, China.

WeNet will start with a number of Smart University pilots to exploit diversity case studies. These will be extended by further engaging five new pilot sites that will be found via the Open Call funding system. For ensuring the long-term sustainability of the research infrastructure, a non-profit organization will be created, which will be in charge of managing the infrastructure and managing the community.

UNIVERSITY OF MILAN

"LA STATALE"

AND AMRITA PLAN COLLABORATION

On February 4, 2019, Dr. Shyam Diwakar, from the Centre for Computational Neuroscience and Neurophysiology, School of Biotechnology, Amrita Vishwa Vidyapeetham, met with the University of Milan La Statale's Rector, Prof. Elio Franzini and had a discussion on augmenting joint possibilities with both Universities. Vice Rector of Internationalisation, Prof. Antonella Baldi also met with Prof. Diwakar and discussed on joint programs and exchange of students. Prof. Maria Pia Abbracchio, Deputy Rector and Vice Rector for Research and Prof. Goffredo Haus, Vice-Rector of Innovation also met with Prof. Diwakar and discussed various engagements that could enhance UNIMI's role through the existing MoU. Prof. Diwakar is also a faculty fellow at Amrita Center for International Programs, that promotes international activities and outreach at Amrita. Universita degli Studi di Milano (UNIMI) and Amrita Vishwa Vidyapeetham had signed an cooperation agreement for student and research exchange in November 2018.

Milan's vice-rector Prof. Baldi says "Together as two universities, we will explore scientific and technological solutions for diverse societies while unifying the commonness with an understanding - all that while we work for a new generation of students for the future of our world." Deputy Rector Prof. Abbracchio who emphasizes on cross fertilization among all branches of sciences and humanities as key to future adds "Successful futures are led by novel policies of joint actions across diverse strengths".

Amrita Vishwa Vidyapeetham has several ongoing working collaborations with UNIMI collaborators and two of Amrita professors are UNIMI alumni. Besides having a PhD from Department of Mathematics in UNIMI, Prof. Shyam Diwakar of Amrita School of Biotechnology had also been the Indian PI of an Indo-Italy program of cooperation 2012-15 on a robotics project with Prof. Giovanni Naldi at UNIMI. Prof. Antonella Delle Fave, Full professor of General Psychology, had facilitated the meeting, is currently leading an Indo-Italy program of cooperation project on neurological diseases with Prof. (Dr.) Ram Manohar, Research Director, School of Ayurveda, Amrita Vishwa Vidyapeetham in addition to Center for Integrative Medicine, Amrita Institute of Medical Sciences, Kochi. Dr. Prasanna Ramani from Amrita School of Engineering, Coimbatore campus is a PhD from UNIMI and is currently collaborating on organic and phytochemsitry with Prof. Luisella Verotta of Department of Environmental Science and Policy at Milano.

UNIMI and Amrita have since been active in collaborative research since 2004 and have had Indo-Italy programs connecting professors and research groups.

BIOLYMPICS 2019

AMRITA VISHWA VIDYAPEETHAM | School of Biotechnology

CELEBRATES ANNUAL SPORTS MEET

Providing a great venue for the students to sweat it out and battle for glory, BIOLYMPICS 2019, the annual Sports meet of School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri campus, was conducted on February 6-8, 2019. The event began with a spectacular march-past by the four houses of the school and the first day saw tightly fought chess, carrom, table tennis and foosball matches that tested the wits, agility and speed of the participants.

BIOLYMPICS 2019 was formally inaugurated with a welcome speech by Mr. Ajith, which was followed by the address of the Dean, Dr. Bipin Nair. The Dean reiterated the importance of sports and physical activities in the life of a student and he encouraged the audience to exercise their bodies as much as they exercise their brains.

The guest of honour was Mr. Dolphin Ratheesh, a renowned swimmer honoured by the Limca Book of World Records. In his speech, Mr. Ratheesh encouraged the students to take up sport to stay fit and practice sportsmanship spirit during the games. The inaugural ceremony concluded with an oath taking formality led by the Creatome Sports secretary, Graham Stains Philip of S4 BSc Microbiology. Afterwards, the captains of the 4 houses promised fair play and mutual respect.
The track and field competitions began on 7th of February with 100 metre heats. It was an eventful day with plenty of sporting action amidst thundering cheers from the watching crowds. The second day, 8th February, began with a 1500-meter race at daybreak and it was followed by relay races, throw ball and basketball competitions.

BIOLYMPICS 2019 came to a conclusion with the prize distribution ceremony honouring the overall champions. House Jyothirmayi emerged as the team with maximum points and the overall championship was awarded to both Graham Stains Philip and Bhanu Vijayakumar.

SCHOOL OF BIOTECHNOLOGY CELEBRATES

Amrita Kalotsavam 2019

Amrita Kalotsavam 2019 was officially inaugurated on April 12, 2019 by Dr. Bipin Nair, Dean, School of Biotechnology, Amrita Vishwa Vidyapeetham, Amritapuri. The colourful festivities began with a prayer followed by lighting the lamp. Dr. Bipin Nair talked about the importance of art in the life of a science student. He spoke of his days in college where he never shied away from the stage and urged students to showcase their talents without nervousness and hesitation. The day also marked the inauguration of the arts club at the School of Biotechnology.

The first day was full of musical symphonies, theatrical actions and synchronized dancing. Students participated enthusiastically in large numbers. The second day was saved for group events, wherein students co-ordinated among themselves to present seamlessly beautiful pieces of art.

The two day extravaganza was held in two different stages to facilitate easy and smooth continuity of events. The off stage events which included literary competitions and artistry were held the week before. The event was successful in not only displaying the diverse talents of the students but also in providing a change from the usual academic scene. The event ended with the declaration of the overall champions, which was won by the B. Sc. students of Semester 4 at School of Biotechnology.

INVESTIGATING THE INTERACTION BETWEEN *Pseudomonas aeruginosa* and *Cryptococcus neoformans*

Mr. Kartik Dattani
Bsc Biotechnology, Student

One fine morning in the month of February 2019, I got a message from one of my seniors congratulating me for getting selected for the JNCASR SRFP 2019. The feeling of joy and awe I felt was not measurable by words. It was one of the best days of my life. I was assigned to Dr. Varsha Singh at the Indian Institute of Science, Bangalore. It was literally a dream come true, specially to intern at IISc. Dr. Varsha Singh's principal work involved the study of innate immune response to pathogenic infections in the model organism Caenorhabditis elegans. She is one of the friendliest people I have ever met. She would listen to my ideas and give advice on how to improve them and come up with creative experiments. She handed me my own project to investigate the interaction between Pseudomonas aeruginosa and Cryptococcus neoformans both in-vitro and in-vivo using C. elegans. All the lab members were familiar with Amrita University as the lab already had two project students from Amrita School of Biotechnology earlier. The initial weeks when I had to standardize a protocol for the study, all the lab members were very helpful and supportive.

I learned the ability to design experiments of my own. To come up with creative and out of the box ideas. I realised that planning an experiment is harder than the actual experiment and most importantly, I have learned to accept failure and embrace it, to learn from my mistake to make better judgements. I was also introduced to the basic techniques of worm handling and culturing which I feel would be a great advantage for my research career. I learnt a lot from my time at IISc and I can personally guarantee that it will surely be an experience of a lifetime.

RECENT PUBLICATIONS

1. Sagitha P, Reshmi CR, Sundaran SP, Binoy A, Mishra N, Sujith A. 2019. In-vitro evaluation on drug release kinetics and antibacterial activity of dextran modified polyurethane fibrous membrane. International journal of Biological Macromolecules, 126:717-30.

2. Thomas AK, Preetha S, Omanakuttan A, Vidyullata L, Ashokan A, Rajachandran V, Chattopadhyay S. 2019. Mutational convergence acts as a major player in adaptive parallel evolution of Shigella spp. Scientific Reports. 9(1):3252.

3. Nair D, Vanuopadath M, Balasubramanian A, Iyer A, Ganesh S, Anil AN, Vikraman V, Pillai P, Bose C, Nair BG, Pai JG. 2019. Phlorotannins from Padina tetrastromaticac structural characterisation and functional studies. Journal of Applied Phycology. 1-1.

4. Banerjee R, Shine O, Rajachandran V, Krishnadas G, Minnick MF, Paul S, Chattopadhyay S. 2019 Gene duplication and deletion, not horizontal transfer, drove intra-species mosaicism of Bartonella henselae. Genomics.

5. Melethadathil N, Nair B, Diwakar S, Heringa J. 2019. Mining Inter-Relationships in Online Scientific Articles and its Visualization: Natural Language Processing for Systems Biology Modeling. International Journal of Online Engineering. 15(2).

6. Gondkar K, Patel K, Krishnappa S, Patil A, Nair B, Sundaram GM, Zea TT, Kumar P. E74 like ETS transcription factor 3 (ELF3) is a negative regulator of epithelial-mesenchymal transition in bladder carcinoma. Cancer Biomarkers. 2019 May 6(Preprint):1-0.

7. Pushkaran AC, Vinod V, Vanuopadath M, Nair SS, Nair SV, Vasudevan AK, Biswas R, Mohan CG. 2019. Combination of Repurposed Drug Diosmin with Amoxicillin-Clavulanic acid Causes Synergistic Inhibition of Mycobacterial Growth. Scientific Reports. 9(1):6800.

8. Bobba KN, Binoy A, Koo S, Nedungadi D, Podder A, Sharma A, Mishra N, Kim JS, Bhuniya S. 2019. Direct readout protonophore induced selective uncoupling and dysfunction of individual mitochondria within cancer cells. Chemical Communications. 55(45):6429-32.

9. Nutakki C, Radhakrishnan S, Nair B, Diwakar S. 2019. Modeling fMRI BOLD signals and temporal mismatches in the cerebellar cortex. CSI Transactions on ICT. 1-8.

10. Pai AR, Nair B. 2019. Synthesis and characterisation of Sb-doped ZrO2 and TiO2 nanoparticles. International Journal of Microstructure and Materials Properties, 14(3):286-98.

PhD Awardees 2019

ASBT had a very successful year with 7 Ph.D. candidates completing their Ph.D. defence and to be awarded the Ph.D. degree during the convocation in September 2019.

Dr. Nidheesh M
PhD Focus : Neuroinformatics
Thesis title : Design of a Biomedical Natural Language Processing System for Mining Scientific Article

Dr. Chinchu Bose
PhD Focus : Phytochemistry
Thesis title : Value Addition To Underutilized Plants And Plant Waste Biomass Through Isolation, Characterization and Bioactivity Studies of Natural Products

Dr. Sindhu Shetty
PhD Focus : Fungal enzymes
Thesis title : Isolation, Screening, Production, Purification, Characterization and Application of Alpha-1,5-L-Endo-Arabinase From Fungi.

Dr. Asha Vijayan
PhD Focus : Computational Neuroscience
Thesis title : Cerebellum Inspired Neural Architecture for Motor Articulation Control

Dr. Jayalekshmi H
PhD Focus : Microbiology
Thesis title : Controlling Pseudomonas aeruginosa virulence through Clove Bud Oil mediated modulation of quorum sensing

Dr. Manjusha Nair
PhD Focus : Computational Neuroscience
Thesis title : Mathematical Modeling and Information Theoretic Analysis of Cerebellum Input Layer Computations

Dr. Divya Nedungadi
PhD Focus : Cancer cell biology
Thesis title : Shogaol induced paraptosis: a novel way to target cancer cell death.

BOOK POST

TO,

IF UNDELIVERED PLEASE RETURN TO:

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GLOBAL UNIVERSITY RANKINGS

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No.1 Private University in India

THE WORLD UNIVERSITY RANKINGS 2018

RANK #188 in ASIA
NO.1 Private University in India, 2018

QS UNIVERSITY RANKINGS

nirf

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AND EMERGING ECONOMIES

THE WORLD UNIVERSITY RANKINGS 2017

RANK #140 in BRICS
NO.1 Private University in India, 2018

QS UNIVERSITY RANKINGS

RANK #8
University Rankings
India, 2018