

Newsletter

3rd Quarter
July-September 2016



Quick Facts



FACULTY
INDEX

TOTAL: 32 (15 Ph.Ds)
PUBLICATION INDEX: 3.2



PUBLICATION
INDEX

SUBMITTED: 16
PUBLISHED: 10 (SCOPUS-INDEXED)



RESEARCH
INDEX

PROPOSALS SUBMITTED:
3/ ₹167 LAKHS
NO. OF PH.D. STUDENTS: 35
PH.D. GRADUATION: 6



GRADUATION
INDEX

UNDERGRADUATES: 80
POSTGRADUATES: 60

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“Choosing Biotechnology as a career option, you have made your future brighter. But along with adapting new technologies, we should always embrace and blend them with our ancient culture and tradition, rather than blindly following the west”

Amrita School of Biotechnology welcomed its new batch of students in a unique induction program titled “SWAGATHAM 2016” on July 27, 2016. The new students were greeted with a traditional welcome from their seniors, after which they each lit a deepam, signifying the light of knowledge, to be placed at the feet of Saraswati Devi, the Goddess of Learning.

This ceremony was followed by the official inaugural programme that commenced with prayers and the traditional lighting of the lamp. Prof. Bipin Nair, Dean (Biotechnology), Amrita University, gave the welcome address, in which he detailed the importance of Biotechnology and its very significant contribution to the modern day

world, after welcoming the new students into the Amrita family.

Swamini Krishnamrita Prana, one of the senior-most disciples of Chancellor Amma, delivered the benedictory address. “Choosing Biotechnology as a career option, you have made your future brighter. But along with adapting new technologies, we should always embrace and blend them with our ancient culture and tradition, rather than blindly following the west,” said Swamini. Prof. Krishnashree Achuthan, Dean (PG Programs), Amrita University, also addressed the audience and encouraged the students to benefit from the significant progress and achievements made by the School and University in the short



Swagatham

Welcoming the new family members!

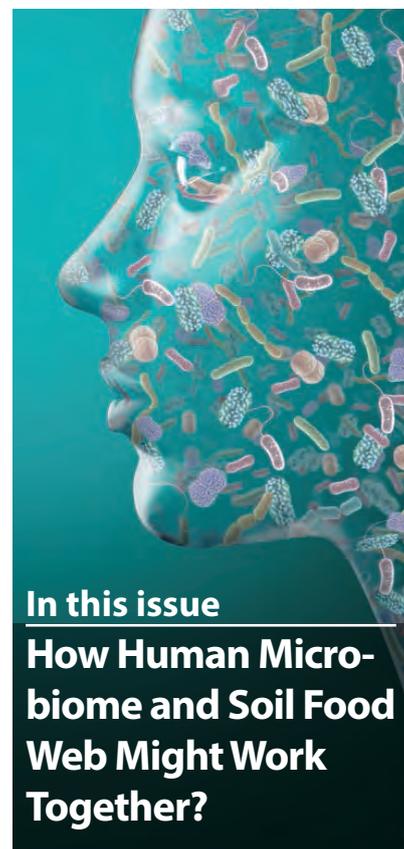
time since their inception. She also reiterated the opportunity to take advantage of the unique environment, a blend of cultural, intellectual and spiritual richness.

The prestigious AMRITAVIDYANIDHI Scholarships were awarded to Ms. Ivy Rose Sebastian (M.Sc. Biotechnology), Ms. Nidhi (M.Sc. Biotechnology) and Ms. Sreesa Sreedharan (M.Sc. Microbiology).

Students were also informed about several extension activities at Amritapuri Campus, including the Global Youth Initiative, AYUDH. Ms. Nidhi Nair of AYUDH Amritapuri explained what it means to be an AYUDH member. The inaugural

programme concluded with the distribution of Prasad by Swamini Krishnamrita Prana to all the new students.

After the official inaugural programme, students had an informal session, with their seniors which served as a fun-filled opportunity for the incoming students to interact with and get acquainted with one another. Students sprinted across the campus as part of a treasure hunt that doubled up as an opportunity to familiarize them with the campus, exhibited their talents on stage, and engaged in various games. The senior students also joined in the celebrations by staging song and dance performances.



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The dedicated, experienced faculty, offer students an opportunity to interact, learn, advance and succeed with career in Biotechnology and related life sciences. With Amma's Grace, there will be ample opportunities for everyone to be a part of the plan, said Prof. Bipin Nair in his welcome address

The parents and the incoming students also had the opportunity to interact with their respective class counselors. The parents were introduced to and trained on the usage of the Amrita University Management System (AUMS) Parent's Portal by which they could track their ward's performance throughout the period of study at AMRITA.

The program initiated not just a new semester, but also many new members into the Amrita family.



IBRO-APRC 4th Bangalore Cognition Workshop

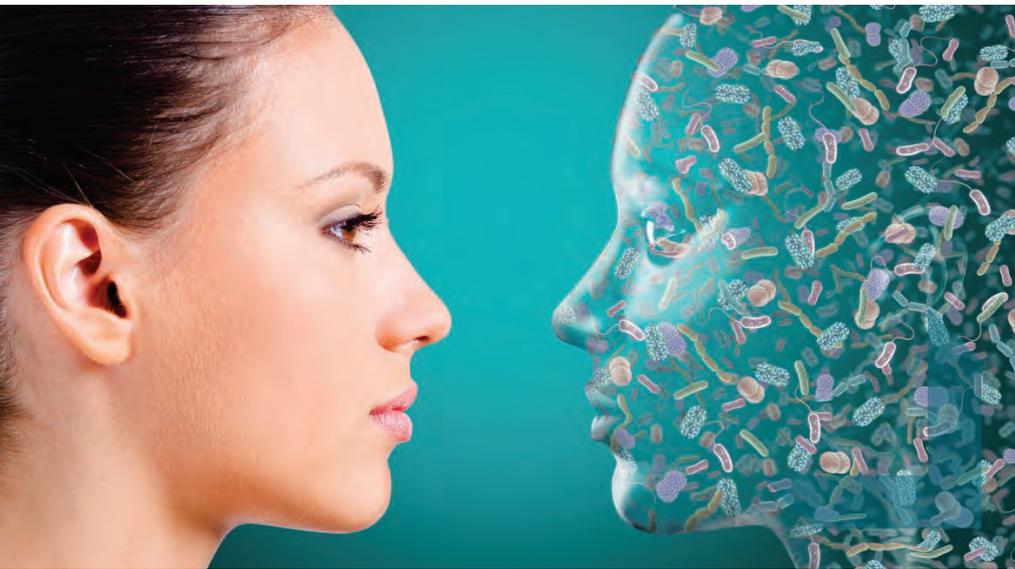
Amrita School of Biotechnology PhD students Arathi Rajendran and Sandeep Boddha participated at the 4th IBRO-APRC Bangalore Cognition Workshop held at Bengaluru, India from June 19-July 2, 2016. Arathi and Sandeep were among the 50 participating students among which 30 were outstation participants. Invited speakers were neuroscientists from USA (15), India (15) and from Europe and Canada (6). The course covered modules on

vision, memory, brain signals such as local field potentials, brain-machine interfaces, electroencephalography, fMRI, attention and spatial navigation. Arathi and Sandeep also volunteered for eye-tracking tests during the hands on sessions. Amrita's Computational Neuroscience Lab had recently published an open source toolbox, LFPsim for local field potential reconstruction from Neuronal models.



Computational neuroscience studies involve mathematical modelling of brain and its circuits in order to understand circuit function and disorders. Amrita team also employs high performance computing using Beowulf clusters and GPUs for effectively modelling neurological conditions. They are also developing a low-cost robotic arm as a platform to test neuro-inspired robotics.





How Human Microbiome and Soil Food Web Might Work Together

Dr. Bodo Eickhoff, Senior Vice-President of Sales & Marketing at Molecular Diagnostics, a large multi-national pharmaceutical company, visited the Amrita University, Amritapuri campus, and addressed the students, faculty, and staff in a seminar titled "Integrating Sciences from a Holistic Perspective: How Human Microbiome and Soil Food Web Might Work Together". An expert in many fields, Dr. Eickhoff initially focused on research, working on HIV co-receptors and cancer therapy, but then moving on to an industry which revolved around producing novel biotechnology products and getting patents. He took an even larger step away from his starting point when he went into manufacturing. Dr. Eickhoff explained that these radical changes in his career provided him a chance to view situations from different perspectives. Science was more complex and based on rationality and

logic, whereas business was linear and required an aspect of socially interacting with people. Through these changes, Dr. Eickhoff understood that the biotechnology industry is not solely about making a product, but is also about customers who are human beings.

Just as Dr. Eickhoff had a mixed background, the audience at his seminar was also an ensemble of students of different departments – Biotechnology, MBA, and Engineering students of the Amritapuri campus.

"In order to achieve a goal, you have to go deep and go broad", said Dr. Eickhoff. He explained that in order to accomplish something we must be able to understand the task at hand and gain insight into how things work in human nature. Dr. Eickhoff spoke about the VUCA world, a concept that revolves around the ever-changing nature of the world we live in. VUCA stand for Volatility, Uncertainty, Complexity, and Ambiguity. Once we understand that we cannot predict anything in life, we can work towards a goal with a right mindset.

Dr. Eickhoff then switched gears back to biology, questioning whether the human microbiome and soil food web may work together. The

Once we understand that we cannot predict anything in life, we can work towards a goal with a right mindset.



human microbiome is vast with various functions including protection from pathogens, digestion, energy production, and production of beneficial compounds such as vitamins and antibiotics. The soil food web concerns the large number of bacteria that grow at the roots of plants. These bacteria, surprisingly, serve many similar functions in plants when compared to the microbiome in humans. Therefore, there is a high chance that these bacteria are connected. This is evident from other common observations – for example it is well known that organic, healthy food produces a healthy microbiome within the body which results in healthy people. This concept could be further

applied; by ingesting specific plants with their own soil food web, it may be possible in the future to gain immunity to certain pathogens.



In the future, the most sought out job may be that of so-called Data Stewards to meet the scientific society's need of a way to efficiently convert, access, annotate, recover, secure, and store data.

Bioinformatics

The Future of Big Data Analysis

Prof. Jaap Heringa, an Adjunct Professor at Amrita University and Professor of Bioinformatics from VU Amsterdam to enlightened us with a two-day seminar on not just the basics of bioinformatics, but also the applications of this novel field. Dr. Heringa is also the Director of Centre for Integrative Bioinformatics at VU (IBIVU), Free University, Amsterdam, Director of the Dutch Life Sciences Centers as well as the Director of the Netherlands Bioinformatics Centre (NBIC), Education Platform BioWise.

During the first day's session, Dr. Heringa introduced the problem of the "data plethora" – the lack of storage space for the overabundant data produced by biological experiments. He proposed that in the future, the most sought out job may be that of so-called Data Stewards to meet the scientific society's need of a way to efficiently

convert, access, annotate, recover, secure, and store data. Dr. Heringa also discussed aspects of bioinformatics such as data clouds to create networks in order to link diseases and homology analysis by sequence alignment in order to find how and when two species diverged from one another in the timeline of evolution.

The second day's talk focused more on creating course-grained models of biological systems by means of Petri nets. In order to explain the process of modeling complex biological systems, Dr. Heringa used two examples; modeling of the differentiation of the hematopoietic stem progenitor cell (HSPC) and the vulval development in *C. elegans*, both of which are complicated in their signaling mechanisms and involve numerous regulatory interactions.

Dr. Ananda K. Sarkar, Scientist from National Institute of Plant Genome Research (NIPGR) in New Delhi and a specialist in plant stem cells, visited Amrita School of Biotechnology on August 12th and spoke to the students and faculty about his work. In his talk titled, "Regulation of Plant Stem Cells and Meristematic Activity by Related Factors", Dr. Sarkar discussed various discoveries in *Arabidopsis thaliana* concerning the interactions between cells in stem cell niches in both shoot and root apical meristems which are essentially responsible for plant growth. In shoots, regulatory cells nearby stem cells express *wuschel* (*WUS*) which activates *clavata 3* (*CLV3*) in stem cells resulting in meristem formation. This mechanism is regulated through a negative feedback loop. In roots, *WOX5* – a member of the *WUS* homeobox (*WOX*) family – is actively expressed in the quiescent center.

Plant Stem Cells and Meristematic Activity



Along with this, many other factors are expressed in root apical meristems such as *short root* (*SHR*), *scarecrow* (*SCR*), *plethora* (*PLT*), and *miR165/166*. Dr. Sarkar also emphasized a surprising

finding – that many of the proteins responsible for shoot formation had homologues in root stem cell niches. This gave rise to the understanding that *CLV*-like molecules help regulate root development.

Through Dr. Sarkar's enlightening seminar, participants were able to understand on a molecular level how plants are able to grow from stem cell niches in their shoots and roots. Furthermore, Dr. Sarkar's talk highlighted the importance of understanding plant totipotency – the defining feature of plant "superiority". This plasticity in plants is attributed to a subset of cells known as stem cells which are self-renewing and can differentiate into any type of plant cell.



INdAM Neuromath Meeting at Italy

Supported by Italy's Istituto Nazionale di Alta Matematica "F. Severi" (INdAM), Prof. Giovanni Naldi and Dr. Thierry Nieuw of University of Milan organized the NeuroMath Meeting bringing together experimental and computational researchers working on various topics in theoretical/computational/mathematical neuroscience.

Amrita School of Biotechnology Associate Professor Dr. Shyam Diwakar presented an invited talk on modelling the computations of cerebellum circuits and how robotic arms can employ such

reconstructions for movement control. Other speakers included Giorgio Ascoli from Krasnow Institute, Fairfax, USA, Stephen Coombes of Nottingham, Egidio D'Angelo of Pavia, Italy, Paolo del Giudice of ISS, Rome, Italy, Wulfram Gerstner of EPFL, Laura Sacerdote of Torino, Gianluigi Mongillo of Paris, Michele Giuliano of Antwerp, Belgium, Alberto Mazzoni of Pisa, Italy, Michele Migliore of CNR, Sicily, Italy, Stefano Panzeri of IIT Trento, Italy, Michele Piana of Genova, Italy, Eero Räsänen of CNR, Florence, Italy.

The Amrita presentation covered the

computational neuroscience of multi-compartmental and spiking neuron models, plasticity, local field potentials, behavior and robotic abstractions. The event, hosted by INdAM, was held at the medieval il Palazzone, a palace from the 1600's, located in Cortona, Italy.

Prof. Giovanni Naldi, Dr. Thierry Nieuw and Prof. Egidio D'Angelo have been collaborators with the Amrita Computational Neuroscience lab and were also part of the Indo-Italy Program of Cooperation 2012-14.



Invited Roles



Bipin G. Nair
Professor and Dean

Invited to participate 5 year transformative technologies Portfolio Review in Seattle from 18-22 July 2016 by the Bill and Melinda Gates Foundation



Sudarslal S
Associate Professor

Resource Person, Ph.D. Thesis Evaluation, MG University, Kottayam



Sanjay Pal
Assistant Professor

Invited to participate 5 year transformative technologies Portfolio Review in Seattle from 18-22 July 2016 by the Bill and Melinda Gates Foundation



Ajith Madhavan
Assistant Professor

Invited to participate 5 year transformative technologies Portfolio Review in Seattle from 18-22 July 2016 by the Bill and Melinda Gates Foundation



1. Combinatorial effect of D-aminoacids and tetracycline against p.aeruginosa Biofilm

Jayalekshmi H, Sajin Sali, Kaushik N, Hari Krishnan, Anoop R, Sarath M, Norin G Victius, Athira O, Geetha Kumar, Bipin G Nair

2. Nitric Oxide and ERK mediates regulation of cellular processes by Ecdysterone.

Athira Omanakuttan, Chinchu Bose, Nanjan Pandurangan, Geetha B Kumar, Asoke Banerji, Bipin G Nair

3. A Rapid and Selective method for the Quantification of Naringenin in order to monitor Naringinase activity

Ajith Madhavan, Pandurangan Nanjan, Sindhu Shetty. K, Shanmugham. S

4. Computational Characterization of Cerebellum Granule Neuron Responses to Auditory and Visual Inputs

Chaitanya Medini, Arathi G. Rajendran, Aiswarya Jijibai, Bipin Nair, Shyam Diwakar

5. Computational Reconstruction of fMRI-BOLD from Neural Activity

Chaitanya Nutaki, Ahalya Nair, Manjusha Nair, Bipin Nair, Shyam Diwakar

6. Computing LFP From Biophysical Models of Neurons and Neural Microcircuits

Sandeep Bodda, Harilal Parasuram, Bipin Nair, Shyam Diwakar

7. Implementing and Deploying Magnetic Material Testing as Online Laboratory

Rakhi Radhamani, Dhanush Kumar, Krishnasree Achuthan, Bipin Nair, Shyam Diwakar

8. Spry2, MMP-14, EMMPRIN and RECK mediate inhibition of gelatinases by Anacardic Acid

Jyotsna Nambiar, Chinchu Bose, Meera Venugopal, Asoke Banerji, Tarun B. Patel, Geetha B. Kumar, Bipin G. Nair

9. GSH-responsive biotinylated poly(vinyl alcohol)-grafted GO as a nanocarrier for targeted delivery of camptothecin.

Divya Nedungadi, Nandita Mishra, Sankarprasad Bhuniya

10. Post-translational modifications of proteins: biomarkers and therapeutic targets for diabetes related complications

Muralidharan Vanuopadath, Divya Nair, Bipin G. Nair, Sudarslal Sadasivan Nair

STUDENT ACCOLADES

CSIR-JRFs



Vishnu M. Nair
Rank 64



Amrutha Mohan
Rank 71



Amrutha P. Kumar
Rank 76



Amrita Salim
Rank 115

UGC-JRFs



Pooja N. B.
Rank 55



Karthika Rajan
Rank 114

UGC-NET



Meera Venugopal
Rank 29