



Megophrys nasuta

[Megophrys nasuta](#) is a long-nosed horned frog. It is also known as the Malayan horned frog, or Malayan leaf frog.

Photo credits: Prof. Ulmar Grafe (Faculty of Science, Universiti Brunei Darussalam)

Foreword by Prof. Naveed Khan



Welcome to the DBS Bulletin, our departmental newsletter that allows us to reflect on achievements, as well as to rejuvenate our commitment to continue our journey in research discovery and to provide high quality education as well as promoting Teaching-Research synergy in the University thematic areas. It is important to reflect! and question ourselves to recognize our efforts, think actively about them, and/or realign our performance with the set objectives/targets. I will take this opportunity to briefly review departmental performance during the 2018. Over the past 3 years, the department has identified key thematic areas and focused its energy to be a credible academic department at the national level. I am particularly pleased to see that our hard work is starting to bear fruits. For example, 2018 has been one of the most successful years for the department. We have been recognized consistently as one of the most credible academic department by the Ministry, i.e., received the most number of FRGS grants obtained by any department at SU). In its latest competition, the department received 4 out of 6 FRGS grants awarded to the University. This is an outstanding recognition at the national level. Moreover, our faculty received 7 external grants with top institutions such as Harvard, Cambridge, Edinburgh, UM. There were a total of 35 publications (24 in the previous year). This is a significant increase, especially with the fact that many laboratories are undergoing renovations and several members are new to the department. At the same time, our total student number increased by approx. 15%. The introduction of innovative and multidisciplinary programmes as taught Masters programme (MSc in Biomed Sci and Business Management) as well as BSc Conservation Science, and BSc Applied Biochemistry (approved by PPAC) will strengthen our links with sister departments as well as offer students unique opportunity to learn from experts with diverse expertise and prepare them well for the challenges posed by the changing world in a competitive market. Moreover, our way forward ought to be applied and collaborative research that is impactful. Let us continue to work together with more zeal and enthusiasm to make future years of high achievements and consolidation of our teaching/learning endeavors as well as focus on transferring our research knowledge to application.

Research

Recent Publications

1. Anwar A, Masri A, Rao K, Rajendran K, Khan NA, Shah MR & Siddiqui R. Antimicrobial activities of green synthesized gums-stabilized nanoparticles loaded with flavonoids. Sci Rep. 2019 Feb 28;9(1):3122. doi: 10.1038/s41598-019-39528-0.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6395601/>

Significance of findings: Herein, we report green synthesized nanoparticles based on stabilization by plant gums, loaded with citrus fruits flavonoids Hesperidin (HDN) and Naringin (NRG) as novel antimicrobial agents against brain-eating amoebae and multi-drug resistant bacteria. Nanoparticles were thoroughly characterized by using zetasizer, zeta potential, atomic force microscopy, ultraviolet-visible and Fourier transform-infrared spectroscopic techniques. The size of these spherical nanoparticles was found to be in the range of 100-225 nm. The anti-amoebic effects of these green synthesized Silver and Gold nanoparticles loaded with HDN and NRG were tested against *Acanthamoeba castellanii* and *Naegleria fowleri*, while antibacterial effects were evaluated against methicillin-resistant *Staphylococcus aureus* (MRSA) and neuropathogenic *Escherichia coli* K1. Amoebicidal assays revealed that HDN loaded Silver nanoparticles stabilized by gum acacia (GA-AgNPs-HDN) quantitatively abolished amoeba viability by 100%, while NRG loaded Gold nanoparticles stabilized by gum tragacanth (GT-AuNPs-NRG) significantly reduced the viability of *A. castellanii* and *N. fowleri* at 50 µg per mL. Furthermore, these nanoparticles inhibited the encystation and excystation by more than 85%, as well as GA-AgNPs-HDN only completely obliterated amoeba-mediated host cells cytopathogenicity. Whereas, GA-AgNPs-HDN exhibited significant bactericidal effects against MRSA and *E. coli* K1 and reduced bacterial-mediated host cells cytotoxicity. Notably, when tested against human cells, these nanoparticles showed minimal (23%) cytotoxicity at even higher concentration of 100 µg per mL as compared to 50 µg per mL used for antimicrobial assays. Hence, these novel nanoparticles formulations hold potential as therapeutic agents against infections caused by brain-eating amoebae, as well as multi-drug resistant bacteria, and recommend a step forward in drug development.

2. Anwar A, Siddiqui R, Shah MR, Khan NA. Gold Nanoparticles Conjugation Enhances Anti-*Acanthamoeba* Properties of Nystatin, Fluconazole and Amphotericin B. J. Microbiol. Biotechnol. 2019, 29-1: 171-177.

[Full text link](#)

Significance of findings: Parasitic infections have remained a significant burden on human and animal health. In part, this is due to lack of clinically-approved, novel antimicrobials and a lack of interest by the pharmaceutical industry. An alternative approach is to modify existing clinically-approved drugs for efficient delivery formulations to ensure minimum inhibitory concentration is achieved at the target site. Nanotechnology offers the potential to enhance the therapeutic efficacy of drugs through modification of nanoparticles with ligands. Amphotericin B, nystatin, and fluconazole are clinically available drugs in the treatment of amoebal and fungal infections. These drugs were conjugated with gold nanoparticles. To characterize these

goldconjugated drug, atomic force microscopy, ultraviolet-visible spectrophotometry and Fourier transform infrared spectroscopy were performed. These drugs and their gold nanoconjugates were examined for antimicrobial activity against the protist pathogen, *Acanthamoeba castellanii* of the T4 genotype. Moreover, host cell cytotoxicity assays were accomplished. Cytotoxicity of these drugs and drug-conjugated gold nanoparticles was also determined by lactate dehydrogenase assay. Gold nanoparticles conjugation resulted in enhanced bioactivity of all three drugs with amphotericin B producing the most significant effects against *Acanthamoeba castellanii* ($p < 0.05$). In contrast, bare gold nanoparticles did not exhibit antimicrobial potency. Furthermore, amoebae treated with drugs-conjugated gold nanoparticles showed reduced cytotoxicity against HeLa cells. In this report, we demonstrated the use of nanotechnology to modify existing clinically-approved drugs and enhance their efficacy against pathogenic amoebae. Given the lack of development of novel drugs, this is a viable approach in the treatment of neglected diseases.

3. Mungroo MR, Khan NA & Siddiqui R. *Naegleria fowleri*: diagnosis, treatment options and pathogenesis. Expert Opinion on Orphan Drugs 2019, Vol 7(2): 67-80. doi: 10.1080/21678707.2019.1571904
<https://www.tandfonline.com/doi/full/10.1080/21678707.2019.1571904>

Significance of findings: Introduction: *Naegleria fowleri* are free-living amoebae known to cause devastating primary amoebic meningoencephalitis (PAM). Parasites enter the host via the nasal route and travel to the central nervous system through the olfactory neuroepithelium resulting almost always in death. Areas covered: Current understanding of clinical diagnosis, treatment options, and pathogenicity of the parasite. A PubMed search using *N. fowleri* combined with diagnosis, treatment, and pathogenesis as keywords was carried out. In addition, we consulted conference proceedings, original unpublished research undertaken, and discussions in Free-Living Amoebae Meetings over the past 20 years. Expert opinion: Although considered rare in developed countries, a large number of PAM cases in developing countries go unnoticed. In particular, religious, recreational, and cultural practices can contribute to this devastating infection in significant numbers. As portal of entry is nose, followed by migration along the olfactory neuroepithelial route and infection of the inferior surface of the frontal lobe, it makes sense to analyse nasal mucosal secretions, in addition to cerebrospinal fluid to expedite early diagnosis. Similarly, for treatment, drug delivery via the nasal route would target the parasite route of entry, achieving minimum inhibitory concentration at low dose at the target site, and exhibit limited associated host tissue toxicity.

4. Yee PTI, Tan SH, Ong KC, Tan KO, Wong KT, Hassan SS, Poh CL. Development of live attenuated Enterovirus 71 vaccine strains that confer protection against lethal challenge in mice. Sci Rep. 2019 Mar 18;9(1):4805. doi: 10.1038/s41598-019-41285-z.
<https://www.ncbi.nlm.nih.gov/pubmed/30886246>

Significance of findings: Besides causing mild hand, foot and mouth infections, Enterovirus A71 (EV-A71) is associated with neurological complications and fatality. With concerns about rising EV-A71 virulence, there is an urgency for more effective vaccines. The live attenuated vaccine (LAV) is a more valuable vaccine as it can elicit both humoral and cellular immune responses. A miRNA-based vaccine strain (pLY) carrying let-7a and miR-124a target genes in the EV-A71 genome which has a partial deletion in the 5'NTR ($\Delta 11$ bp) and G64R mutation ($3D^{P^{\circ}l}$) was designed. The viral RNA copy number and viral titers of the pLY strain were significantly lower in SHSY-5Y cells that expressed both let-7a and miR-124a. Inhibition of the cognate miRNAs expressed in RD and

SHSY-5Y cells demonstrated de-repression of viral mRNA translation. A previously constructed multiply mutated strain, MMS and the pLY vaccine strain were assessed in their ability to protect 4-week old mice from hind limb paralysis. The MMS showed higher amounts of IFN- γ ex vivo than the pLY vaccine strain. There was absence of EV-A71 antigen in the skeletal muscles and spinal cord micrographs of mice vaccinated with the MMS and pLY strains. The MMS and pLY strains are promising LAV candidates developed against severe EV-A71 infections.

4. Tan YJ, Tan YS, Yeo CI, Chew J, Tiekink ERT. In vitro anti-bacterial and time kill evaluation of binuclear tricyclohexylphosphanesilver(I) dithiocarbamates, {Cy3PAg(S₂CNRR')}₂. Journal of Inorganic Biochemistry 2019, 192: 107-118.

<https://www.sciencedirect.com/journal/journal-of-inorganic-biochemistry/vol/192/suppl/C>

Significance of findings: Four binuclear phosphanesilver(I) dithiocarbamates, {cyclohexyl₃PAg(S₂CNRR')}₂ for R = R' = Et (1), CH₂CH₂ (2), CH₂CH₂OH (3) and R = Me, R' = CH₂CH₂OH (4) have been synthesised and characterised by spectroscopy and crystallography, and feature tri-connective, μ_2 -bridging dithiocarbamate ligands and distorted tetrahedral geometries based on PS₃ donor sets. The compounds were evaluated for anti-bacterial activity against a total of 12 clinically important pathogens. Based on minimum inhibitory concentration (MIC) and cell viability tests (human embryonic kidney cells, HEK 293), 1-4 are specifically active against Gram-positive bacteria while demonstrating low toxicity; 3 and 4 are active against methicillin resistant *S. aureus* (MRSA). Across the series, 4 was most effective and was more active than the standard anti-biotic chloramphenicol. Time kill assays reveal 1-4 to exhibit both time- and concentration-dependent pharmacokinetics against susceptible bacteria. Compound 4 demonstrates rapid (within 2 h) bactericidal activity at 1 and 2 $\times$ MIC to reach a maximum decrease of 5.2 log₁₀ CFU/mL against *S. aureus* (MRSA).

5. Chen JE, Barbrook AC, Cui G, Howe CJ, Aranda M. The genetic intractability of *Symbiodinium microadriaticum* to standard algal transformation PLoS One. 2019 Feb 19;14(2):e0211936. doi: 10.1371/journal.pone.0211936.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6380556/>

Significance of findings: Modern transformation and genome editing techniques have shown great success across a broad variety of organisms. However, no study of successfully applied genome editing has been reported in a dinoflagellate despite the first genetic transformation of *Symbiodinium* being published about 20 years ago. Using an array of different available transformation techniques, we attempted to transform *Symbiodinium microadriaticum* (CCMP2467), a dinoflagellate symbiont of reef-building corals, with the view to performing subsequent CRISPR-Cas9 mediated genome editing. Plasmid vectors designed for nuclear transformation containing the chloramphenicol resistance gene under the control of the CaMV p35S promoter as well as several putative endogenous promoters were used to test a variety of transformation techniques including biolistics, electroporation and agitation with silicon carbide whiskers. Chloroplast-targeted transformation was attempted using an engineered *Symbiodinium* chloroplast minicircle encoding a modified PsbA protein expected to confer atrazine resistance. We report that we have been unable to confer chloramphenicol or atrazine resistance on *Symbiodinium microadriaticum* strain CCMP2467.

Research

Funding opportunities

1. APEC funding: The deadlines for the Concept Note submission to APEC Program Directors are on 12 March 2019 (for Session 1/2019) and 15 July 2019 (for Session 2/2019). MESTECC will assist projects related to science, technology and innovation to secure co-sponsoring economies for the project before the above-mentioned submission deadlines. Hence, we urge all submissions of Concept Note to reach the secretariat (undersigned) latest by 19 February 2019 (for Session 1/2019) and 24 June 2019 (for Session 2/2019 - preferred).

For further details:

<https://www.apec.org/Projects/Funding-Sources>,
<https://www.apec.org/Projects/Applying-for-Funds>

2. Long Term Research Grant Scheme (LRGS) and Trans-disciplinary Research Grant Scheme (TRGS)

Background: LRGS is a fundamental research, involving more extensive scope, a long period of time and requires a high commitment. LRGS can generate theories and new ideas that advanced in a strategic niche to expand the boundaries of knowledge. TRGS aims to boost the generation of theories, concepts and new ideas that can accelerate new break-through discoveries which surpasses the boundaries of knowledge and innovative creation.

Quick facts: LRGS Maximum award of RM 3,000,000 per annum for 3-5 years. TRGS Maximum award of RM 1,500,000 for 3 years

Deadline: 26 April 2019

More details: <http://mygrants.gov.my/main.php>

3. L'Oréal-UNESCO For Women in Science Fellowships

Quick facts: Maximum award of RM 30,000. Age limit 40 years.

Deadline: 31st May 2019

More details: <https://www.forwomeninscience.com/en/fellowships>

4. The Jeffery Cheah Travel Grants for Southeast Asia Studies (Fall tem 2019)

Quick facts: Application for travel grant are for scholars who fish to travel to Harvard University during the Fall term (Sept - mid Dec 2019)

Dateline: 30th April 2019

More details: <http://jci.edu.my/travel-grant-application-guide/>

5. MTSF Malaysia Toray Science Foundation Science & Technology Research Grant

Quick facts: Maximum award of RM 60,000 for 1-year project.

Dateline: 31st May 2019

More details: <http://www.mtsf.org/mtsf/strg/infor.html>

Department Events

1. PhD In Biology (PBIO) Audit

Date: 27-28th February 2019

As the first intake of the PhD in Biology programme are due to graduate this year, an internal audit took place on February 27th and 28th. The PhD programme leader Professor Ruqaiyyah Siddiqui presented information regarding the programme to the auditors. Faculty who are supervisors/ involved in teaching the programme as well as a selection of PhD students were also interviewed to share their experience of the programme. Auditors were very impressed with the number of (25) peer reviewed publications by PhD students as well as conferences attended. The auditors will present their recommendations to the department in the near future.



BELIEVE YOU CAN...
and you're half way there!

Department Events

2. DBS Laboratory Facilities Tour & Equipment Demonstration for A-Level Students

Date: 8th March 2019 (9-13pm)

Our laboratory staff, Ms. Dhaniah, Ms. Nurafifah and Mr. Timothy hosted a laboratory tour and demonstrated some equipment related to DNA experimentation to 80 A-level students from Sunway College. These students are currently studying Biology under the guidance of Ms. Sharon Kong Foong and the lab visit is an extension to the topic Gene Technology.

Ms Sharon Kong Foong, which teaching Biology in the A-Level program in Sunway College requested to have a laboratory tour & demo of some equipment related to DNA. Her students who have currently covered the topic on Gene Technology would like to visit your facility.



Please share your updates (publications, events, funding) via [this link](#) by the 25th of each month, to be published in the up-coming bulletin.

3. Sunway University Open Day

Date: 16-17th, 23-24th March 2019

Sunway University Open Day was held over two weekends, with the majority of the DBS staff members being involved. There were roughly 70 enquiries in total. The open day talk entitled “Exciting Frontiers in Biosciences: Biomedicine, Biology with Psychology and Medical Biotechnology” was presented by Dr. Kavita Reginald.



From L-R: Dr Kavita during Open Day Talk, Prof. Ruqaiyyah and Prof. Jeff Tan, Dr. Tommy Tong and Dr. Jit Ern.

4. SST SunU DEGREE Orientation Day - March 2019 intake

Date: 21st March 2019

The orientation programme for students of the School of Science and Technology commenced with a welcome from Assoc. Prof. Dr. Alvin Ng (HOD, Dept. of Psychology). For the students of the Department of Biological Science, the programme continued with a welcome address by Prof. Naveed Khan, followed by detailed introductions by the programme leaders, Dr. Tommy Tong and Dr. Ong Seng Kai.



From L-R: Assoc. Prof. Dr. Alvin, Prof. Naveed and Dr. Ong Seng Kai

DBS members in action

Assoc. Prof. Dr. Shyamala Ratnayeke - Ecology Field Course at Kuala Belalong Field Studies Centre, Ulu Tembrung Brunei

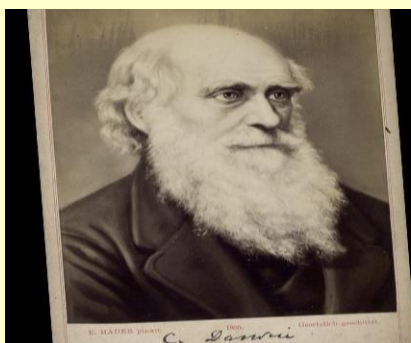
Dr. Ratnayeke joined the University of Otago's team of instructors on a 2-week Tropical Ecology Field Course in primary rainforest (9-23 Jan 2019). Fourteen students and 4 instructors, including Prof. Ulmar Grafe from University of Brunei participated. Students worked on a joint multi-year amphibian survey and also developed and conducted small field research projects of their own. Afternoons included lectures or tutorial sessions. Most field work was at night. Surveys revealed more than 28 species of frogs, a rare caecilian, and several species of snake including a large Bornean krait. Otago's ecology programme requires that students develop research skills from year one along with courses in data analysis and statistical programming every year. This participation was funded by the Academic Enhancement Teaching Award that Dr. Ratnayeke had received.



DBS members in action

Assoc. Prof. Dr. Shyamala Ratnayeke - Field course at the Tautuku Field Station in the Catlins National Park, New Zealand

From Feb 10-17th, Dr. Ratnayeke joined the University of Otago ECOL 313 field course at the Tautuku Field Station in the Catlins National Park, New Zealand. Twenty-three students, 5 faculty and 2 teaching assistants participated in the course. The Catlins contains some of the last remaining stands of native old growth forest, dominated by ancient podocarps and giant tree ferns. The coastal location offered students a variety of ecosystems within which they could develop short-term research projects under the guidance of faculty. This participation was funded by the Academic Enhancement Teaching Award that Dr. Ratnayeke had received.



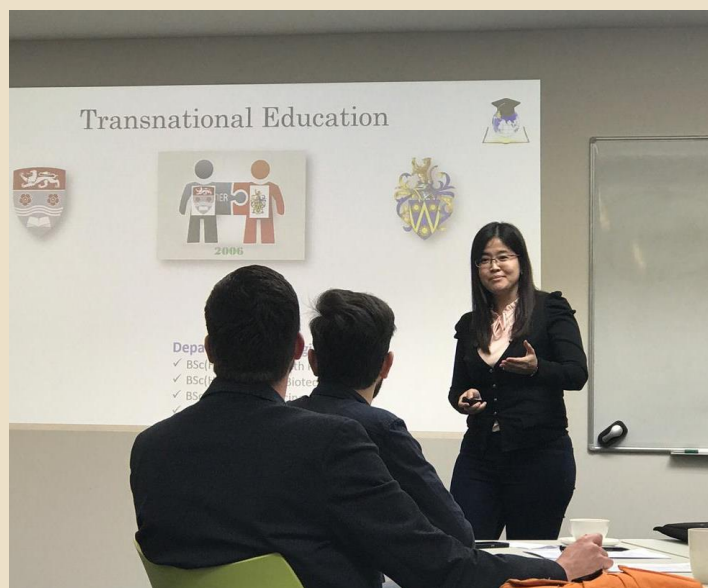
The **love** for all living creatures
is the most noble **attribute**
of **man**.

— Charles Darwin

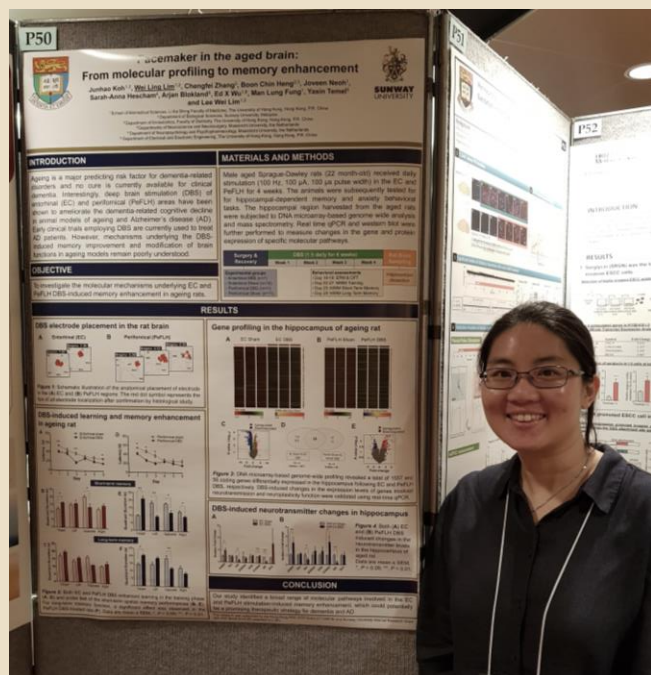
DBS members in action

Dr. Yao Yoon Yen - Educational Development Programme, Lancaster University

Dr. Yow Yoon Yen has been invited by Lancaster University to take part in their Educational Development Programme from 9th to 18th March 2019. This visit aims to enhance the academic relationship between Lancaster University and Sunway University in terms of coordination of programmes and research collaborations. Dr. Yow was also invited by Lancaster University to speak in an annual sharing practice event with the theme of “Globalizing the curriculum for 21st century teaching & learning” on 15 March 2019. She shared her experience and teaching practice on how to develop an inclusive module for Medical Biotechnology students: Challenges, strategies and way forward.



Dr. Audrey Lim - 14th International Symposium on Healthy Aging



Dr Audrey Lim participated in the 14th International Symposium on Healthy Aging 'Embrace the Golden Years', held on 16th - 17th March 2019 at the Sheraton Hong Kong Hotel & Towers, Tsimshatsui, Hong Kong. She gave a poster presentation with the title 'Pacemaker in the aged brain: From molecular profiling and memory enhancement' during the symposium.

DBS members in action

Assoc. Prof. Dr. Reuben Gopalasamy and Assoc. Prof. Dr. Shyamala Ratnayeke- 2nd Sunway DBS-BCSS Wildlife Statistics Bootcamp

The 2nd Sunway DBS-BCSS (Borneo Conservation Society of Sarawak) Wildlife Statistics Bootcamp was held from 7-18 January in the Sunway University campus. Details of what was covered can be found here:

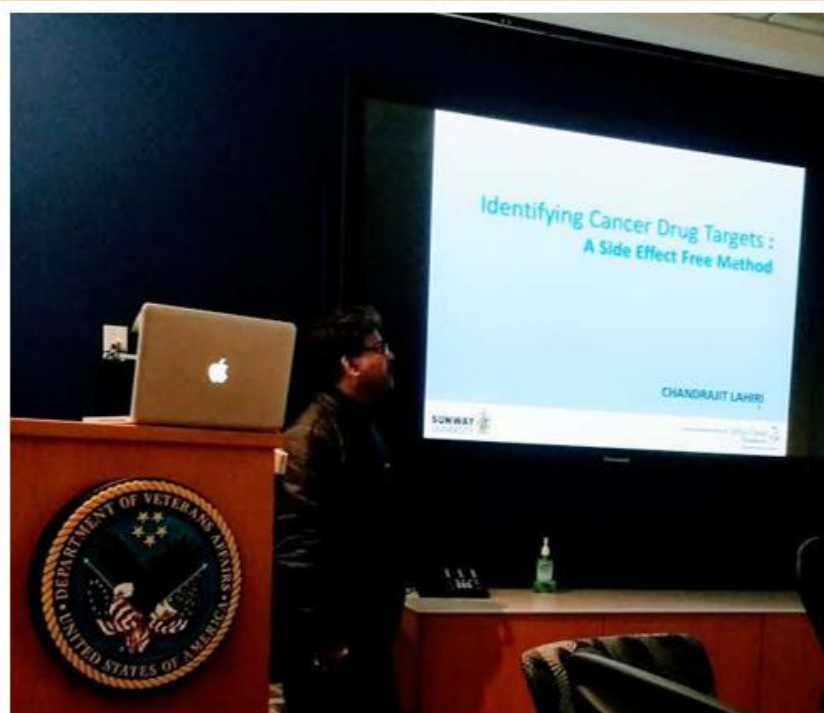
http://www.bcss.org.my/statsWorkshops/boot_camp.htm.

The bootcamp was organised by Shyamala and Reuben and was co-facilitated by Ngumbang Juat and Mike Meredith from BCSS. Since 2009, BCSS has run 39 Boot Camps in 11 countries. 617 people from 37 countries have attended a Boot Camp at least once, many coming more than once. Their partners include environmental NGOs such as WWF, Wildlife Conservation Society, Flora and Fauna International and many universities in the region. This is one of the best statistics courses in Southeast Asia. Despite its focus on wildlife research, it has great relevance to design and analysis of experiments in other fields in biological sciences such as medicine. While the 1st bootcamp had participants from Sunway University, this year's bootcamp quickly filled up with international and regional participants that include working professionals from the Malaysian government and various NGOs, and postgraduate students and professors from universities as far as University of Southampton to institutions closer to home such as Cebu Technological University and Nottingham University Malaysia. If you missed this bootcamp, there will be another one possibly held in KL in July 2019. If you would like to attend, please check the BCSS website regularly for a call for registration: <http://www.bcss.org.my/>



DBS members in action

Dr. Chandrajit Lahiri- Visit to Dana Farber Cancer Institute and VA Boston Medical Centre of Harvard Medical School



Dr. Chandrajit Lahiri visited the Dana Farber Cancer Institute and VA Boston Medical Centre of Harvard Medical School, Boston, US for 3 weeks during February-March, 2019. His visit was supported by the Jeffrey Cheah Travel Grant on South-East Asia Studies at Harvard. The main aim of this travel was to seek collaboration to explore further his research in the field of network biology. He was welcomed by Dr. Nikhil C. Munshi and Dr. Masood Shammash, of DFCI, HMS, US to present his work on developing a side effect free method of identifying cancer drug targets and was appreciated for the effort put forward for the novel thought. Furthermore, he was keen to gain insight on the genomic instability leading to cancer multidrug resistance and for extrapolating the ideas to help develop precision cancer medicine with little or no side-effects. He believes that, essentially, this venture could serve the purpose of aligning with the 17 global goals for sustainable development of the United Nations, of which Sunway is also a part.

Nothing worth having comes easy

DBS members in action

Dr Khalisah Zulkefli - UN's Science, Technology and Innovation workshop in Bangkok, Thailand

Dr Khalisah Zulkefli, a research associate working with Professor Dr Abhi Veerakumarasivam recently took part as a panelist in the preparatory workshop meeting on Science, Technology and Innovation (STI) for the 2030 Sustainable Development Goals (SDGs). The workshop was held at the United Nations Economic and Social Commission for Asia and the Pacific (UN ESCAP) building in Bangkok, Thailand from the 27.2.2019 - 1.3.2019. This workshop was collaboratively organized by UN ESCAP, the United Nations Department of Economic and Social Affairs (DESA) and the United Nations Conference on Trade and Development (UNCTAD). Dr Khalisah was on the panel for the session to deliberate the impact of new and emerging technologies on the SDGs where she spoke about the dawn of new gene editing era discussing gene drives and CRISPR and the role that the DIY Biology field has on the issues of accessibility of these new technologies.



Dr Khalisah Zulkefli - FameLab in Malaysia



Dr Khalisah Zulkefli has been selected as one of the top 12 finalists who will be competing in the FameLab National finals on the 26th of April 2019 for the coveted chance to represent Malaysia in the FameLab International Final 2019 at the Times Cheltenham Science Festival. FameLab is the world's largest science communication competition where participants from various backgrounds and disciplines breakdown complex concepts of their research to the general public in a 3-minute talk. First established in the United Kingdom at the Times Cheltenham Science Festival in 2005, the FameLab competition is now held all over the world in over 25 countries including Malaysia. National winners will then go on to the FameLab International final to compete to become the world's best science communicator. FameLab Malaysia is organized by British Council Malaysia and the Malaysian Industry Government Group for High Technology (MIGHT).

Other News

DBS Journal Club

DBS Journal Clubs are held on Tuesday afternoons to promote interest in research, and to showcase current discoveries both by students and faculty members.

5th March - Mr. Samson Eugen Simon, PhD student, DBS - “Activation of the Proapoptotic Bcl-2-Protein Bax by a Small Molecule Induces Tumor Cell

12th March - Mr. Abdul Kadir Masri, PhD student DBS - “Study on the mechanism of antibacterial action of magnesium oxide nanoparticles against foodborne pathogens”

Courses offered in March 2019 semester

CODE	SUBJECT NAME	LECTURER
BIO1014	Human Physiology	Prof Abhi Veerakumarasivam
BIO 1024/1204	Impact of Microbes on Human Life/General Microbiology	Dr Jactty Chew
BIO 1064	Human Anatomy	A/P Dr Shyamala Ratnayeke
SCI 1024/BIO 1214	Organic Chemistry/ Basic Biochemistry	Dr Ayaz Anwar
BIO 2044	Medical Microbiology	Dr Jactty Chew
BIO 2154	Medical Biotechnology	Dr Babu Ramanathan
BIO 2064	Molecular Diagnostics	Prof Jeff Tan
PRJ 3200	Research Project	Dr Yow Yoon Yen/A/P Shyamala Ratnayeke
BIO 2024	Biochemistry	Dr Chandrajit Lahiri
BIO 2254	Pathology	Dr Kavita Reginald
BIO 2204	Medical Statistics and Epidemiology	Dr Chen Jit Ern
BIO 3134	Research and Publication	Prof Naveed Khan
RSM 5040/ RSM 6020	Research Methodology/ Research, Design, Analysis and Communication	Assoc Prof Gopalasamy Reuben Clements
BIO6014	Directed Readings and Academic Presentations	Prof Ruqaiyyah Siddiqui
BIO6024	Research Ethics & Biological Safety	Prof Ruqaiyyah Siddiqui