DBS Bulletin

School of Science and Technology

SUNWAY UNIVERSITY

January 2020
Issue 11

Faculty members and administrative staff of the Department of Biological Sciences at their Chinese New Year lunch.

HOD's Foreword

Happy New Year and Gong Xi Fa Cai! Isn't it wonderful that we get to celebrate 2 new years in one month. Just as we break our first new year resolution, we get to make new ones. And now we can look forward to the Tamil New Year in April! The celebration of the many new years in a single calendar year in Malaysia teaches us that the more we embrace inclusivity and diversity in our lives; the more opportunities we get to reflect on our conduct and enhance our purpose.

It has certainly been an eventful start to the New Year at DBS. We welcome all our new and returning students. We are committed to ensure that we are here to support your dreams and aspirations. We can assure you that the journey that you will take towards your graduation will not be without challenges, because how you manage and overcome these challenges will help shape you into the resilient adult that is ready to embrace the various unknowns that your future will throw at you. Dear students, we certainly look forward to be working with you; especially through the Sunway Biological Society (SBioS) to provide you the best educational experience possible.

In the research front, DBS has proven to be one of the most productive academic departments in the University. We have developed a work-in-progress action plan to ensure that we not only focus on increasing our research output but also develop niches of excellence to answer research questions and find solutions for specific grand challenges. To achieve this, we recognise the importance for our departmental members to maximize synergy within the department as well as engage with members of the University and our external partners who have diverse expertise .

I would like to take this opportunity to thank the leadership at Sunway Education Group and the University for their continued support through the provision of internal grants, laboratory capital expenditure, postgraduate and undergraduate student research project support, travel grants, and various other resources and opportunities. This continued generous support by the leadership ensures that our students are provided exposure to world-class life sciences research; as evidenced by the growing research publications involving our students.

As we embrace the opportunities we have here at Sunway University this New Year, let us continue to reflect on our greater role in society. The current crisis in Wuhan sheds light on the fragility of humanity but it also shines a spotlight on the importance of biological science in educating the public, informing policy makers and finding solutions to cure and prevent the spread of the disease. History may repeat itself, but science certainly provides hope and an opportunity for us to (re)shape history.

Happy New Year(s)!

Prof. Dr. Abhi Veerakumarasivam

Research Publications

SUNWAY UNIVERSITY

1. **Mbugua SW**, **Choong HW**, **Ratnayeke S** (2019) Effects of artificial light on the larvae of the firefly *Lamprigera sp.* in an urban city park, Peninsular Malaysia. Journal of Asia-Pacific Entomology 23 (2020) 82–85. https://doi.org/10.1016/j.aspen.2019.10.005

Abstract: Many firefly populations are threatened globally by habitat alteration, pesticide use, and anthropogenic sources of light. Lamprigera fireflies were recently reported at an urban city park in Kuala Lumpur. Here we report on the responses of Lamprigera larvae to artificial light from street lamps on paved park trails. Larvae were located farther from artificial light sources when street lamps were illuminated than when they were not, and mostly where light intensities were lowest, off park trails. Larvae that were located within the direct field illumination tended to be immobile, whereas, when street lamps were turned off, they actively travelled paved trails. Larvae positioned directly in the path of downwelling light from street lamps at dusk may therefore experience an effectively longer diurnal period, limited time for active foraging, and greater exposure to pedestrian traffic.

M. Samantha Wanjiru Mbugua
BSc Medical Biotechnology

2. Aziz SA, Chua MAH and **Gopalasamy CR** (2019) Catch and release: Novel predation strategy by white-bellied sea-eagle (*Haliaeetus leucogaster*) on island flying fox (*Pteropus hypomelanus*) in Peninsular Malaysia demonstrates flying fox swimming ability. Journal of Bat Research & Conservation. https://doi.org/10.14709/BarbJ.12.1.2019.09 https://www.youtube.com/watch?v=uW0SakDF_b8&authuser=0

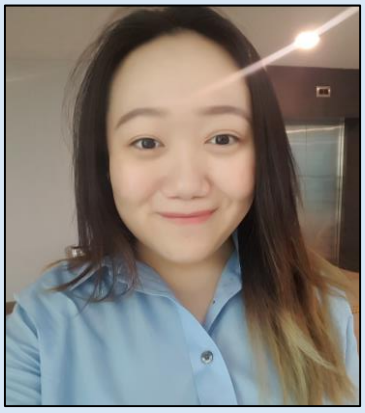
Abstract: Raptors are one of the known predators of flying foxes (*Pteropus* spp.), but this predator-prey relationship is poorly understood. Here, we report an opportunistic observation of a pair of white-bellied sea-eagles (*Haliaeetus leucogaster*) employing an undocumented predation technique on an island flying fox (*Pteropus hypomelanus*) individual from Tioman Island, off the east coast of Peninsular Malaysia. The sea-eagles appeared to deliberately drop the flying fox in the sea, repeatedly. Systematic observations could help determine the frequency of this predator-prey interaction, and improve our understanding of it.

Research Publications

SUNWAY UNIVERSITY

3. Anwar A, **Lim ST**, **Anwar A**, Noor ul Ain, Faizi S, Shah MR, Khan NA, Siddiqui R(2020) Anti-amoebic activity of plant-based natural products and their conjugated silver nanoparticles against *Acanthamoeba castellanii* (ATCC 50492). AMB Express. 10:24. https://doi.org/10.1186/s13568-020-0960-9

Abstract: *Acanthamoeba* spp. are the causative agent of *Acanthamoeba keratitis* and granulomatous amoebic encephalitis (GAE). The current options to treat *Acanthamoeba* infections have limited success. Silver nanoparticles show anti-microbial effects and enhance the efficacy of their payload at their specific biological targets. Natural folk plants have been widely used for treating diseases as the phytochemicals from several plants have been shown to exhibit amoebicidal effects. Herein, we used natural products of plant or commercial sources including quercetin (QT), kolavenic acid (PGEA) isolated from plant extracts of *Polyalthia longifolia* var pendula and crude plant methanolic extract of *Caesalpinia pulcherrima* (CPFLM) as anti-acanthamoebic agents. Furthermore, these plant-based materials were conjugated with silver nanoparticles (AgNPs) to determine the effects of the natural compounds and their nanoconjugates against a clinical isolate of *A. castellanii* from a keratitis patient (ATCC 50492) belonging to the T4 genotype. The compounds were conjugated with AgNPs and characterized by using ultraviolet visible spectrophotometry and atomic force microscopy. Quercetin coated silver nanoparticles (QT-AgNPs) showed characteristic surface plasmon resonance band at 443 nm and the average size distribution was found to be around 45 nm. The natural compounds alone and their nanoconjugates were tested for the viability of amoebae, encystation and excystation activity against *A. castellanii*. The natural compounds showed significant growth inhibition of *A. castellanii* while QT-AgNPs specifically exhibited enhanced anti-amoebic effects as well as interrupted the encystation and excystation activity of the amoebae. Interestingly, these compounds and nanoconjugates did not exhibit in vitro cytotoxic effects against human cells. Plant-based compounds and extracts could be an interesting strategy in the development of alternative therapeutics against Acanthamoeba infections.



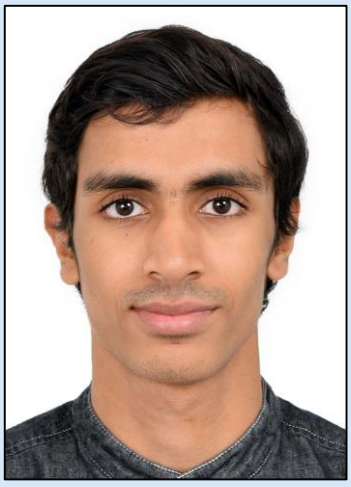
Ms. Elaine Lim Siew Ting
BSc Medical Biotechnology

Research Publications

SUNWAY UNIVERSITY

4. **Mungroo MR**, Shahbaz MS, **Anwar A**, Saad MS, Khan KM, Khan NA, Siddiqui R. (2020) Aryl Quinazolinone Derivatives as Novel Therapeutic Agents against Brain-Eating Amoebae. ACS Chemical Neuroscience. https://doi.org/10.1021/acschemneuro.9b00596

Abstract: *Naegleria fowleri* and *Balamuthia mandrillaris* are protist pathogens that infect the central nervous system, causing primary amoebic meningoencephalitis and granulomatous amoebic encephalitis with mortality rates of over 95%. Quinazolinones and their derivatives possess a wide spectrum of biological properties, but their anti-amoebic effects against brain-eating amoebae have never been tested before. In this study, we synthesized a variety of 34 novel arylquinazolinones derivatives (Q1–Q34) by altering both quinazolinone core and aryl substituents. To study the anti-amoebic activity of these synthetic arylquinazolinones, amoebicidal and amoebistatic assays were performed against *N. fowleri* and *B. mandrillaris*. Moreover, amoebae-mediated host cells cytopathogenicity and cytotoxicity assays were performed against human keratinocytes cells *in vitro*. The results revealed that selected arylquinazolinones derivatives decreased the viability of *B. mandrillaris* and *N. fowleri* significantly ($P<0.05$) and reduced cytopathogenicity of both parasites. Furthermore, these compounds were also found to be least cytotoxic against HaCat cells. Considering that nanoparticle-based materials possess potent *in vitro* activity against brain-eating amoebae, we conjugated quinazolinones derivatives with silver nanoparticles and showed that the activities of these drugs were enhanced successfully after conjugation. The current study suggests that quinazolinones alone as well as conjugated with silver nanoparticles may serve as potent therapeutics against brain-eating amoebae.



Mr. Ridwane Mungroo
MSc. Life Sciences candidate

Research Publications

SUNWAY UNIVERSITY

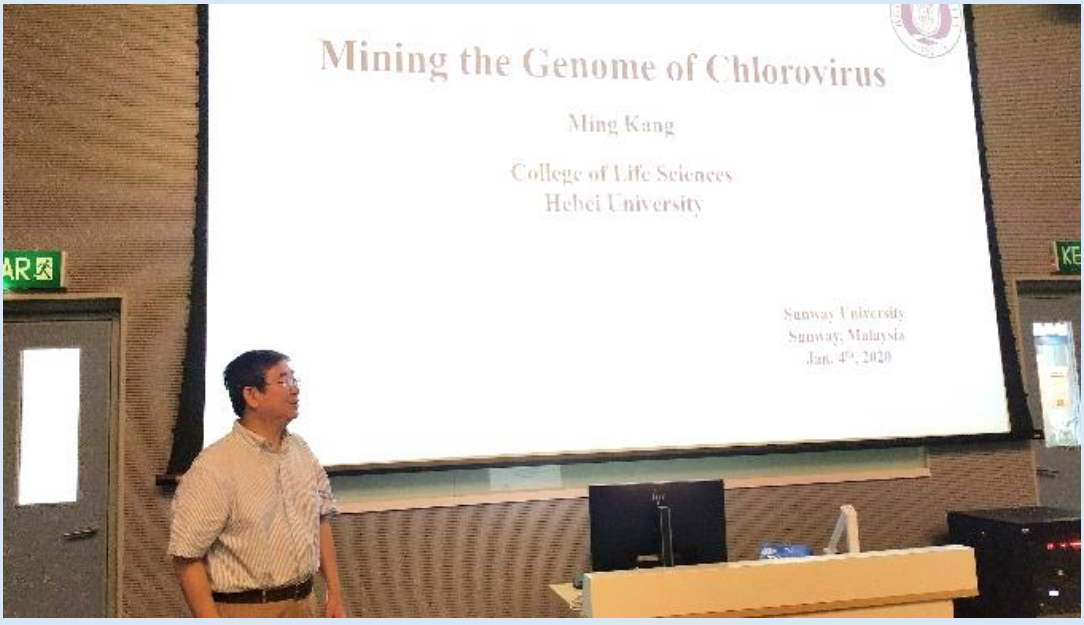
5. **Anwar A**, Siddiqui R, Hameed A, Shah MR, Khan NA. (2020). Synthetic Dihydropyridines as Novel Anti-acanthamoebic Agents. Medicinal Chemistry. 16:1-7. https://doi.org/10.2174/1573406415666190722113412

Abstract: Background: *Acanthamoeba* is an opportunistic pathogen widely found in the environment. *Acanthamoeba* causes excruciating keratitis which can lead to blindness. The lack of effective drugs and its ability to form highly resistant cyst are one of the foremost limitations against successful prognosis. Current treatment involves mixture of drugs at high doses but still recurrence of infection can occur due to ineffectiveness of drugs against the cyst form. Pyridine and its natural and synthetic derivatives are potential chemotherapeutic agents due to their diverse biological activities. Objective: To study the anti-amoebic effects of four novel synthetic dihydropyridine (DHP) compounds against *Acanthamoeba castellanii* belonging to the T4 genotype. Furthermore, to evaluate their activity against amoeba-mediated host cells cytopathogenicity as well as their cytotoxicity against human cells. Method: Dihydropyridines were synthesized by cyclic dimerization of alkylidene malononitrile derivatives. Four analogues of functionally diverse DHPs were tested against *Acanthamoeba castellanii* by using amoebicidal, encystation and excystation assays. Moreover, Lactate dehydrogenase assays were carried out to study cytopathogenicity and cytotoxicity against human cells. Results: These compounds showed significant amoebicidal and cysticidal effects at 50 µM concentration, whereas, two of the DHP derivatives also significantly reduced *Acanthamoeba*-mediated host cell cytotoxicity. Moreover, these DHPs were found to have low cytotoxicity against human cells suggesting a good safety profile, and they can be employed as therapeutic agents. Conclusion: The results suggest that DHPs have potential against *Acanthamoeba* especially against the more resistant cyst stage and can be assessed further for drug development.

Department Events

1. Visit of Professor Kang Ming of Hebei University to Sunway University

Professor Kang Ming, a visiting professor from the College of Life Sciences at Hebei University, China visited Sunway University on the 3rd of January 2020. His visit was part of a research collaboration with DBS, where two Masters students from Hebei University, Ms Lee Jing and Mr Shan Shiwei are currently conducting research under the supervision of DBS faculty (Prof. Jeff Tan, Dr Yow and Dr Jane) for a period of three months. During his visit, Professor Kang Ming gave a talk on his research that focuses on understanding the characteristics of the Chlorovirus genome (a double-stranded DNA virus that infects green algae).



Department Events

2. DBS Research Strategy Workshop: Future-focussed Research Excellence

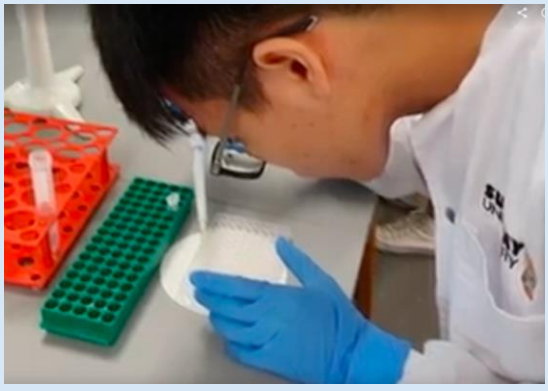
DBS faculty members started the year by holding a DBS Research Strategy Workshop on the 6th of January 2020. We shared our research interests and goals and grouped our projects into focussed Research Domains that will serve as the departments's areas of focus. The workshop served to strengthen our research output and impact by strategising intra-departmental collaborations as well as harnessing the potential of external collaborative networks.

Department Events

SUNWAY UNIVERSITY

3. BioScience Exploration program – AUSMAT students

DBS faculty members and laboratory staff jointly conducted the BioScience Exploration program for the AUSMAT students on the 16th of January 2020. This was a science outreach program to expose the pre-university students to the diverse areas of research carried out within the department. Students were rotated between three hands-on experential stations; A) Pathogens: tiny but not trivial, B) Cockroaches: Friend or Foe? and C) HIV: Envelope complex. We look forward to engaging the next generation of biological scientists!



Department Events

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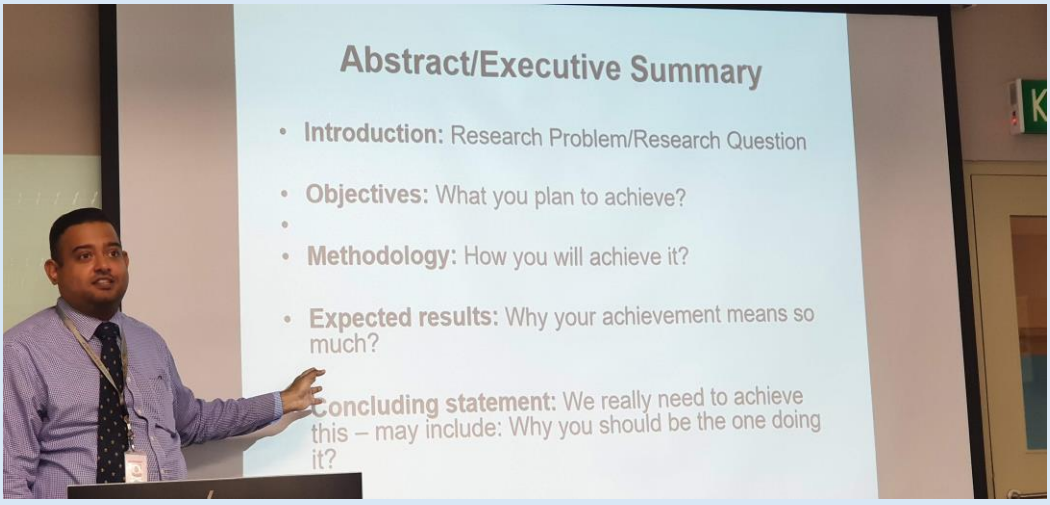
4. DBS Chinese New Year Lunch

In conjunction with the Chinese New Year celebrations, faculty and staff members of DBS came together for a lunch gathering on the 21st of January at Sunway Pyramid.

DBS Members In Action

1. Prof. Abhi conducts a grant-writing workshop for university staff

Prof. Abhi and Assoc. Prof. Dr. Yong Min Hui (Department of Phychology, SST) jointly conducted a grant writing workshop on the 31st of January. Thirty participants from different research areas From Sunway University participated in this workshop. This workshop focused on the different aspects to focus on when applying for grants offered by the Malaysian Government with a special focus on FRGS, PRGS, TRGS and LRGS. A grant-writing clinic was also offered to give personalized advice to participants who were interested to obtain feedback.



DBS Members In Action

SUNWAY UNIVERSITY

2. Congratulations to Ms. Arcana on Best Poster Award!

Congratulations to our PhD in Biology student, Ms. Arcana Thirumorthy (Supervisor: Prof. Abhi). She won the Best Poster Presentation Award at the 2nd International Conference on Oral Microbiology & Oral Immunology organized by the Malaysian Society of Oral Microbiologists and Oral Immunologists (MySOMOI) in collaboration with Universiti Putra Malaysia (UPM). The abstract of the poster presentation has been published in the Malaysian Journal of Medicine and Health Sciences Vol. 15 Supp 8, November 2019 (eISSN 2636-9346). The conference was held at the Palm Garden Hotel, Putrajaya on the 19th-20th of November 2019.

3. Congratulations to DBS faculty on securing the Sunway Internal Grant 2020.

In this cycle of internal grants, seven of our DBS members were successful in securing research grants.

No.	Project title	Investigators
1.	Unveiling the antibacterial activity of Malaysian Green and Brown seaweeds	PI: Jactty Chew Co-I: Dr Yow Yoon Yen (DBS, SU), Dr Joash Tan Ban Lee (Monash University Malaysia)
2.	ASEAN Landscape of Responsible Conduct of Research: Understanding the Underlying Factors that Influence Attitude and Practice	PI: Prof. Dr. Abhi Veerakumarasivam Co-I: Assoc. Prof. Dr. Lin Mei-Hua (Dept. of Psychology, SU), Dr. Wo Su Woan (Dept of Psychology, SU), Dr. Chai Lay Ching (University of Malaya), Dr. Chau De Ming (Universiti Putra Malaysia), Dr. Orakanoke Phanraksa (National Science Technology and Development Agency, Thailand)

No.	Project title	Investigators
3.	Combinatorial Cancer Therapy Mediated by Adenovirus, Tumor Suppressors and Chemo-drugs Targeting Cancer Stem Cells	PI: Prof Jeff Tan Kuan Onn Co-I: Dr. Babu Ramanathan (DBS, SU)
4.	Characteristics of Envelope Genes Cloned from HIV-1 Infected Plasmas with Potent Neutralizing Response	PI: Dr. Tommy Tong Co-I: Dr Tee Kok Keng (University of Malaya), Dr Nicole Doria-Rose (NIH, USA), Dr John Mascola (NIH, USA)
5.	Securing the future of the 'king of fruits': elucidating the pollination ecology of durian (*Durio zibethinus*) across Peninsular Malaysia	PI: Assoc. Prof. Gopalasamy Reuben Clements Co-I: Dr. Sheema Abdul Aziz (Rimba) and Assistant Professor Giam Xingli (University of Tennessee)
6.	Neuroprotective potential of *Polygonum minus* extract against glutamate-induced toxicity and neurodegeneration in vitro	PI: Dr. Lim Wei Ling, Audrey Co-I: Dr Teoh Seong Lin (Universiti Kebangsaan Malaysia Medical Centre)
7.	Title of Project: Design, synthesis and application of hypoxia-responsive nanomaterials to target the tumor microenvironment	PI: Dr. Ayaz Anwar Co-I: Prof Jeff Tan Kuan Onn (DBS, SU), Assoc Prof Nanthini Sridewi (Universiti Pertahanan Nasional Malaysia)

*Please share your updates (publications, events, funding) via **this link** by the 24th of each month, to be published in the up-coming bulletin.*

Feature Profile

Ms Esther Erin
BSc (Hons) Medical Biology graduate
With her mother and brother at graduation

Tell us briefly about yourself.

My name is Esther Erin and I am a proud BSc (Hons) Medical Biotechnology graduate of Sunway University. I grew up in Subang Jaya but moved to Ara Damansara since I was a teenager. I am currently the Regional Programme Officer for the International Network for Government Science Advice (INGSA) Asia Chapter. I just had my graduation last week!

What do you think was your greatest achievement while at Sunway?

My greatest achievement in Sunway was definitely making my mom proud. When I received my First Class Honours dual degrees from Sunway University and Lancaster University as well as the Jeffrey Cheah Scholastic Award during my convocation, I had to go up the stage twice and that made my mom cry twice. She was so incredibly happy for me and I am so incredibly happy that she is happy.

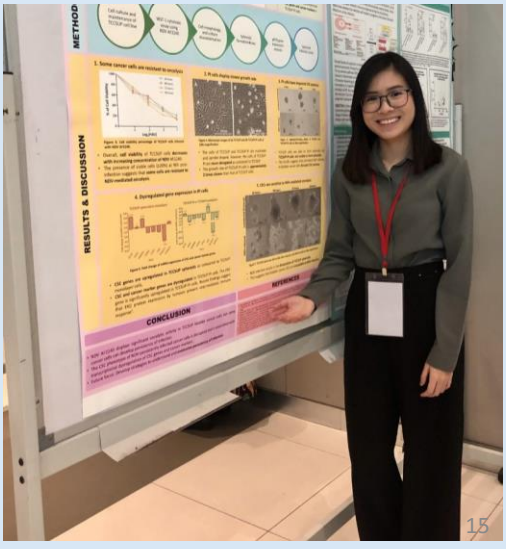
Who are the biggest champions in your life?

My mom is my pillar of strength and my best friend. She has always supported me in everything I do. I used to take part in competitive cheerleading for 6 years. The sport required a lot of travelling, time and money. I also got injured many times and one of my worst injury was twisting my spine. Through the championships, the pain and tears, my mom was always there for me. When I could not cope with my studies in high school, my mom would accompany me till

4am everyday as I did my revision. Back then, I did not score very well for my school examinations, but my mom continued to encourage me. My brother, Walter Aaron, on the other hand is the reason why I am in this field. I am so incredibly grateful that I share the same passion for science as my brother. We can both talk about science-related topics for hours over meals or during bedtime. We are total nerds, when we see a housefly around, we'll say "*Musca domestica*" instead of fly. Mom would sometimes stare at us in disbelief, sorry mom!

How do you rate your Sunway experience? What are you best memories at Sunway?

I rate my experience at Sunway: 100%. Given a chance, I would do it all over again. I had the pleasure of meeting the best lecturers. Honestly, the reason why I enjoyed studying here was because I saw how passionate the lecturers are at Sunway. My favourite subject was Biodiversity because Prof Shyamala made it so interesting. I never felt sleepy for her 8am classes! Some hated Bioinformatics but Dr Chandrajit taught with all his heart. Many are afraid of Dr Ong but he is the main reason why I love Genetics now. Medical Microbiology is tough? Dr Jactty made it easy. I will never forget Dr Yow, she is the sweetest lecturer and always made sure we understood her lectures for Cell and Tissue Culture. Through Sunway, I also got to meet my Final Year Project supervisor Prof Abhi. Since being his student, I attended my first ever science workshop, received two awards, organised an international conference, and got a job; all in less than a year. He pushes me to be the best version of myself and for that I am truly grateful (and sleep- deprived ☺).



Poster presented during the ASEAN Emerging Researchers Conference 2019

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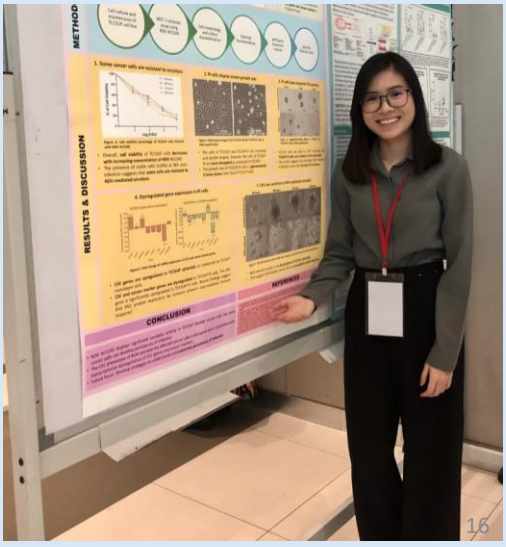

Poster presented during the ASEAN Emerging Researchers Conference 2019

Feature Profile

SUNWAY UNIVERSITY

Any unforgettable stories that you would like to share?

The Biodiversity trip with Assoc. Prof Shyamala, Suga and Huai En. Our class went to different locations to collect different species of *Pomacea* snails and their eggs for our laboratory coursework. I was so excited throughout the whole week; we even had an encounter with angry alpha male monkeys at Kuala Selangor. Prof Shyamala told us not to look at the monkeys in the eyes because they would think that we're trying to challenge them. What an eye-opening experience, for a short instance, I thought I was going to be their dinner.

Celebrating Dr Yow's Birthday in Year 2

What is it about the BSc (Hons) in Medical Biotechnology course at Sunway that you like most? How has it prepared you for life?

For me, the first year of the course was relatively straightforward because I believe that the subjects were meant to strengthen our foundations. The subjects in second year was reasonably challenging. In one of the semesters that included Human Molecular Genetics, I remember that I had a meltdown due to the amount of submissions we had in the same week. It was a memorable week for me because I remembered entering class with teary eyes and was surprised to see my other classmates crying as well. It was depressing yet funny at the same time because you see all these 20-year old adults crying together. Looking back now, it's funny because back then it almost seemed impossible, but we still managed to meet every deadline and pass every test. I am glad I entered this specific course with this specific batch of friends who have been extremely supportive and kind in stressful times. We would study together, solve problems together and bring food for each other to get each other pumped up for classes. My class threw a gathering to celebrate the end of each semester and in the last party we were all so emotional because we knew we will be going our separate ways.

Do you have any regrets?

My biggest regret was not taking part in other clubs or societies in Sunway University. I guess I was in my comfort zone for the longest time. If I could go back to the start of my degree, I would definitely try to contribute to other clubs and societies to broaden my worldview and network.

What are you doing right now? What do you plan in the near future? What are your long-term plans?

I first learnt about science advice when I attended an East Asia Capacity Building Workshop by INGSA Asia last year. As the regional programme officer of INGSA Asia, I am responsible for coordinating various programmes that promote capacity for science advice to governments across Asia. As we know, our scientific enterprise is not only dependent on sound scientific discoveries but also how scientific knowledge can influence government policies for greater economic progress and social justice. I applied for this job because I am currently interested to learn more about the bigger picture revolving science governance; way beyond the confines of the laboratory. If you're interested to learn more, you can visit our webpage (https://www.ingsa.org/). However, in the near future I plan to pursue a postgraduate degree in a medical-related research field. I hope that I am able to not only bring hope to others through my scientific research but actually improve their quality of life.

Sir Peter Gluckman, Chair of International Network of Government Science Advice presenting the certificate of participation for the East Capacity Building Workshop on Science Advice & Non-Communicable Diseases

Feature Profile

SUNWAY UNIVERSITY

How can the Department better engage Alumni like yourself?

I think it would be great if the Department continues to engage alumni like myself in events or activities in Sunway University. Please welcome us back for your various student-related activities. I am also interested to help the University as a student volunteer whenever possible and it would be great to help with community projects by the Sunway Alumni Club.

Any advice to current and future students?

The greatest advice I have ever received was from a school friend and top student, Natalie Gunter. She truly inspired me because the STPM exam was (still is) the hardest exam I have ever sat for (Dr Tommy's Immunology exam would come in second). I remember asking Natalie for tips on how to study and I thought her answer would be to quit your social life, stop extra-curricular activities, prioritise only your studies, etc. To my surprise, she said "consistency is the key" and she mentioned that even only an hour a day was enough for me to score well. I did not believe her at first, but I decided to be consistent from the very first day I started my degree. I did revision every single day (if you're wondering, yes weekends count too) for just one hour a day and guess what? I never fell behind my studies.

The point is, you must always choose discipline over motivation because you can never be motivated all the time. This does not only apply to studying but for everything you do in life. Do not wait for motivation to emerge because sometimes it won't. Having said that, remember to take a break whenever you feel worn out and always have good friends and family around you!

Esther representing Malaysian All-Star Team Awesome at CHEER 2013 National Finals by RAGE The Star

Upcoming Events

SUNWAY UNIVERSITY

Biological Sciences Lecture Series #2

SUNWAY UNIVERSITY A CLASS ABOVE

University of Essex

Dr Ulrike Bechtold PhD (University of Essex, UK)

Dr Bechtold is a plant molecular biologist, with a keen research interest in the effects of stress on plants. Dr Bechtold graduated in 2002 from the Department of Diseases & Stress Biology, John Innes Centre, Norwich, and has since published over 20 papers and secured multiple grant funding from prestigious funding agencies for her work. Her work has deep implications on the development of resilient crops that can better tolerate climate change.

You are cordially invited to attend the talk and sharing session by Dr Bechtold titled "Genetic modification of plants in response to climate change" as a part of our Biological Sciences Lecture Series.

12th February 2020 (Wed)
12pm – 1pm
LT3 (Level UG)
Sunway University

Event registration
https://forms.gle/tkbJVugDmBCSrVsh7

In collaboration with

SUNWAY BIOLOGICAL SOCIETY

Prepared by: Dr. Kavita Reginald
Approved by: Prof. Abhi Veerakumarasivam

Date: 11-02-2020