DBS Bulletin

SUNWAY UNIVERSITY

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Issue 5

Drs. Jactty and Shyamala with postgraduate student Sherene Lai visit two final year research project students, Terence and Jonathan, at the Bornean Sun Bear Conservation Centre in Sabah. The students were testing trap designs to snag hair from wild sun bears. DNA recovered from hair follicles has several useful applications for monitoring sun bear populations. Terence and Jonathan tested four different hair-snagging designs within rainforest enclosures where captive bears are released for several hours each day.
Photo credits: Assoc. Prof. Dr. Shyamala

Foreword by A. Prof. Lau

Associate Dean and Head - Department of Computing and Information Systems

First and foremost, I would like to thank the Department of Biological Sciences (DBS) for this opportunity to share my thoughts. It is a great initiative to have a bulletin to keep everyone informed about the latest developments and happenings.

As Sunway University recently is included in the QS World University Ranking for the very first time, I would take the chance to congratulate all colleagues for the achievement as well as the hard work they have put in all this while. Sunway University is only eight years old, and our first attempt for a world ranking has placed us at 751-800. In my opinion, this is a good result and an excellent start to benchmark with our peers all over the world.

There are different, perhaps divided, views on ranking among academics. While I agree that ranking may not mean everything (especially some of the measurements may not be agreeable by all), being in the ranking can still be a useful thing. Firstly, it allows us to be compared with other institutions. I take the comparison as a benchmark to help us to be more focused on improvement. Without any benchmark, it is pretty hard to tell where to begin with any effort to improve.

Secondly, being at a recognized position, it opens new doors. Students from other institutions (potential PG students!) may now gain interests to consider either further study or an exchange semester at Sunway University. You may also get new collaborators who acknowledge the newly acquired recognition for potential research collaboration. I have collaborators who told me, the reason they find interests in building collaboration ties with Sunway University is because of the external recognition such as QS ranking or MDEC Premier Digital Tech University status. I must say, those are the moments I feel encouraged because higher ranked partners recognize my institution.

All in all, this does not mean we should then play the trick of gaming the system. That may be tempting, but again, we should develop our credentials and quality by doing the right thing. Building good links with external collaborators, learn from each other, challenge ourselves to move out of our comfort zones – I believe, though the journey is challenging, it will be rewarding. We will one day be looking back, and share with our students, that it was a good journey learning from the Giants ahead of us, and hope that they will continue from where we stop.

Let’s cheer and encourage one another so that SST will grow stronger together!

Research

Recent Publications

1. Khan NA, Soopramanien M, Siddiqui R. Crocodiles and alligators: physicians' answer to cancer?. Current Oncology, [S.l.], v. 26, n. 3, june 2019. ISSN 1718-7729. Available at: <https://current-oncology.com/index.php/oncology/article/view/4855/3807>. Date accessed: 27 june 2019. doi:http://dx.doi.org/10.3747/co.26.4855.

Significance of findings: Despite advances in therapeutic approaches and supportive care, cancer remains a significant burden on human health. According to the International Agency for Research on Cancer, the number of new cancer cases and cancer deaths were 18.1 million and 9.6 million respectively in 2018—numbers that are expected to rise to 21.7 million and 13 million by 2030, highlighting the need to identify novel anticancer therapies. Vertebrates such as crocodiles and alligators can withstand high levels of radiation, reside in unsanitary environments, scavenge on rotten meat or other germ-infested diets, and be routinely exposed to heavy metals. They are among the few species to endure the catastrophic Cretaceous–Paleogene extinction event. But such species have rarely been reported to develop cancer. It is unclear how species such as the crocodile can survive up to 100 years without developing cancer, all the while being exposed to noxious agents that are detrimental to *Homo sapiens* and that are well-reported to be causes of cancer development. We have therefore recently postulated that such species have established mechanisms to defend themselves from developing cancer. In support, our recent studies showed that the organ lysates of crocodiles exhibit potent anticancer properties.

2. **Anwar A, Abdalla SAO,** Aslam Z, Shah MR, **Siddiqui R, Khan NA.** Oleic acid-conjugated silver nanoparticles as efficient antiamoebic agent against *Acanthamoeba castellanii*. Parasitol Res. 2019 May 15. doi: 10.1007/s00436-019-06329-3. https://doi.org/10.1021/acschemneuro.9b00111

Significance of findings: *Acanthamoeba castellanii* belonging to the T4 genotype is an opportunistic pathogen which is associated with blinding eye keratitis and rare but fatal central nervous system infection. *A. castellanii* pose serious challenges in antimicrobial chemotherapy due to its ability to convert into resistant, hardy shell-protected cyst form that leads to infection recurrence. The fatty acid composition of *A. castellanii* trophozoites is known to be most abundant in oleic acid which chemically is an unsaturated cis-9-Octadecanoic acid and naturally found in animal and vegetable fats and oils. This study was designed to evaluate antiacanthamoebic effects of oleic acid against trophozoites, cysts as well as parasite-mediated host cell cytotoxicity. Moreover, oleic acid-conjugated silver nanoparticles (AgNPs) were also synthesized and tested against *A. castellanii*. Oleic acid-AgNPs were synthesized by chemical reduction method and characterized by ultraviolet-visible spectrophotometry, atomic force microscopy, dynamic light scattering analysis, and Fourier transform infrared spectroscopy. Viability, growth inhibition, encystation, and excystation assays were performed with 10 and 5 μM concentration of oleic acid alone and oleic acid-conjugated AgNPs. Bioassays revealed that oleic acid alone and oleic acid-conjugated AgNPs exhibited significant antiamoebic properties, whereas nanoparticle conjugation further enhanced the efficacy of oleic acid. Phenotype differentiation assays also showed significant inhibition of encystation and excystation at 5 μM. Furthermore, oleic acid and oleic acid-conjugated AgNPs also inhibited amoebae-mediated host cell cytotoxicity as determined by lactate dehydrogenase release. These findings for the first time suggest that oleic acid-conjugated AgNPs exhibit antiacanthamoebic activity that hold potential for therapeutic applications against *A. castellanii*.

3. **Mujawar S**, Mishra R, Ashraf M, Pawar S, Gatherer D, **Lahiri C**. Delineating the plausible molecular vaccine candidates and drug targets of multidrug resistant Acinetobacter baumannii. Front. Cell. Infect. Microbiol., 20 June 2019 | https://doi.org/10.3389/fcimb.2019.00203

Significance of findings: Nosocomial infections have become alarming with the increase of multidrug-resistant bacterial strains of *Acinetobacter baumannii*. Being the causative agent in ~80% of the cases, these pathogenic gram-negative species could be deadly for hospitalized patients, especially in intensive care units utilizing ventilators, urinary catheters, and nasogastric tubes. Primarily infecting an immuno-compromised system, they are resistant to most antibiotics and are the root cause of various types of opportunistic infections including but not limited to septicemia, endocarditis, meningitis, pneumonia, skin, and wound sepsis and even urinary tract infections. Conventional experimental methods including typing, computational methods encompassing comparative genomics, and combined methods of reverse vaccinology and proteomics had been proposed to differentiate and develop vaccines and/or drugs for several outbreak strains. However, identifying proteins suitable enough to be posed as drug targets and/or molecular vaccines against the multidrug-resistant pathogenic bacterial strains has probably remained an open issue to address. In these cases of novel protein identification, the targets either are uncharacterized or have been unable to confer the most coveted protection either in the form of molecular vaccine candidates or as drug targets. Here, we report a strategic approach with the 3,766 proteins from the whole genome of *A. baumannii* ATCC19606 (AB) to rationally identify plausible candidates and propose them as future molecular vaccine candidates and/or drug targets. Essentially, we started with mapping the vaccine candidates (VaC) and virulence factors (ViF) of *A. baumannii* strain AYE onto strain ATCC19606 to identify them in the latter. We move on to build small networks of VaC and ViF to conceptualize their position in the network space of the whole genomic protein interactome (GPIN) and rationalize their candidature for drugs and/or molecular vaccines. To this end, we propose new sets of known proteins unearthed from interactome built using key factors, KeF, potent enough to compete with VaC and ViF. Our method is the first of its kind to propose, albeit theoretically, a rational approach to identify crucial proteins and pose them for candidates of vaccines and/or drugs effective enough to combat the deadly pathogenic threats of *A. baumannii*.

4. Tan LT, Mahendra CK, **Yow YY**, Chan KG, Khan TM, Lee LH, Goh BH. *Streptomyces sp.* MUM273b: A mangrove-derived potential source for antioxidant and UVB radiation protectants. Microbiologyopen. 2019 Jun 14:e859. doi: 10.1002/mbo3.859. [Epub ahead of print]

Significance of findings: Microbial natural products serve as a good source for antioxidants. The mangrove-derived Streptomyces bacteria have been evidenced to produce antioxidative compounds. This study reports the isolation of Streptomyces sp. MUM273b from mangrove soil that may serve as a promising source of antioxidants and UV-protective agents. Identification and characterization methods determine that strain MUM273b belongs to the genus Streptomyces. The MUM273b extract exhibits antioxidant activities, including DPPH, ABTS, and superoxide radical scavenging activities and also metal-chelating activity. The MUM273b extract was also shown to inhibit the production of malondialdehyde in metal-induced lipid peroxidation. Strong correlation between the antioxidant activities and the total phenolic content of MUM273b extract was shown. In addition, MUM273b extract exhibited cytoprotective effect on the UVB-induced cell death in HaCaT keratinocytes. Gas chromatography-mass spectrometry analysis detected phenolics, pyrrole, pyrazine, ester, and cyclic dipeptides in MUM273b extract. In summary, Streptomyces MUM273b extract portrays an exciting avenue for future antioxidative drugs and cosmeceuticals development.

Department Events

1. **Poster & Viva Voce Examinations for Final Year Project's Students (PJR 3200 Research Project)**
   Date: 26th June 2019
   Venue: Art Gallery, Sunway University

   This is an annual event for the Final Year Project's Students to present their research findings. These examinations are part of the assessment for the module of Research Project. The module aims to give students an appreciation of the value of research in biosciences, particularly on how research contributes to furthering scientific knowledge, as well as to provide skills in discovery and hypothesis-driven science that will be of value in practice. There were 63 students from the Programme of Medical Biotechnology and Programme of Biology with Psychology participating in this event. Five external examiners (from Monash University Malaysia, Universiti Sains Malaysia, UCSI and UTAR) and four internal examiners were involved in the examinations.

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

Department Events

2. **Dr. Sutherland visit**
   Date: 4th June 2019

Dr. Sutherland Maciver, visited the department on 4th June. Dr Maciver is Associate Prof/ Reader at the University of Edinburgh, UK. Dr Sutherland's main areas of research are, exploring the free living amoebae, the role of SAF-A in chromatin organization, and the actin cytoskeleton. He gave a research seminar entitled "Sexual vs asexual reproduction in single-celled organisms." During his visit, he held meetings with members of the Biology Department and discussed potential research collaborations. In addition, he took time to review the work of several Masters and PhD in biology students from the department.

3. **Visit to crocodile farm by Prof. Ruqaiyyah's team**
   Date: July 2019

Prof. Siddiqui's research team recently visited a crocodile farm in Langkawi to undertake collaborative research in the field of cancer. Cancer remains one of the leading killer contributing to over 10 million deaths annually. It is a devastating disease affecting 1 in 3 people. Among various risk factors, radiation, exposure to heavy metals, pollution, poor diet and unsanitary environments are considered important causes of cancer. It is intriguing that crocodiles are able to thrive in unsanitary conditions, feeding on rotten meat, are exposure to heavy metals and high radiation levels. We hypothesize that crocodiles have developed mechanisms to defend themselves against cancer development. We recently tested this hypothesis and demonstrated that various organ lysates of crocodile exhibit powerful anti-cancer activity. Our findings revealed that crocodile lysates killed human cancer cells, and could pave the way for the development of novel anti-cancer agents. Based on these findings, we are currently working on identifying and characterizing novel anti-cancer molecule(s) from crocodiles.

DBS members in action

Dr. Kavita wins RM1500 prize money for 1st prize in poster presentation

Congratulations to Dr. Kavita Reginald for being awarded RM1500 as prize money by the Malaysian Society of Allergy and Immunology. This is in recognition of her winning the 1st prize in poster presentation during the Malaysian Allergy Conference 2019.

Dr. Jane Gew invited to speak to Taylor's University undergraduate students

Dr. Jane Gew Lai Ti was invited to give a guest lecture on "Nano biotechnology" by School of Biosciences, Faculty of Health and Medical Sciences, Taylor's University Lakeside Campus on 11 June 2019, where she addressed about 20 first year students undertaking the B.Sc. (Hons) Biotechnology program. In her lecture, she explained the fundamental principles of nanotechnology and their applications in Biotechnology. She also shared her research experiences on "The Design of Lipid-based Nano Delivery System". From this lecture, students will be able to elucidate the emerging of nanotechnology in biology research, and subsequently will influence students' future career choices.

Prof. Jeff Tan attends Single Cell Proteomics Conference in Boston

The Single Cell Proteomics Conference focused on highly relevant areas of Single Cell Proteomics (SCP), including the technologies and devices for detection and analysis of single cell proteomics, advantages and disadvantages of single cell proteomics, limitations of the technologies for SCP as well as understanding the big data from SCP. Big data generated from SCP required further validation and analysis through various methodologies. Although mass spectrometry technologies (MST) have been used to study SCP, the quality of SCP data obtained through MST requires further improvement as the current MST generate significant amount of background noise and the validation of SCP data required further analysis through a population of single cells.

DBS members in action

Dr. Kavita speaks at the National Biosafety Seminar 2019

Dr. Kavita Reginald represented Sunway University in her capacity as the Deputy Biosafety Officer to present a talk entitled "Biosafety: The Sunway Experience" at the National Institutional Biosafety Committee (IBC) Seminar 2019. This seminar was organized by the Department of Biosafety which is under the Ministry of Water, Land and Natural Resources, and held at the Cititel Mid Valley Hotel on the 25th of June 2019. The theme of this year's meeting was "Monitoring of Contained Use Activity", specifically focusing on risk assessment and management, administrative matters in relation to risk management and adherence to requirements by the National Biosafety Committee, the Genetic Modification Advisory Committee (GMAC) and the National Biosafety Board (NBB). There were approximately 200 participants nation-wide that participated in this seminar, which was officiated by YB Dato' Wan Mazlan bin Wan Mahmood, from the Ministry of Water, Land and Natural Resources.

Congratulations to four members of DBS on receiving the Collaborative Research Fund 2019

Congratulations to **Dr Jane Gew Lai Ti** for being one of the recipients of the Collaborative Research Fund 2019 on the project entitled: "Development of Novel CO_2 Capturing Agents from Natural Resources". This project is led by Prof. Kheireddine (Sunway University) in collaboration with University of Malaya. The total amount of grant is RM50,000.

Congratulations to **Profs Naveed Khan and Ruqaiyyah Siddiqui** (Sunway University) and Prof. Kwang Sik Kim (Johns Hopkins University) for receiving Collaborative Research Fund 2019 on the project involving Brain-eating amoebae. The total amount of grant is RM125,000 over the period of two years.

Congratulations to **Dr Chen Jit Ern** (Sunway University), Prof Christopher Howe (University of Cambridge) and Prof Elisa Schaum (University of Hamburg) for receiving the Collaborative Research Fund 2019 on the project to study experimental evolution of heat resistance in zooxanthellae (coral endosymbiotic algae). The total amount of grant is RM245,000 over the period of three years.

Research

Funding / Award opportunities

1. **2019 National Young Scientist Award**: This award recognises the significant work and achievements of young scientists in R&D of science and technology. It promotes the enhancement of excellence, creativity and contribution to science and technology among technologist.
   Award Incentive: RM10,000, Plaque and Appreciation Certificate
   Application Procedures: Submitted online via http://bit.ly/2vNiN8g before **16 July 2019**.
   For further details: Puan. Hani Nazuha (hanikamaludin@mestedd.gov.my), 03-8885 8183; Mr. Muhammad Muaz (muhammadmuaz@ mestedd.gov.my), 03-8885 8093

2. **2019 National Technologist Award**: This award recognises the significant work and achievements of technologist in Science & Technology (S&T).
   Award Incentive: RM10,000, Plaque and Appreciation Certificate
   Application Procedures: Submitted online via http://bit.ly/2Jablan before **16 July 2019**.
   For further details: Puan. Hani Nazuha (hanikamaludin@mestedd.gov.my), 03-8885 8183; Mr. Muhammad Muaz (muhammadmuaz@ mestedd.gov.my), 03-8885 8093

3. **Falling Walls Lab AIMST 2019**: The Lab is a platform for excellent academics, entrepreneurs and professionals from all disciplines who would like to present their research work, business model, innovative project or idea in front of their peers and a distinguished jury from academia and business – in 3 minutes each.
   Finale winner: A trip to Berlin, Germany and other incentives.
   Apply online at falling-walls.com/lab by **28 July 2019**.
   For further details: fallingwalls@aimst.edu.my

Upcoming Events

1. **International Conference on Industry 4.0: A Global Revolution in Business, Technology and Productivity**

SEGi University in collaboration with multiple Government Agencies, GLCs and private sectors is organizing an "International Conference on Industry 4.0: A Global Revolution in Business, Technology and Productivity" (www.myindustries.org) from 5th– 7th September 2019 at SEGi University, Kota Damansara, Selangor.

This mega Conference is to be officially opened by YB Tun Dr. Mahathir bin Mohammad who would also deliver the Keynote address. The Conference offers academic tracks in multi disciplines. Attached please find copy of the areas suggested for academic presentations. The conference consequently offers academics an opportunity to publish in Scopus journals. The list of journals which have agreed to publish our papers is also attached for your perusal.

More information: www.myindustries.org

2. **27th FAOBMB & 44th MSBMB Conference: Call for Participation**

The 27th FAOBMB Conference will have the general theme of "Biomolecules: Networks & Systems" with a Special Symposium on "Mosquito-borne illnesses". We have put together an excellent scientific programme with eminent speakers, forums for Career Development, Education and Women in Science and pre- and post-conference workshops providing networking opportunities for all delegates.

Abstract submission deadline: 31 May 2019
Conference date: 19th – 22nd August 2019
Venue: Berjaya Times Square Hotel
More information: www.faobmkl2019.com

Welcome to new students

We welcome the following new post-graduate students (Masters to our department): Ms. Wong Yi Ru (supervised by Dr. Kavita), Ms. Shweta Gangasa Walvekar (supervised by Dr. Jane), Ms. Humaira Reza (supervised by Dr. Babu).

Prepared by: Dr. Kavita Reginald Approved by: Prof. Naveed Khan Date: 05-07-2019