



**Malaysian
Society for
Microbiology**

THE MALAYSIAN SOCIETY FOR MICROBIOLOGY

E-BULLETIN

What's inside this issue:

- **MSM SPOTLIGHT**
- **NEWS AND REPORTS**
- **ARTICLES FROM MSM MEMBERS**
- **STUDENT'S COLUMN**
- **UPCOMING EVENTS**
- **TRY THIS! -WORD SEARCH**

Editorial Board Dec, 2022 (Vol. 3)

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MSM EXCO

From the President's desk..



Welcome to our first bulletin of 2023! As we transcend into another calendar year with renewed spirits and reinvigorated optimism, the MSM continues on its charter of advancing microbial research in Malaysia for the betterment of societal well-being.

The society, through its EXCO will be even harder at work as we shift into more initiatives conducted via physical means. This includes the organisation of MSMPs 2023 and ICMSM 2023, and our vested strategic collaborations in NSC 2023 and JAMS-KL Seminars with both the Academy of Sciences Malaysia as well as JAMS-KL, respectively. In the coming weeks, look out for our calls of proposals for the MSM Outreach Grants too, as we endeavor to support two more outreach programs by our MSM members.

The MSM bulletin is transcendent of our aspirations for a conducive platform of networking for all our members. We open submissions from everyone which includes sharing of knowledge on new advancements as well as personalities in the fields of Microbiology, postings of events and planned tentatives, as well as sharing important information that can benefit a multitude of entities. The fundamental law of humanity is interdependence; a person is a person through another person. The Editorial Board of the e-bulletin welcomes participations and contributions from our members, and together let's make this space a launchpad for a more inclusive and wonderful avenue for the growing family of MSM. We also welcome comments and suggestions from our members to collectively make the society better too!

I wish all our readers a productive, auspicious year ahead. May this year bring us all joy, happiness, along with the best of health and being. Take care, and looking forward to meet everyone through our MSM activities throughout the year! Thank you and best wishes from us.

MAS JAFFRI MASARUDIN
MSM President, 2021/2023



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MSM SPOTLIGHT

From Penang to the World: The Inspiring Journey of Prof. Dr. Khatijah Yusoff

**BIODATA OF ACADEMICIAN
PROF. DATIN PADUKA DR. KHATIJAH
YUSOFF, DSIS, FASC, FTWAS, FIAS, DSC
(HONORIS CAUSA), PHD (LA TROBE)**

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*NEVER GIVE UP AND
VALUE THE IMPORTANCE
OF TEAMWORK*

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Prof. Datin Paduka Dr. Khatijah Yusoff is a renowned microbiologist and academic at Universiti Putra Malaysia (UPM). Born in Penang in 1956, she received her early education there and pursued her tertiary education in Australia, where she received a First-Class Honours in Microbiology and a PhD in Microbiology from La Trobe University. Prof. Khatijah began her academic career as a lecturer at UPM in 1983 and has spent four decades in the field, becoming a leading expert in microbiology. Her research focuses on the molecular biology of the Newcastle disease virus and the interactions between microorganisms and the environment.

Throughout her career, Prof. Khatijah has received numerous awards and honors for her contributions to the field. Among them were the prestigious National Young Scientist Award in 1990, the UNESCO Carlos J Finlay Prize for Microbiology in 2005, and the Merdeka Award in 2015. She is known for her exceptional teaching skills and has mentored numerous postgraduate students. Prof. Khatijah is active in various professional organizations, including serving on the editorial board of leading scientific journals.

On January 30th 2023, Prof. Khatijah retired from her role as an academician from UPM after a 30-year service. She now serves as a Subject Matter Expert at the Malaysia Genome Vaccine Institute and as a Professor under the Amal Putra scheme at UPM. She continues to make significant impacts in her new role and her legacy will continue to be felt for years to come. Her special message to young Malaysian scientists is to "never give up and value the importance of teamwork".



What inspired you to be a microbiologist?

The story began when I visited a pathology lab during a primary school trip. I got so excited and was very impressed with the experience, that my dad bought me a microscope so I can start exploring the tiny world of microbes. As my passion in the biological sciences grew, I eventually decided to major in microbiology, particularly in microbial genetics when I started studying at La Trobe University in Melbourne for my undergraduate studies. I like microbiology because it is so interesting and so much easier to score than in the arts and humanities.

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I BELIEVE THAT MOLECULAR IMMUNOLOGY AND CANCER BIOLOGY ARE FIELDS WITH A LOT OF POTENTIAL FOR MAKING A REAL IMPACT IN OUR WAR AGAINST CANCER

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How did you begin your research at UPM? Can you describe your research journey and highlight some of the key projects you have been involved in, and how they have evolved over time?

I initially started my research in microbial genetics at the Department of Biochemistry and Microbiology, Universiti Putra Malaysia (UPM) in 1983. I realised that I was not making any progress in getting any research grants in my area of expertise, i.e. microbial genetics. The break came when I was invited by the Deputy Vice-Chancellor of UPM to a meeting with the late Professor Abdul Latif Ibrahim, a veterinarian from UPM who will eventually become one of my mentors. I remembered his lab had cubicles with no biosafety cabinets or even laminar air flow cabinets. I used to work in that cubicle to conduct tissue culture under a Bunsen burner. This meeting with Professor Abdul Latif Ibrahim marked a turning point in my research, as he introduced me to Newcastle disease virus (NDV) and sparked my interest in virology.

An opportunity to learn more on NDV came soon after that meeting when my late husband had to do his cardiology training at the University of Newcastle -upon-Tyne, UK. I began by looking at the genes of the virus, sequencing them, and analysing their expressions. Over time, I expanded my research to include other areas in molecular biology. I even had a student working on water buffalo genetics, specifically on the development of a PCR system for animal mitochondrial DNA analysis.

My journey in virology has been one of exploration and discovery. I started out studying NDV, a virus that affects poultry in the 1980s. In my early work, I focused on the simple things, like understanding the nucleotide sequence and antigenic sites of NDV, as well as its protein structure. By manipulating the viral genome, we not only successfully developed several vaccines against NDV but also against other pathogens, like Enterovirus 71, respiratory syncytial virus and the avian influenza virus, some of which have been patented. Despite the availability of NDV vaccine in the market, emergence of different genotypes of NDV continued to taunt the poultry industry. An effective and stable genotype-matched live attenuated NDV vaccine (mIBSO25) based on a novel naturally recombinant Malaysian isolate was developed using reverse genetics by manipulating the cleavage site of the fusion protein.

Interestingly, this poultry virus was found to selectively kill cancer cells and has triggered a whole new initiative to develop adjunctive therapy for cancers. In the early 2000s, I began exploring the use of NDV as a tool for inducing apoptosis in cancer cells. This marked the transition of my research from poultry to cancer. I found that NDV infection promotes cell death in cancer cells, which led me to investigate the underlying mechanisms. My work revealed that NDV-induced apoptosis involved the redistribution of Bax to mitochondria and the involvement of apoptotic proteins upstream of mitochondria. Through reverse genetics, we are currently developing several types of NDV-based cancer vaccine carrying immunomodulators like anti-PD-L1, IL-12 and apoptin for the treatment of cancers.

In addition to my work on NDV and apoptosis, I also studied the use of *Lactobacillus acidophilus* as a live vehicle for oral immunisation against chicken anemia virus and the surface display of respiratory syncytial virus glycoproteins in *Lactococcus lactis* NZ9000. The latter is a generally regarded as safe (GRAS) bacteria that has the potential to be used as a food grade vaccine by displaying heterologous proteins on the surface of the bacteria. This strategy has been extensively studied using the epitopes of chicken anaemia virus, avian influenza virus, Mycobacterium tuberculosis antigens, and respiratory syncytial virus. More recently, my research has focused on the surface display of tumor antigens, such as Tyrosinase-related protein-2 (TRP-2) on *Lactococcus lactis*. I have also studied methicillin-resistant *Staphylococcus aureus* biofilms and their influence on bacterial adhesion and cohesion. I am very interested in using phage therapy as an alternative to antibiotics.

What obstacles did you have to overcome in your professional path as a microbiologist to make sure your research stayed up to date with the most recent developments in the field?

When I first obtained my PhD in microbial genetics, I found it difficult to secure grants for my research. This prompted me to switch my focus to virology, which proved to be more financially viable.

I used to subscribe to journals from the Society for General Microbiology (SGM) back in the 1980s when we did not have any access to the internet. Through this subscription, I received newsletters and had access to various publications. Nevertheless, the online subscription to journals of today really helped. Another very important aspect in being up to date with the latest trends in microbiology is to do online search and attending conferences and scientific meetings. Recently, however, most of us are “zooming” here and there, saving us time not only on traveling but we now have greater on-line accessibility to reach out to other scientists. Connecting with others is now so much easier and cheaper, as well as more cost-effective in staying updated on the latest trends and updates in the field. In addition, I engage with companies to ensure that my research meets industry needs.

It is important for young lecturers to recognise that the field of microbiology is constantly evolving and that it is important to adapt to these changes in order to remain relevant. However, it is also crucial to maintain a balance between adaptation and staying true to one's passion and interests. Young lecturers should not be too rigid in their approach, but rather, should work on something that they enjoy. By doing so, they can ensure that their research not only remains relevant, but also that they are motivated and engaged in the work they are doing.

Along your career path, what significant achievements have you accomplished?

Over time, my research and innovation received great acclaim nationally and internationally. I was honoured by the Houghton Trust to deliver the 3rd Houghton Lecture at the XIIth World Veterinary Poultry Association (WVPA) Congress in 2002 and I was later accorded the UNESCO's Carlos Finlay Prize for Microbiology in 2005. In 2008, I received the Distinguished Alumni Award from my alma mater, La Trobe University, and in 2014, I was identified as one of the top 20 most influential women in science in the Islamic World by Muslim-Science.com. I suppose along the way, one can get lucky to receive awards such as the National Young Scientist Award (1990), Mendel Lecturer (2009), Microbiologist of the Year Award (2009), Australian Education Achievement Award (2013), Zakri Award (2013), the prestigious Merdeka Award (2015), the Lifetime Scientific Research Achievement Women's Award (2019) and the Anugerah Tokoh Akademik Negara (2022).

As an exponent of Science, I have had extensive engagement and network with both national and international public, industry, and professional bodies. I was elected as a Fellow of the Academy of Sciences Malaysia (ASM) in 2007, a Fellow of the Islamic World Academy of Sciences (IAS) in 2008 and The World Academy of Sciences (TWAS) in 2010. I am currently the Vice-President of IAS, and a member of the Council of Scientific Advisers of the International Centre for Genetic Engineering and Biotechnology (ICGEB).

Believing strongly in the need for translating science into tangible benefits to people around the world, I had the opportunity to be on the Board of Trustees of the International Livestock Research Institute (ILRI) based in Kenya and Ethiopia. This organisation supported by governments and philanthropists such as the likes of the Melisa and Bill Gates Foundation, who are dedicated to bringing science to the poor farmers in Africa. I was also involved in many other Boards and Committees.

What was the biggest challenge you have faced so far as a microbiology researcher? How did you cope with the challenges?

One of the biggest challenges I faced as a researcher is staying updated in my field, particularly in the area of immunology. The field of signal transduction pathway, for example, is constantly evolving and it can be challenging to keep up with the latest trends and developments.

To cope with this challenge, I found that working with young researchers and academics from various fields has been a valuable asset. They tend to be more familiar with the latest trends and advancements and can provide valuable insights and perspectives. That is why I often emphasise on attending regular lab meetings and journal clubs.

In my early years as a researcher, we did not have the computers or software that we have today to do sequence alignment to analyse sequencing data. Everything had to be done manually. I wrote my thesis using typewriters and even had to manually adjust the brightness of gel photos. I had to make my own electrophoresis set, everything was DIY.

Nowadays, many things have become automated and it is important to expand our connections and work together effectively to stay updated. That is why it is important to build a network and collaborate with other researchers in our field, it will help us to stay updated with the latest advancements and technologies. As instruments are becoming more sophisticated and expensive, it is more cost effective to share what we have. Moreover, when we share, we also get to strengthen our network.

What strategies can be implemented to adapt to the rapid changes from conventional to contemporary microbiology, and ensure the sustainability of the post-genomic era of microbiology from both an economic and social point of view?

It requires a significant investment of time and resources to stay current with the latest technologies and techniques. However, the benefits of contemporary microbiology are undeniable. The use of newer technologies such as multi-omics, synthetic and systems biology has led to the generation of vast amounts of data which can be utilised for a wide range of applications. This has led to a new era of data science in biological sciences which is expected to continue to grow in the 21st century, a century that is full of challenges, a century that the biological sciences have a huge role to play!

In order to keep up with the rapid changes in the field, it is important to encourage our lecturers to upskill and update the university curriculum regularly. This includes teaching students the current issues and encouraging them to think critically. It is also recommended for the lecturers themselves take postgraduate diploma in teaching, which is mandatory in some private universities.

Additionally, I have found that working in groups and teaching students about current issues is effective to encourage learning. Students should be exposed to a wider variety of perspectives and be involved in debates. This can be achieved by encouraging them to read widely, giving them critical questions and exposing them to different cultures and civilisations.

Overall, it is important for researchers and educators to stay current with the latest advancements in microbiology and to encourage others to do the same. This includes investing time and resources to upskill as well as incorporating new technologies and techniques into research and education. Additionally, it is important to take a holistic approach that includes not only the technical aspects of science, but also the arts and cultural context in which it exists. This will help to ensure the sustainability of the post-genomic era of microbiology from both an economic and social point of view. You need to appreciate that interdisciplinary approach to solving societal challenges is the way forward.



If you could do something differently in your career, what would it be?

Molecular immunology and cancer biology. The complexity and diversity of these fields have always fascinated me and I have always been motivated to understand more about them. In hindsight, I realise that I could have devoted more time and resources to exploring these fields in more depth.

Cancer is a disease that affects many people and I would have liked to do more to help those affected by it. I believe that molecular immunology and cancer biology are fields with a lot of potential for making a real impact in our war against cancer. With the advancements in technology and research, I wish I had invested more time in learning about these fields and being able to contribute more to this war against cancer.

How do you manage your time as a researcher while juggling administrative work and personal responsibilities?

Balancing the demands of being a researcher, while also managing administration work and maintaining a work-life balance can be challenging. I have found that having a strong support system at home is critical. My late husband was the most important figure in helping me achieve a work-life balance and support for my career. The other key matters that helped me to balance my workload was having a helper at home, and a driver to help us with transportation. This allowed me to focus on my work and responsibilities as a researcher. I have also been fortunate to have had strong support from my children, friends, and family.

I always made sure to take time for myself and engage in activities that I enjoy. For example, I enjoy reading a lot, particularly on novels and science fiction. I also listen to e-books, TED talks, revert stories and religion, travel channels on YouTube, and podcasts on current global issues. I used to subscribe to a service called Luminosity which had games that improved my memory, but nowadays, many of these games are available online free.

It is important to find activities and hobbies that we enjoy, these will help us to relax, and enjoy our free time, and it will also help us to reduce the stress that comes with heavy workloads. I also try to make sure that I spend quality time with my family, even though we may not have a lot of free time, we made sure to make the most of the time we have together. For example, have at least one meal a day together with the family, and if possible perform our prayers together (berjemaah). My late husband used to lead our prayers but now, my children have taken over that role.

What is your advice to all researchers?

Know your endgames and work effectively towards them. Follow your passion and be steadfast in your undertakings. Throughout my research and science engagement journey, I have learned that collaboration and persistence are key to achieving our goals. Make friends to build strong networks. Teamwork is very important, not only at your workplace but also at home. I have had the privilege of working with many talented individuals, and I am proud of what we have accomplished together. And finally, of course, we need spiritual support. I hope my story inspires others to continue exploring new things, even when faced with challenges.

Lastly, as a proud Life Member of MSM, how can the Malaysian society and microbiology community benefit from MSM?

One way in which MSM can contribute to the society is by regularly organising events and meetings that promote open and relaxed discussions. These informal settings allow members to get to know each other better, share ideas, and build trust.

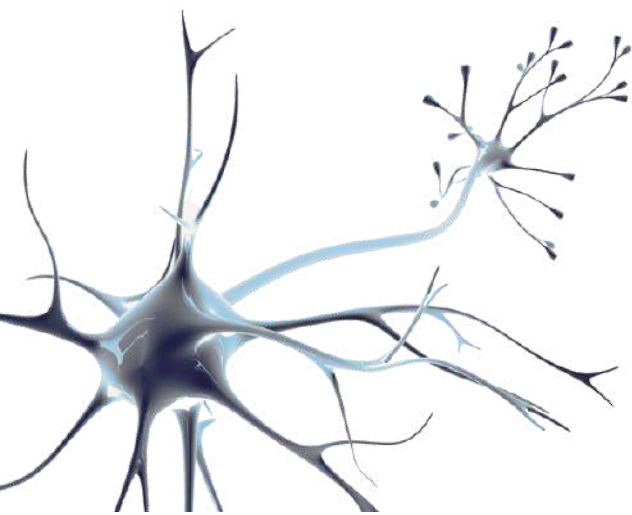
Such events provide an opportunity for microbiologists from different backgrounds and areas of expertise to come together and share their knowledge and experiences. This can lead to the exchange of new ideas and the formation of new collaborations, which can ultimately lead to advancements in the field of microbiology in Malaysia.



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*KNOW YOUR ENDGAMES AND WORK
EFFECTIVELY TOWARDS THEM. FOLLOW
YOUR PASSION AND BE STEADFAST IN
YOUR UNDERTAKINGS*

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NEWS AND REPORTS

SEPT - DEC 2022

The 35th Symposium of the Malaysian Society for Microbiology (MSM2022)

The 35th Symposium of the Malaysian Society for Microbiology (MSM2022) was held in Kuala Lumpur from the 1st to 2nd December 2022. This two-day symposium was the first in-person event for MSM since the pandemic. The theme for the symposium was 'Microbial Technologies: Ensuring Biosecurity and Sustaining the Future'. MSM2022 was jointly organized by Universiti Malaya (led by Prof. Dr. Rofina Yasmin Othman) and MSM. The symposium was officiated by Professor Dr. Zulqarnain, the Dean of the Faculty of Science, representing the Vice Chancellor of Universiti Malaya. Two keynote speakers, Professor Datin Paduka Dr. Khatijah Yusoff and Dr. Ipek Kurtboke (President of the World Federation for Culture Collections), delivered inspiring talks to more than 80 participants from 13 public and private universities, and 6 government agencies. There were 8 plenary talks, as well as 13 oral and 26 poster presentations. In addition to the usual sessions in the different areas of microbiology (health, food, environmental, agricultural, industrial and molecular microbiology), MSM2022 had a session on microbiology education and outreach (a first among the MSM symposiums!). There were also treats and games from four booth sponsors. General feedback from the participants indicated that they had an enjoyable and fruitful time at the symposium.



FNCA 2022 Workshop

A team of researchers from the Malaysia Nuclear Agency participated in the Forum for Nuclear Cooperation in Asia (FNCA) 2022 Workshop on Radiation Processing and Polymer Modification (RPPM). The event was held from November 28th - December 2nd, 2022 at the Takasaki Advanced Radiation Research Institute (TARRI), National Institutes for Quantum Science and Technology (QST), Japan. The workshop, which was also conducted online, was hosted by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, with the cooperation of TARRI, QST. Thirty-two representatives involved in radiation processing and polymer modification from ten FNCA member countries attended the workshop, namely Bangladesh, China, Indonesia, Japan, Kazakhstan, Malaysia, Mongolia, the Philippines, Thailand, and Vietnam. FNCA Biofertiliser project is a framework for international cooperation for the peaceful use of atomic energy in biofertiliser development. The programme included open seminars, progress reports and future plans from each member country; as well as group discussions and visitation to NHVC, a private company of electron accelerators. Malaysia's role in this project is on the sterilisation of biofertiliser carrier materials, commercialisation of biofertiliser, radiation mutagenesis, and development of microbial beads for bioremediation. With this involvement, Malaysia will be able to promote biofertilisers developed through Malaysian technologies to member countries, as well as acquiring new information on the latest biofertiliser technologies globally.



KEM CUTI SEKOLAH@IBS: DUNIA MIKROB (School Holiday Camp@IBS: World of Microbes)

Microbial Culture Collection Unit (UNiCC) in collaboration with the Microscopy Unit (EM), Institute of Bioscience, Universiti Putra Malaysia have organised a much awaited community event; Kem Cuti Sekolah@IBS: Dunia Mikrob (School Holiday Camp@IBS: World of Microbes) on the 13th to 14th December 2022. The programme was aimed at sharing basic knowledge related to microorganisms as well as inculcating soft skills in school children aged between 13 to 15 years old. Participants of this programme had the opportunity to perform hands-on experiments which included: (1) Introduction to laboratory safety and personal protective equipment (PPE); (2) Handling of basic equipment and apparatus for microbiology works; (3) Sampling and isolation of microorganisms from various field samples; (4) Gram staining; (5) Introduction to light, stereo and electron microscopes. Microbial related art activities were also incorporated where participants took part in doodle drawing competition with microorganisms as the theme. Two industrial partners collaborated in making this programme a success. Histocenter (M) Sdn. Bhd. provided demonstration using light and stereo microscopes, and Yakult (M) Sdn. Bhd delivered a talk on Misi Sihat Yakult (Yakult's Mission Towards Good Health). Positive responses received from participants indicated the success of the programme in increasing knowledge and enhancing experience on microbiological works, as well as refining soft skills such as self-expression, communication and teamwork.



16s rRNA Microbiome Data Analyses using R Bioinformatics Workshop organised by the Joint Academic Microbiology Seminars Kuala Lumpur (JAMSKL)

Dr. Liyana binti Azmi
Universiti Sains Islam Malaysia
JAMSKL Secretary

The 16s rRNA Microbiome data analyses using R Bioinformatics Workshop organised by the Joint Academic Microbiology Seminars Kuala Lumpur (JAMSKL) was successfully held from the 8th - 11th of November 2022. The 4-day workshop held at the Taylor's University Lakeside Campus had 25 participants. The workshop was led by Assoc. Prof. Dr Federico Lauro from Nanyang Technological University, assisted by his team, Ms Winona Wijaya and Dr Ezequiel Santillan. The training experience consisted of a mix of lectures, quizzes, hands-on training and a final-exam mock session to enable the trainees to conduct their own analyses.



All participants and trainers for the 16s rRNA Microbiome data analyses using R Bioinformatics Workshop

On Day 1, trainees were first exposed to fundamental knowledge of experimental design, sampling, sample processing and sequencing. Lectures by Assoc. Prof. Dr. Federico Lauro focused on amplicon sequencing, sequencing technologies, effective practical strategies and troubleshooting, library preparation and tools for sequencing. The lecture was interactive, with the participants actively asking questions throughout the session. Before the end of Day 1, participants had a short hands-on session to access Linux servers, were taught to use command lines and performed brief sequence quality checks using a real dataset.



Assoc. Prof. Dr. Federico Lauro from Nanyang Technological University



All trainers and participants during a workshop session

On Day 2, trainees dived into the practical led by Ms. Winona Wijaya. The session began by learning how to install R programs, then proceeded into sequence quality visualisation, pre-processing, learning error rates using DADA2, and cleaning up the sequencing reads. The practical lasted the whole day and had breaks to accommodate the participants and facilitators. While everyone in the workshop progressed at different rates, all facilitators were diligent in providing guidance and brought all the trainees to the same page before moving to sequencing analyses the next day. At the end of the session, the trainees participated in a Kahoot quiz to test their knowledge of sequence processing.



Ms. Winona Wijaya from Nanyang Technological University



Dr. Ezequiel Santillan from Nanyang Technological University

Day 3 consisted of a mix of lectures by Dr. Ezequiel Santillan and a hands-on session. Dr. Santillan talked about standard multivariate/statistical analyses in microbial ecology studies using ggplot/phyloseq. The lectures were then accompanied by a hands-on session utilising the dataset from the previous day. The trainers facilitated participants with using the cleaned dataset and guided them on how they could best extract meaningful information to answer specific research questions.

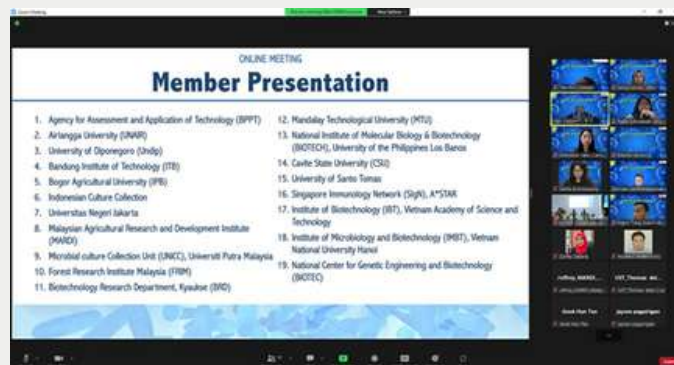
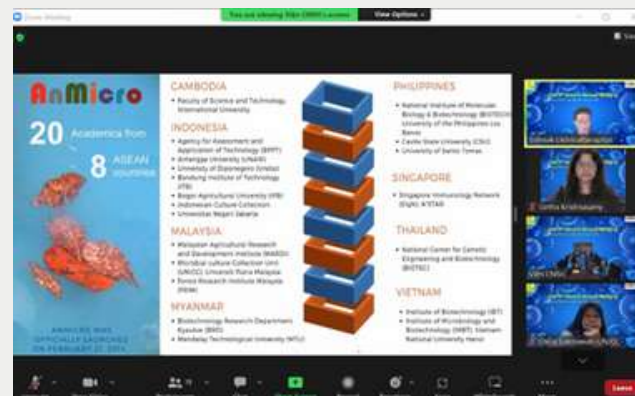
On Day 4, the workshop began with lectures by Dr. Santillan, who explained cluster analyses, construction of phylogenetic trees, sequence alignments and other analyses such as time series, network and multiple linear regressions. Then, the participants were given a real-life research scenario, a sample dataset by the trainers and research questions regarding the sequenced data. Each participant had access to a dataset and participants were required to process their own data, conduct analyses to finally answer the research questions and produce high-quality figures to support their findings. The practical was followed by a final short Kahoot quiz on all the materials learnt during the workshop while at the same time having fun. At the end of the workshop, all participants acquired lecture notes, scripts, and materials which would facilitate the users to independently analyse their own data set.



Final class photo

9th Meeting of ASEAN Network on Microbial Utilisation

The 9th Meeting of ASEAN Network on Microbial Utilisation (AnMicro) was hosted by Institute of Biotechnology (IBT), Vietnam Academy of Science and Technology (VAST). The Meeting held on 21 October 2022 was chaired by Dr. Tien Phi, Deputy Director of IBT and AnMicro secretariat, who facilitated the meeting agenda. Members of the AnMicro network were represented by researchers from organisations in Thailand, Philippines, Myanmar, Cambodia, Indonesia, Vietnam and Malaysia. Researchers from Malaysia who participated in this meeting were from Malaysian Agricultural Research and Development Institute (MARDI), Microbial Culture Collection Unit (UNICC), Universiti Putra Malaysia and Forest Research Institute Malaysia (FRIM). Besides discussion on the network's activities and focus teams, presentations were also given by the member organisations.



Microbiology Community Outreach Program Among Middle School Children in Mukim Mengabang Telipot , Kuala Nerus, Terengganu

Assoc. Prof. Dr. Siti Nor Khadijah Addis,
Ts. Dr. Fazilah Ariffin & Dr. Noor Zarina Abd Wahab
Faculty of Science and Marine Environment, Universiti Malaysia Terengganu

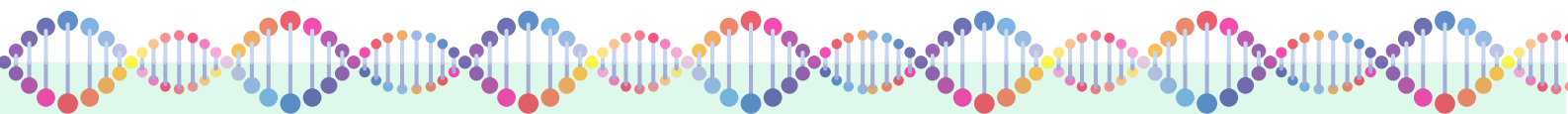
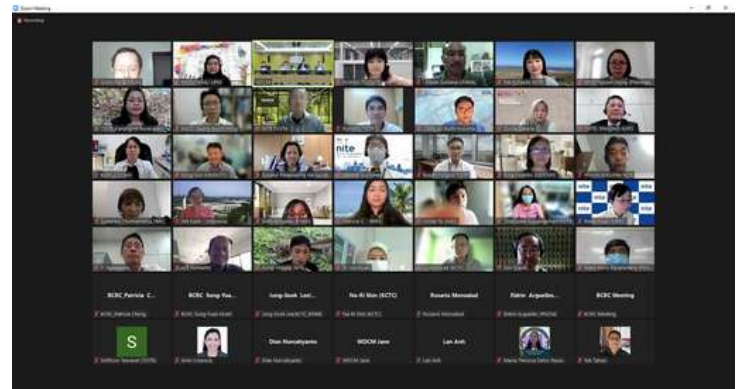
A community outreach STEM program organised by a group of young lecturers under the Knowledge and Technology Assimilation Grant Scheme (KTAGS) 2022 was held on the 12th of November 2022 at Universiti Malaysia Terengganu (UMT). This program was organised in association with the Community Outreach Working Group of the Malaysian Society for Microbiology (MSM), featuring MSM members from UMT and Universiti Sultan Zainal Abidin (UniSZA). The goal of the program was to increase public understanding and appreciation of microbiology and its impact on daily life.

This half-day program aimed to educate middle school children about microbiology and the role of microorganisms in everyday life. The program exposed the participants to the importance of proper hygiene, the benefits and potential dangers of different microorganisms, and the ways in which microbiology research can improve the community's health and well-being. The program also included hands-on activities, such as microscope demonstrations and experiments that helped to engage the participants and make the subject more accessible. The participants in the program responded with a lot of positive feedback as the program also improved their teamwork and public speaking skills. The project also helped the students to understand the importance of volunteering and public health education.



19th Meeting of the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM19)

Microbial Culture Collection Unit (UNiCC) of Institute of Bioscience represented Universiti Putra Malaysia (UPM) at the 19th Meeting of the Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM19). The event took place on 18th October 2022 via the Zoom platform. Prof. Dr. Zunita Zakaria (coordinator of UNiCC) presented the annual report for UPM in this meeting. The ACM19 was hosted by the Institute of Microbiology, Chinese Academy of Sciences (IMCAS), Asian Consortium for the Conservation and Sustainable Use of Microbial Resources (ACM), and WFCC-MIRCEN World Data Center for Microorganisms (WDCM). The meeting was attended by ACM members from various research institutions and universities from Malaysia, China, Japan, Thailand, Indonesia, Philippines, Taiwan, and South Korea. Other Malaysian institution that is also member of ACM is Malaysian Agricultural Research and Development Institute (MARDI).



MSM Working Groups



Scan me to join!



COMMUNICATION

Coordinates information and news sharing related to MSM, MSM members and Microbiology



OUTREACH

Coordinates community events that promote transfer of knowledge to the public on Microbiology

ARTICLES FROM MSM MEMBERS

Application of *Pseudomonas fluorescens* as a Potential Biofertiliser

Dr. Jeffrey Lim Seng Heng
Principal Research Officer

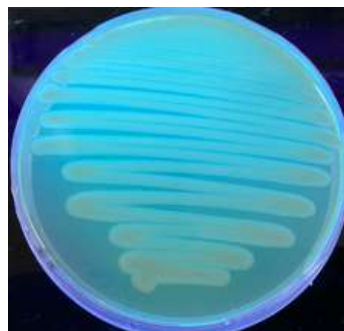
Agrobiodiversity & Environment Research Centre
Malaysian Agricultural Research and Development
Institute (MARDI)

Maintaining or increasing agricultural production while having less destructive impact to the environment has been one of the major challenges faced by farmers, researchers and companies in the current agriculture sector. Farmers need to increase the usage of fertilisers and pesticides to increase the crop yield. Furthermore, comparing chemical fertilisers and pesticides to biological fertilisers and biopesticides, chemical products seem to outweigh the biological products due to cost and fast efficacy. However, the idea of plant protection using non-hazardous strategies such as biological fertiliser, biological control and naturally-friendly methods such as composting, are to be proposed and taught to farmers so that consumers can better enjoy their food with ease and also to give a better environment to the next generations. One of the well-known group of microbes that usually attract the attention of researchers with reference to biofertilizer are the plant growth promoting bacteria (PGPB) such as *Pseudomonas fluorescens*. *Pseudomonas fluorescens* is an ubiquitous organism that is present in agricultural soils and in the rhizosphere. *Pseudomonas fluorescens* possesses many traits such as efficient biological control agent and promoting plant growth through production of phytohormones.

A study was conducted by Agrobiodiversity and Environment Research Centre in 2019, to isolate indigenous *Pseudomonas fluorescens* from soils of vegetable farms and fruit orchards in Malaysia. The reason of having *Pseudomonas fluorescens* is to reduce risks of importing alien species into Malaysia as it may disrupt the soil microbial community in Malaysia. The obtained *Pseudomonas fluorescens* was later screened for potential activities such as antimicrobial activities, enzyme production, nitrogen fixation, phosphate solubilisation and phytohormone production. These biological activities are important parameters to select an efficient PGPB that is able to stimulate plant growth and in producing higher yield. *Pseudomonas fluorescens* is typically selected because the bacteria is known to coat the root of the plants, thus protecting the plants from being invaded by pathogenic microorganisms.



In the study conducted, five (5) isolates of *Pseudomonas fluorescens* were selected and tested for their phytohormones production, enzymes production, nitrogen fixation, phosphate solubilisation and also antimicrobial activities. It was observed that none of the *Pseudomonas* sp. showed nitrogen fixation ability, complying with the nature of *Pseudomonas* sp. as a denitrifying bacteria instead. However, all the five selected *Pseudomonas* sp. showed good phytohormone production (IAA and GA3). From these, *Pseudomonas fluorescens* k29pf gave the best activity in both tests with 8.52 and 72.41 µg/ml for IAA and GA3, respectively. *Pseudomonas fluorescens* k29pf was later used in a pot trial for planting of *Brassica chinensis*. It was observed that the result of the microbe alone was not significantly different from the commercially available organic fertiliser. However, when both the organic fertiliser and the microbe were mixed together, better root elongation, fresh weight and dry weight data was recorded. Currently, the team is in preparation to apply the combination to field trials, to evaluate the true potential of the *Pseudomonas fluorescens* immobilized to the organic fertiliser.



Pure culture of *Pseudomonas fluorescens* k29pf



Glasshouse trial

Trending Microbes from Endomicrobiomes

Professor Adeline SY Ting
Monash University Malaysia



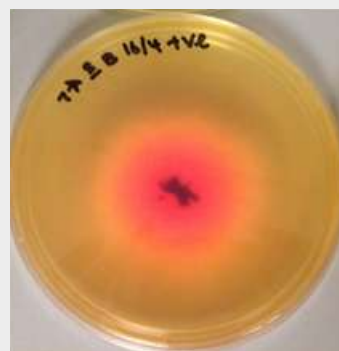
The team with the Gold Award at the 29th ITEX for the innovation using endophytic fungi as potential biofungicide.

The endomicrobiomes consist of microbes that live or spend part of their lifecycle in a host. In our context, endomicrobiomes refer to the environments within a host plant or a host lichen, inhabited by endophytic and endolichenic fungi, respectively. They have the ability to form a mutualistic, if not a symbiotic relationship, with their hosts. The microbes from the endomicrobiome are trending in recent years due to their distinctive characteristics. As inhabitants of the internal tissues ("endo" environment) of the host, they are protected from external stress from the environment, resulting in better survivability and colonization. They have also been shown to produce an array of bioactive compounds, that may present similar analogues to their host plants. As such, rather than destructive harvesting of the hosts, these endophytic and endolichenic isolates can be harnessed and up-scaled for the production of valuable compounds.

Our research team has a profound interest in exploring and understanding endophytic and endolichenic microorganisms. Over the years, we have discovered the diversity of endophytes and endolichenic fungi in diverse host species, and established their potential in various applications. Our work on endophytes is mainly in realising their role in crop improvement and disease management. One of our key achievements is the use of metal tolerant endophytes for crop improvement and disease management. The metal-tolerant endophytes were isolated from the phytoremediator plant *Phragmites*, and we profiled their metal tolerance level, and determined their ability to improve growth and suppress *Ganoderma* incidence in oil palm seedlings while under the influence of metal stress. As a result, several endophytic isolates have been identified as beneficial to oil palm seedlings under metal stress. This is an important breakthrough, given that arable lands are increasingly scarce and most soils are acidic and metal-laden. The metal-tolerant endophytes can therefore help to sustain growth of plants in these conditions. In addition, some endophytic isolates have also shown strong biofungicide potential when inoculated to oil palm and banana plants, that the presentation of these findings at the 29th ITEX, won the Gold Award. Our work to further understand the colonization behaviour of endophytes within the endomicrobiome has also led to integrated technological approaches using FTIR, Fluidigm RT-PCR, and qPCR. As such, we are advancing in both knowledge capacity as well as techniques employed through our work on endomicrobiomes.

Both endophytes and endolichenic fungi have also been explored for their valuable compounds. For endophytes, they are mainly antimicrobial compounds, as well as the production of L-asparaginase, an antitumour agent. We have also explored light mediation as a strategy to induce production of valuable compounds in endophytes, with green light spectrum more beneficial than others. For endolichenic fungi, they have not only been shown to produce usnic acid that is similar to their lichen hosts, but also an array of metabolites such as aplysinopsin (P_1587), piliformic acid (P_1117), and pestalopyrone A/tensyucic acid C/tensyucic acid D (P_1588). The rapid identification of metabolites was made possible with the metabolomics approach. Additionally, we further explored the potential of endolichenic fungi in bioremediating dye. In our novel study, we documented the dye removal potential of *Pseudopestalotiopsis theae* (accession number MG881833) and *Astrocystis bambusae* (accession number MH370741) to decolorize the dye Malachite Green (MG). *P. theae* decolorized MG with 89.22% degradation efficiency (DE), while *A. bambusae* recorded 67.69% DE, and these levels were comparable to a non-endolichenic fungus (*T. asperellum*, 76.19% DE).

In short, microbes from the endomicrobiome are trending in the recent years, as more discoveries have been made on their diversity and their applications. The endophyte and endolichenic communities continue to intrigue us with new species revealed and beneficial properties established. Indeed, the endomicrobiomes are deservedly trending microbes for they present a reservoir of novel isolates and applications.



L-asparaginase activity by endophytic fungi indicated by the pink coloration.

STUDENT'S COLUMN

EMBL Workshop on Metabolite and Species Dynamics in Microbial Communities

Nabilah Khairi

Postgraduate student (Dr Hazrin-Chong's lab)
Department of Biological Sciences & Biotechnology
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Recently I was selected to attend a workshop entitled 'Metabolite and Species Dynamics in Microbial Communities' organised by the European Molecular Biology Laboratory (EMBL). The workshop was held from the 17th to 22nd of October 2022 at the Bangalore Life science cluster (BliSC), Karnataka, Bangalore India. The same workshop was also held concurrently at the EMBL Research Institute, Heidelberg, Germany.

EMBL is an intergovernmental organisation that provides advanced training for researchers in various topics in molecular biology. The course I attended particularly focused on the metagenomics and metabolomics of microbial communities to understand the mechanisms underlying the dynamics of these communities. Using experimental and computational approaches, the course provided an overview and tools to move cataloguing to identifying key metabolic agents. It also included integrating species and metabolite dynamic data, as well as leveraging the power of genome-scale metabolic models to predict community interactions.



Photo with fellow EMBL speakers, trainer and participants

The five-day workshop utilised a model microbial community from Kefir's milk, based on a recent study by Blasche et al. (2021) in *Nature Microbiology*. Kefir's milk has a natural milk-fermenting microbial community that encompasses approximately 30-50 prokaryotic species (lactic acid and acetic acid bacteria) and yeasts. Despite having complex communities, the cultivation and maintenance of Kefir's milk is very straight-forward as the Kefir grain (i.e., inoculum) acts as a self-renewing community. Additionally, Kefir's milk community is also known to be resilient against various abiotic and biotic stresses. Therefore, the community was used as a model microbial ecosystem to gain insights into the stability of natural communities.

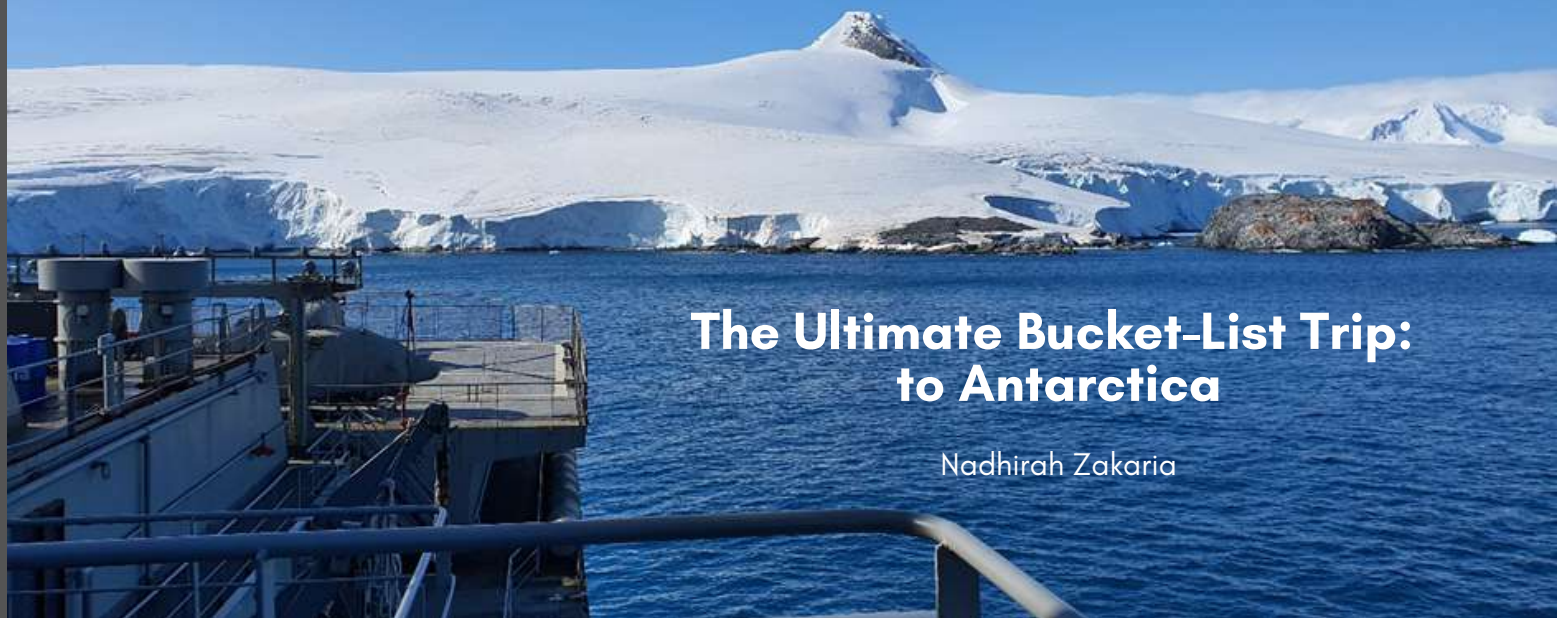
The course was divided into several parts that included lectures, practical and computational sessions. A step-by-step demonstration was made for the practical session, which made it easier to understand each of the workflows used throughout the course. Using the Kefir's milk samples, we performed microbial inoculation, DNA extraction, PCR and cell culture plating. We were also exposed to handling our data by running a computational session on 16S analysis using Nanopore sequencing technology, computational analysis using R-studio or Python, and metabolic modelling of community interactions. As we processed our samples and resulting data, I was surprised by the number of technical issues that could arise, particularly during computational sessions. Thus, this exposure was a good experience for me to gain as much knowledge and experience as I could.



Cell plating and Nanopore sequencing demonstrations by EMBL trainers

Throughout the course, participants were able to network with not only the local attendees but also the concurrent participants in Germany remotely. We all had the opportunity to discuss each other's research, discuss issues and help with experimental troubleshooting, and even exchange ideas for future experimental work. Additionally, during the workshop, we were given a tour of their facility in the Bangalore Life Science Cluster (BliSC), which is made up of two research institutes, inStem and CCAMP. The Bangalore Biocluster Next Generation Genomic Facility (NGGF) provides genomic services for scientists, including transcriptomic, metagenomic, exome-, and amplicon-based analyses. There are also many other facilities provided, including mass spectrometry and electron microscopy core facilities. On the last day of the workshop, participants presented their data from the practical sessions and what they had learned throughout the course.

Overall, attending this workshop was an excellent opportunity to gain new knowledge and skills for my research. As a first year PhD student, I found that the exposure to data analyses is fundamental for my work in molecular ecology. Networking with other students and trainers enlightened me to learn about their work, and boosted my enthusiasm for my own research. Given the chance, I would definitely join more workshops, seminars and conferences in the future (especially those organised by EMBL), and encourage my peers to do the same.



The Ultimate Bucket-List Trip: to Antarctica

Nadhirah Zakaria

I was just an undergrad when I was first introduced to scientific research in Antarctica. In other words, I always knew about Antarctica and Arctic, one being a continent and the latter a region consisting of several parts of countries, and that there is no possibility of finding polar bears in Antarctica (bet you didn't know that too). I never would have imagined that they had a whole system to delegate and monitor activities in Antarctica, let alone a global scientific community that systematically canvasses and governs scientific research and human activities in Antarctica. Thanks to them, we now know how climate change really affects the whole world. It begins with increasing carbon footprint from countries thousands of miles away from Antarctica that would ultimately contribute to the overall heat, which causes warming of the sea, which then comes back to Antarctica, resulting in the melting glaciers and increased levels of seawater. That's just the basic gist of it and that's only a tiny percentage of information out of the many different types of studies being done in Antarctica. Fast forward to several years, I am now doing my postgraduate studies in hydrocarbon bioremediation using marine Antarctic bacteria, and I was fortunate to be able to go to one of the many research stations in Antarctica.

At exactly 9.00 pm on the night of 24th January 2020, I set out on my first ever trip to Antarctica aboard the Aquiles. A four decked, some 200-passenger Chilean Navy brigantine, equipped with two corridors on each deck, two common rooms, a dining area, and an assortment of sleeping cabins. I was travelling with another colleague, Fareez, and our objectives were to complete the last leg of our PhD research. We left the harbour of Punta Arenas, a sleepy town in the southern most region of Chile. Punta Arenas is a major entry point into Antarctica and every year, many scientists from all over the world would gather and embark on this wondrous journey together.



Possibly the ultimate bucket-list trip, our preparations for the expedition began months before, with the painstaking details of what equipment, gears and laboratory consumables we were to take with us. We had a lot of help from our co-supervisor, Dr. Claudio Gomez-Fuentes from the Universidad de Magallanes. Dr. Aqlima Ahmad, our supervisor from Universiti Putra Malaysia had been collaborating on a project with Dr. Claudio which dealt with developing steps in combating oil spills both on land and the marine environment in Antarctica that is to be placed as a contingency plan in accordance with the Antarctic Treaty. Fareez and I were lucky enough that our PhD project could contribute even a very small part to the project. Our journey on the 20 something year old ship was eventful. During the Antarctic summer season of 2020, Fareez and I were the only Malaysians on board that ship, alongside a huge team of Chilean scientists, a group from Ukraine, several others from various parts of the world (Ecuador, Czech Republic and an American) who travelled solo or in pairs. We grew familiar to the rocking of waves, even though it was a considerably large ship (not huge but quite large), we still felt sick in the beginning. A week passed by, and the ship sped steadily onwards, deeper and deeper as we crossed into the Drake Passage, notorious for its rough seas and high waves. The excitement of travelling began to fade, and everyone relaxed into a routine of slow mornings and early bedtimes.

Language didn't become too much of a barrier, as we slowly caught on to familiar words. The naval officers were also kind to us and spoke slowly in Chilean Spanish though some understood English just fine. The weather turned colder and colder. Imagine trying to fall asleep, and you had to stay still under your wooly blankets. If you tried moving your feet or turning sideways, you'll reach a cold patch on the bed. Frigid evenings were greeted by still colder mornings as we awaited word to disembark. The sea changed colours with each passing hour, sometimes tempestuous greys replaced by magnificent blue and green hues. The white capped waves grew steadily into high, breaking waves and the ship hurtled steadily south, deeper into the Antarctic, greeted with brash ice along the way. I remembered the first time we caught sight of an ice floe one particular morning. There are different types of ice, not just ice bergs. Ice floes are drift ice that are 20 m wide and flat and brash ice were small groups of ice fragments not larger than 2 m across. It was a bright sunny morning, a warm respite from the usual blustery sky, which made staring out into the sea that much difficult. I ran back into my tiny cabin to get my polaroid sunglasses, calling at Fareez as I passed by his room, to do the same and glimpse our first ice out at sea. There it was, a large crop of ice in the distance, glittering in the sun and dazzling the passengers onboard. It was our first glimpse of ice, a brief but welcoming interlude from our mundane routine and we knew that our journey at sea was coming to a close end. 15.....

After 11 days out in the open sea, we finally disembarked from the ship, grateful to set foot on solid land once more. Base General Bernardo O'Higgins Riquelme was situated on a small rocky island, enclosed by the continental ice plateau. The first week I walked around the island and made a mental note of all the crooks and crannies of the terrain. After 1 hour, I came full circle back to the base, it was small but so beautiful I wish I could describe it better. There was a shallow channel of water that we could wade across safely during low tide to reach the continental ice plateau which separated Base O'Higgins from the continent during high tide. We had our own research laboratory at the base, accessible 24/7. The laboratory was warm, airy and bright equipped with an autoclave, a laminar flow, fridge, -80°C freezer, weighing balance and odd pieces of glassware. We settled into a new routine of indoor experiments and outdoor field trials. We had brought along a 10 L bioreactor prototype, fabricated in Malaysia for the sole purpose of biodegradation field trial in Antarctica.

Mornings at the base was the growing familiarity of the squawks and bleating of our resident penguins. The island's seasonal inhabitants of Gentoo penguins were in the larger hundreds. One of the army officers enthused that O'Higgins was a penguin nursery. The current military dotación had arrived several months before and was received by penguin mothers laying and hatching eggs. We arrived in February to the sight of fluffy, grey penguin chicks, intrepid and unalarmed of humans in their midst. The smell of penguins no longer distracted my mornings and nighttime was cozy and warm. At night, windspeeds reached over 140 knots, sometimes turning into gales, pounding the metal cabins leaving me to my imagination. One night, the wind was so bad I was so anxious of the equipment left outside. The machine prototypes were always secured inside a grey box just by the kitchen stairs outside the base, leading down to the beach but I couldn't shake off this bad feeling that night. It was 3 AM and I just had to ask the officer on duty that night if I could just take a quick peek outside, even though by then the wind was building up into a tempest, already well into the red zone of 160 knots. Up on the observation deck, it was hideously cold and the officer told me no. I still couldn't sleep until 6.30 AM when I heard the kitchen preparing for breakfast. I begged to go outside and finally 3 of the officers (friends by now as 3 weeks had passed by since we came) helped me. The wind had died down just slightly, 130 knots by then. Opening the metal door was a task, because the wind was so strong, they made a human chain as I took a quick glimpse to make sure my equipment was intact. It wasn't. The plastic box was wide open, and even a metal barrel that I had used the day before and carelessly left by the box had rolled away, just meters from the beach cliff. Luckily, one of the officers helped to retrieve it. Never again will I be so mindless about my equipments in Antarctica. It could be a beautiful sunny morning and the weather can quickly turn ugly.



A bunch of nosy Gentoo penguins out by the bay near Base O'Higgins.



That one fine snowy morning in February 2020



Inside the Aquiles ship with Fareez.



By the grey box where we kept our machines at night.



Out at sea on the zodiac with the whole team at Isla Larga, preparing to disembark.



One morning, we woke up to our first snow, just fresh the night before. The sun was high in the sky as we crunched our way through the powdery snow with our sampling equipment. There was a nip to the air despite the burning sun, so we didn't bother much with our windbreaker. It was an odd sensation as we trudged further towards the ice shelves, carefully recording, and collecting snow and seawater samples. Noon settled in, and by then the last remaining snow left wet slushes in our path.

During our time, we were fortunate enough to go out at sea onboard the zodiac which was an inflatable speedboat that could seat 20 adults comfortably. We zipped steadily through around the island, sometimes slowing down to part the brash ice with wooden oars. There were a few rocky islets we wanted to visit, and we finally stopped at Isla Larga to take samples of green and red algae. We had to be careful because just a few meters away, were a small herd of Weddell seals, adorable from afar but terrifyingly huge up close. We stopped by several more islets in and around the station and saw few more Weddell seals and a stray baby leopard seal. Speaking of strays, we had the good fortune of seeing a stray baby Emperor penguin. Sometimes he came near to the base, looking sad, and lonely, huddled by himself against the cold wind. Our 5 weeks were nearly up, and by then, the baby Emperor had nearly molted his chick feathers into mature adult ones.

There was just so much to do in a very short season, but we managed to complete our scheduled objectives. For the rest of the crew, there was maintenance, repairs to be done, science equipment to be installed, and more sampling to be done before nights turned longer. Days turned into weeks and the season's end was almost upon us. Soon the first sea ice would come creeping as the wintery winds blew throughout the island. After 5 weeks, our ship, the Fuente-Alba finally came into view one morning, and we were more than ready to embark on our journey home. Life at O'Higgins is what you make of it. It can be hard at times and at other times easy, everyone has their good days and bad days. It felt natural to be there, see everyone's faces, and have conversations with the few that could. Sometimes it got too much, and I just wanted some alone time but there was always somebody popping by the laboratory to see what we were up to. At the end of the day, everyone at the base was looking out for one another and I felt the warmth companionship as an outsider being welcomed into the clicks and whistles of the crew. For some, they will only make the trip to Antarctica once, and for some lucky others, they will experience the indescribable draw to the continent and come back the following seasons. Being in Antarctica is an individual experience because it is what you make of it. There are no words to describe the colours, the sound and smell, and the simple joys of everyday companionship that isn't bogged down by work calls, appointments, or familial commitment. It was just myself and my work, in Antarctica. It was a Mecca for me, a temporary respite from the real world, but distance just makes the heart fonder doesn't it.



During one of our excursions to sea on the zodiac, we came very close to this beautiful cave-like ice flow.



A particularly cloudy day on the Aquiles.



A picture of the continental ice plateau, moments after a piece of the glacier broke off in a thundery crash into the sea on one cloudy evening at Base O'Higgins.



Out by the deck of the Aquiles on a clear beautiful afternoon.



The small bay where the shallow waves lapped gently on the pebbly shores.



Sunset at Base O'Higgins, February 2020.

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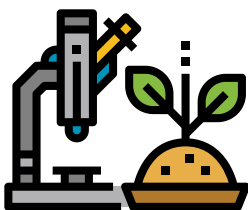
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