The Swire Institute of Marine Science

太古海洋科學研究所

Annual Report

2018

Gray with WK Chow at the AFCD Hong Kong Marine Biodiversity video screening

Director's Foreword

This year was probably one of the most exciting and then most disappointing years in SWIMS history. The year started with work forging ahead on the expansion which saw the entire SWIMS laboratory and research facilities moved back to HKU campus where we have a postgraduate 'commons' area and laboratory and aquarium facilities. This disruption also involved students in the Residences who had to be relocated for two months.

It was exciting to see workers knocking down all the old walls and reinforcing the concrete structure to expand SWIMS. Sadly, all this positive work began to slow down, and it became clear that whilst a lot of SWIMS was being knocked down, very little was actually being built! Progress slowed and HKU was forced to release the contractor. This was, obviously, a huge blow as it left SWIMS in a poor condition. The contractor left the site in the summer and we started the lengthy procedure to appoint new contractors. These problems were compounded by the arrival of the largest typhoon to hit Hong Kong in the last three decades, Typhoon Mangkhut, which had a huge impact on Hong Kong and SWIMS. The result of all these events is that SWIMS is currently a rather battered, empty shell, awaiting the re-start of its expansion.

Despite this there were many positive notes in 2018. Dr Celia Schunter joined us from KAUST. Celia works on the genomic effects of environmental changes and, together with JD, significantly strengthens our molecular biology skills. The number of researchers at SWIMS has risen to over 90 people, doubling over the last 10 years. SWIMS numbers will continue to grow in the next years as we secured three new joint positions with the Department of Earth Sciences in the Faculty of Science 80th Anniversary recruitment exercise, strengthening our inter-disciplinary portfolio. Early in the year, we did lose Leszek who left SWIMS to concentrate on more applied work on cetacean research – we wish Leszek every success in his new career.

Despite the difficulties of moving out of SWIMS, we have been able to maintain our outputs and grant awards. The overall quantity and quality of our publications remains high, with an increase in the average journal impact factor. We also brought in nearly HK$14M of research funds as well as co-organized several international meetings or workshops, all of which are detailed in this annual report, which each year keeps expanding!

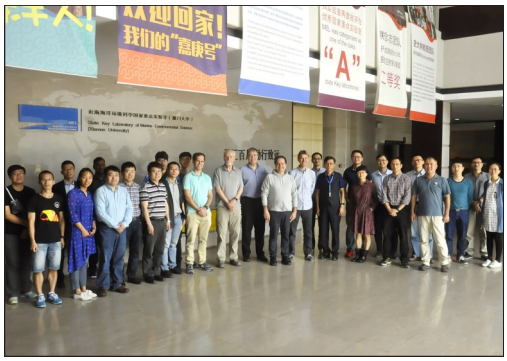
Clearly 2018 is a year to move forward from: our growing numbers and increased research performance and outreach are testament to the importance and relevance of SWIMS work in this region and indeed internationally; and we shall continue to move forward through 2019.

Best wishes from the staff and students of SWIMS.

Gray A Williams

International Collaborations

This year was much more challenging for international visitors due to construction work associated with SWIMS expansion. Nevertheless, the relocation of SWIMS to the main campus is still attractive to a number of visiting international and mainland scientists, post-docs and students. SWIMS continued, for example, to collaborate with the Marine Biological Laboratory (University of Chicago, USA) on joint research projects. In addition, scientists from mainland China and SWIMS are also continuing their collaborative projects at various levels. In particular, SWIMS has been strengthening our previously established links with Xiamen University (Xiamen, China) and Institute of Oceanology Chinese Academy of Sciences (Qingdao, China).



Attendees of the Ling Feng Forum in Xiamen University

Like previous years, SWIMS proactively engaged with international scientists, colleagues and students in various ways. Several international scientists have officially visited SWIMS as part of various collaborative projects including Prof Brian Helmuth and Mr Francis Choi (Northeastern University, USA) and Prof Mark Davies (University of Sunderland, UK), who visited to continue collaboration with Gray. Profs Laura Airoldi (University of Bologna, Italy), Sean Connolly (James Cook University, Australia) and Mark Costello (University of Auckland, New Zealand) all visited to give formal seminars. In total this year SWIMS hosted over 25 seminars and talks by visitors from the USA, UK, South Africa, Canada, Japan, Norway and Italy as well as colleagues from other Hong Kong institutions.

Gray catching up with Joao and Guca Flores (CEBIMAR) sampling in Sao Sebastiao, Brazil

SWIMS also continues to be one of the key members of the World Harbour Project (WHP). As part of this project, Kenny organized The 2nd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development, which serves as platform for WHP members to discuss their ongoing projects and to establish new collaborations.

In this year, Profs Nancy Knowlton and Jeremy Jackson (Smithsonian and Florida Museum of Natural History and University of Florida, USA) returned for their third and final visit as Visiting Research Professors of SWIMS. As always, they engaged with SWIMS students and staff, and specifically talked about "international" science and academic life. Nancy and Jeremy also provided expert advice and witnessed the good progress of the MarineGEO-Hong Kong project led by Dave. We are extremely grateful for the advice and support Nancy and Jeremy have willingly given during their time at SWIMS.

David and Yvonne with Visiting Research Professors Jeremy Jackson, Nancy Knowlton and Daniel Pauly

The Secretary for the Environment the Hon KS Wong speaking at the Eco-shoreline meeting

Participants for the Mainland-Hong Kong Joint NSFC Workshop in Xiamen

Group photo taken during the UCAS 10th Anniversary dinner

International Conferences and Workshops

Although SWIMS is still under expansion, we have hosted or been co-hosts or organizers, of a variety of conferences and workshops at HKU campus or at other institutions. These meetings not only helped us with capacity building but also provided a platform for our new staff members and graduate students to explore new collaborations at various levels. Among those, SWIMS students joined the University Consortium on Aquatic Sciences (UCAS) to mark the 10th anniversary for UCAS, which was held in March 2018 at Dongshan Swire Marine Station, Xiamen.

Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment

The Natural Science Foundation of China (NSFC) sponsored a 'Mainland-Hong Kong' joint workshop in Xiamen, China. This is a unique joint effort involving NSFC, the State Key Laboratory of Marine Environmental Science and Dongshan Swire Marine Station (Xiamen University), and the Swire Institute of Marine Science (The University of Hong Kong). Staff and students of all four institutions were joined by several scientists from other mainland (e.g. the Institute of Oceanology, Qingdao) and Hong Kong (e.g. Hong Kong University of Science and Technology) institutions. This workshop provided a unique platform to advance our understanding of the key scientific issues of 'the responses of coastal ecosystems to the impact of climate and environmental changes' for elucidating changes in production, biodiversity and ecosystem functioning. Participants also discussed the development of integrative marine observation and experimental platforms for monitoring long-term coastal changes. Finally, we discussed opportunities and challenges in research and administration of marine stations.

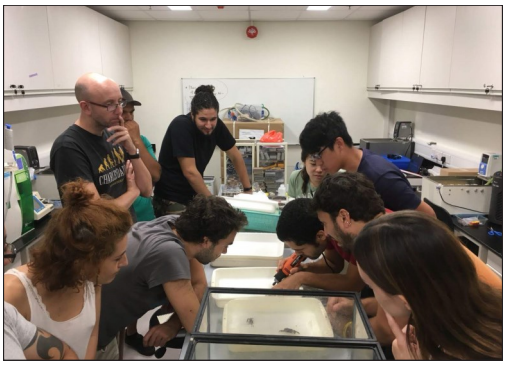
Participants from NSFC also took part in our discussion on framing large scale collaborative research initiatives or projects for funding support from mainland and/or Hong Kong agencies. One of the major outcomes of this workshop was a summary report which focused on future opportunities for collaborative research in (1) continuous observations of coastal Chinese waters: developing autonomous and interdisciplinary platforms, (2) approaches to understand the functioning of coastal ecosystems under the coupled impacts of intensive human activity and climate change, and (3) the future of coastal ecosystems and human communities under 3°C warming: predictive modeling and empirical approaches to maximize adaptation. It is anticipated that these reports can be developed into one or two multi-institutional and multi-disciplinary grant proposals.

China and the Sea: Maritime Economy and the Challenge of Sea and Ocean Sustainability

Speakers and organisers of the China and the Sea symposium

Christelle and Gray co-organized, in collaboration with the Centre d'Etude Francaise sur la Chine Contemporaine (CEFC) and the French Consulate in Hong Kong, the International Symposium on China and the Sea: In Maritime Economy and the Challenge of Sea and Ocean Sustainability from 7-8 June 2018. This two-day event brought together researchers from different backgrounds (fisheries, maritime transport, law, ocean sustainability, etc.) to discuss the development of China's maritime economy and the sustainable management of the sea. It was a successful event, with participation from academics, government officers, NGOs and journalists. It was also a good opportunity for SWIMS's collaborators such as Profs Minhan Dai and Daniel Pauly to discuss implications of their work in an interdisciplinary context.

Measuring O_2 Concentrations in Invertebrate Body Fluids: A Practical Workshop



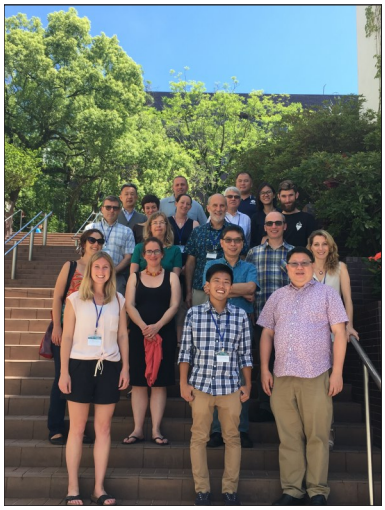
Experiments being undertaken during the O_2 measurement Workshop

Stefano organised this 3-day, hands-on workshop from 30 May-1 June 2018, focusing on measuring O_2 concentration in invertebrate haemolymph. The workshop was led by Dr Simone Babbini (Natural Science Museum of South Tyrol, Italy) in the SWIMS ecophysiology laboratory and was attended by 12 participants including MPhil, PhD students and SWIMS staff. The aims were to learn and practice how to extract oxygenated, arterial, and deoxygenated, venous blood from invertebrates, how to measure O_2 concentrations using the TX3 (PreSens, Germany) instrument and how to analyse the sampled concentrations. An interesting and interactive discussion on the relevance and importance of this approach for the study of environmental stressors and climate change closed the workshop.

Microbiomes of Terrestrial Crabs: Microbial Culturomics Assay and Prediction of Metabolic Potential from 16Ss and Shotgun Metagenomic Data

Participants learning basic and advanced microbial culturomic techniques

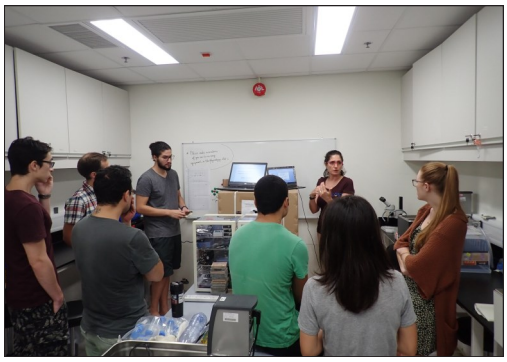
This workshop was held at SWIMS on-campus facility in October 2018 and divided into two different sections. During the first part, organised by Prof Duccio Cavalieri, Prof Alessio Mengoni, Dr Sara Fratini and Mr Niccolo' Meriggi (The University of Florence, Italy) and attended by 14 postgraduate students, basic and advanced microbial culturomics techniques were taught, using mangrove crab tissues as a model. The aim of the second part, led by Dr Giovanni Bacci (The University of Florence, Italy) and attended by more than 20 postgraduate students and post-docs, provided an introduction to the current approaches used to predict the metabolic potential of microbial communities both from shotgun metagenomic data and/or from large-scale surveys that are usually conducted with the help of target genes.



Kenny with participants of the 2nd Eco-shoreline Workshop

The 2nd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development

The 2nd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development, led by Kenny, was successfully organised during 28 May-1 June 2018 at HKU. This workshop was funded by the Civil Engineering and Development Department (CEDD) of the HKSAR Government and jointly organised by SWIMS and the School of Biological Sciences of HKU, the Environmental Division of the Hong Kong Institution of Engineers, and the Hong Kong Institute of Qualified Environmental Professionals. The workshop was divided into three main parts: an academic symposium, writing workshop and a field trip. The symposium was held during 28-29 May 2018, attracting a total of 130 participants from across four continents. There were 9 keynote lectures and 14 invited talks covering a wide range of topics related to eco-engineered shorelines. Secondly, there was a closed-door writing workshop where experts reviewed the history, and future perspectives of eco-shorelines with reference to its barriers and opportunities. Finally, on 1 June 2018, there was a field trip for the experts to visit some of the trial sites for ecologically engineered shorelines in Hong Kong. After the field trip, the experts provided useful comments and advice to the project team and CEDD for strengthening the ongoing trial eco-shoreline projects.



Francesca Porri provides an overview on larval respirometric techniques

Sampling Methodologies and Physiological Energetics of Larvae from Mangrove Microhabitats

With the increasing recognition that early life stages of aquatic organisms are key to the maintenance of populations, the focus on larval occurrence and performance is central to mangrove ecology. As such, Stefano hosted larval ecology specialists, Dr Francesca Porri and PhD candidate Mr Lyle Vorsatz (South African Institute for Aquatic Biodiversity) to lead a technical workshop on the best practices to sample invertebrate and vertebrate larvae in mangrove habitats as well as to determine egg/larval respiration rates. The workshop was attended by a mixed audience, including several SWIMS research assistants, postgraduates, post-docs and staff members. SWIMS students and scientists will use these approaches and respirometric techniques when investigating larval dynamics from a broad range of aquatic habitats. The genuine level of engagement and interest during this workshop also afforded stimulating conversations (often extending beyond the fixed working hours!) on biological, physiological and ecological topics.

Global Challenges in Food, Nutrition & Environment Symposium

SWIMS co-organised with the School of Biological Sciences and the Global Challenges University Alliance a Symposium on Global Challenges in Food, Nutrition & Environment (GCFNE) between 6-8 December 2018. The conference had over 100 young scientists and PI's. Talks were given by internationally renowned speakers representing 12 countries in the region, Europe and USA and provided an opportunity to exchange views on current issues related to pollutants; nanomaterials; supplements and pharmaceuticals; food security and nutrition. SWIMS had a pivotal role in bridging the gap of knowledge in environmental issues and this was further emphasised in the Round Table Discussion led by SWIMS scientists. Participating young scientists also had an opportunity to share their research in 3-minute interactive presentations.

Group photo of the Global Challenges in Food, Nutrition & Environment Symposium

Workshop in Computational Behavioural Ecology

Before he left SWIMS, Leszek organised and chaired one more interdisciplinary training workshop, the 2nd Regional Training Workshop in Computational Behavioural Ecology, delivered by an expert team led by Prof Wayne M Getz (University of California, Berkeley, USA) and targeted quantitative analyses of animal movement and spatial ecology. Once again, the workshop proved to be a great success and exciting learning experience for student participants from Hong Kong, Mainland China, the Philippines, Japan, Taiwan, Malaysia and South Africa.

Leszek along with the UC-Berkeley team

Coral Restoration Workshop and Public Lecture

On 18 August 2018, Vriko was invited as a guest speaker to give a talk about coral restoration for the Marine Parks Public Lecture Series, organised by the Agriculture, Fisheries and Conservation Department (AFCD). Over 100 attendees participated to learn more about the restoration potential in Hong Kong and the on-going coral restoration project in Hoi Ha Wan Marine Park. On 22 August 2018, Dave and Vriko served as technical advisers for the Coral Restoration Workshop which was co-organized by SWIMS. The workshop was the first citizen science based restoration workshop in Hong Kong, initiated by the AFCD and Reef Check Hong Kong. The objective of the workshop was to train and empower the qualified reef check scientists to rescue "corals of opportunity", which are coral fragments that are dislodged or detached from substrates, mainly due to human activities.

Vriko gave a talk on coral restoration for Marine Parks, organised by AFCD

SWIMS and OPCFHK

Sammi & Ting visiting the Shanghai Yangtze Estuarine Nature Reserve for Chinese Sturgeon

Andrew, Blanco, Keith & Kim with children from the village in Banggai Island

The Ocean Park Conservation Foundation, Hong Kong (OPCFHK) continues to work with SWIMS staff, graduate and undergraduate students for the conservation of marine ecosystems, including endangered animals. In 2018, our students participated in different OPCFHK funded field research projects led by leading international scientists to gain first-hand experience in the field.

Under OPCFHK's university student sponsorship program, six students got an opportunity to work on various projects. Andrew Lam joined a project on "Community-based conservation management of the Banggai Cardinalfish" in Indonesia. Sammi Lo worked on Chinese sturgeon, specifically on competition stress from exotic sturgeon species on the wild population of Chinese Sturgeon in the Yangtze River Estuary. Sammi Sin and Christy Yu jointly worked on manta rays. Finally, both Alvin Wong and Angus Hau jointly worked on a project on orangutans, addressing human-orangutan conflicts in agricultural landscapes in Northern Sumatra.

We are grateful to OPCFHK for their continuous support for our SWIMS staff and students with such excellent experiential learning opportunities and look forward to continuing our work with them in the future.

The 2018 Student committee members of UCAS from HKU, XMU, NTOU and NSYSU

The 10th UCAS Postgraduate Symposium: The Blue Planet: What Are We Doing and What's To Be Done?

In celebration of a decade's cultural and academic exchange, this year's annual UCAS Postgraduate Symposium was held in Xiamen. The Symposium engaged 50 students and 19 staff members from seven universities in Hong Kong, Taiwan and China: Hohai University (HHU), National Kaohsiung University of Science and Technology (NKUST), National Sun Yat-sen University (NSYSU), National Taiwan Ocean University (NTOU), The University of Hong Kong (HKU) and Xiamen University (XMU).

During the Sympoisum, students working on a range of research topics, from oceanography and biochemistry to marine ecology and environmental sustainability, shared their research and findings. Students from SWIMS, Mr John Doherty and Ms Sarah Lau, won the Best Presentation Awards. In addition to student presentations, four insightful keynote speechs on biogeochemistry, fish biology, trophic studies and global change were delivered by Dr Tiantian Tang (XMU), Dr Yi-Ta Shao (NTOU), Prof Meng-Hsien Chen (NSYSU) and Dr Stefano Cannicci (HKU). Interactive workshops on Geographic Information Systems and a fieldtrip to a local abalone farm were also incorporated to improve students' data mapping and science communication skills and better expose students to hands-on aquaculture management.

Staff Research

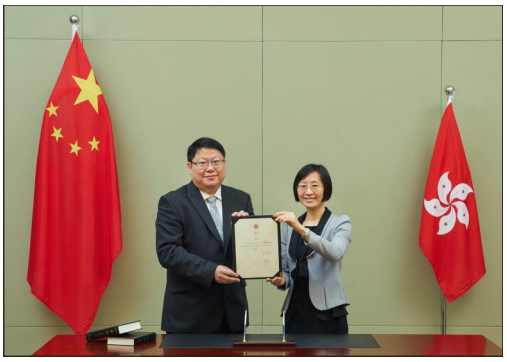
Gray A Williams

Continuing with the theme of the supposed vulnerability of high shore species to climate-change induced thermal stress, Gray's research in 2018 focused on metabolic depression in high shore gastropods, mainly littorinid snails. As the last stage of his Fellowship in Brazil with Ronaldo Christofoletti, Gray investigated metabolic performance in mid-high shore species, demonstrating metabolic depression in *Echinolittorina lineolata*. Working in Vigo, Spain together with Sarah Lau and in collaboration with Emilio Rolan-Alvarez, Gray also found a similar depression in high shore *Melarhaphe neritoides*. These results highlight a possible convergent evolutionary relationship between different genera of littorinid snails and metabolic depression as a survival mechanism in the extreme, high shore environment.

Gray discussing research with Emilio Rolan-Alvarez in Vigo, Spain

Kenny Leung

In this year, Kenny and his team commenced a trial of ecologically engineered shorelines in Hong Kong to verify if this technology could provide both shoreline protection and biodiversity enhancement on artificial seawalls. This 3-year project was commissioned by the Civil Engineering and Development Department (CEDD). Additionally, CEDD further supported Kenny to extend a similar trial in Taishan, China. In 2018, Kenny was appointed as a Justice of the Peace by the HKSAR Government, and selected as one of the top 100 scientists in Asia by Asian Scientist Magazine (https://www.asianscientist.com/as100-2018/) owing to his professional achievements and dedicated community services.



Kenny receiving the certificate for his appointment as a Justice of the Peace by the HKSAR Government

Yvonne Sadovy

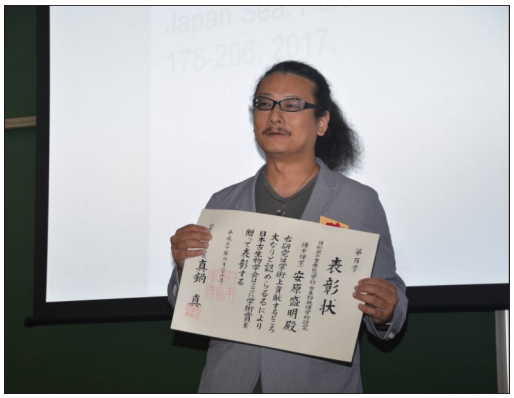
Live seafood is highly valued and much appreciated in Hong Kong and southern Mainland China. However, much of the trade is unmonitored and unregulated and it is often associated with smuggling and, occasionally, with illegal trade. Yvonne and colleagues completed a comprehensive analysis and report of the trade and solutions needed to move this trade towards biological sustainability. The report highlights solutions such as consumer choice to select for sustainable options, better enforcement by source and destination governments, tools for distinguishing legal from illegal fish, greater awareness by and engagement of traders to adopt better practices as well as the need to close several legal loopholes.

Red leopard coral trout and hybrid groupers are among the most commonly sold live reef fish in Hong Kong

Senior delegation from Lee Kum Kee Group, Mr Eddy Lee and Mr Brian Lee, visited Rajan's oyster group

V. ThiyagaRajan

In this year, Rajan's group have started understanding the rapid "non-genetic" adaptation potential of edible oysters to multiple stressors (acidification, warming and pathogens) by analyzing stress-induced epigenetic markers on DNA, i.e. DNA methylation. By using transgenerational experiments and multi-omics data in conjunction with physiological performance, they are hoping to identify heritable traits that are critical for oysters to survive in the future ocean with multiple-stressors. They have also strengthened their collaboration with local oyster growers and the "Lee Kum Kee" company to transfer research knowledge to industry through a series of knowledge exchange activities.



Moriaki receives the Academic Award 2018 from the Paleontological Society of Japan

Moriaki Yasuhara

This year, Moriaki welcomed Skye Yunshu Tian, who started a PhD on Cenozoic biogeography from September, and a final year project student Rachel, Wai Ching Chu, who is working on reconstructing past methane seep activities using microfossil ostracods, to his lab. Moriaki received the Academic Award 2018, from the Paleontological Society of Japan, and became an editorial board member of Marine Micropaleontology. He has been working with the Global Ocean Oxygen Network (GO2NE, UNESCO) and, in this year, published a synthesis paper in *Science* and organized a session at the Asia Oceanic Geosciences Society 15th Annual Meeting. He continues his research on paleoecology, macroecology and biogeography.

Dave with coral expert Yossi Loya in Hainan

David Baker

In 2018, Dave passed the tenure hurdle and was promoted to Associate Professor. The lab celebrated some departures; Dr Till Rothig took up a post-doc position at University of Derby (UK) and Jordan Pierce started his grad studies at the University of New Hampshire (USA); and arrivals, Yu De Pei joined us from Taiwan as an RA working on coral restoration, HKPF student Alison Corley arrived from the USA to work on historical ecology and geochemistry, and Tracey Prigge has started as a part-time molecular lab manager. MarineGEO continues to be a major emphasis for the group, along with further enhancement of our SIRMS laboratory, which won a CRF Equipment Grant from the RGC.

Stefano Cannicci

Stefano's Integrated Mangrove Ecology (iMEco) Laboratory has continued to grow in numbers. The laboratory welcomed Senior Assistant Researcher, Henrique Bravo Gouveia, to lead an ECF funded mangrove project, and two new postgraduate students, Christine Cheng and Ka Hei Ng, to work on a new project on terrestrial crabs, funded by the TUYF Charitable Trust. Samantha C. Klein and Thea Bradford completed the team working as Research Assistants for various on-going projects. In parallel, Laura, Rebekah, Pedro and Ying continued to work on their projects that are focused on mangrove food webs and the impacts of heavy metal pollution and climate change on mangrove fauna and marine debris, respectively.

Stefano traveling with students to Ayeyarwady Mangroves, Myanmar

Bayden Russell

It was another year of growth and success for the Marine Futures Laboratory. Cheryl Chu joined us in a collaborative project with Benoit Thibodeau on the role of sea cucumbers in nutrient cycling and Steven Wong expanded the oyster restoration programme in collaboration with The Nature Conservancy. Bayden's lab now have test oyster reefs in the water! He further extended the lab's thermal physiology research across the region, working on *Diadema atrementosa* with our collaborators in Thailand (KMITL) and Japan (Shimoda Marine Research Institute). He also co-supervised a Masters student in Chumphon, Thailand, with Dr Monthon Ganmanee from KMITL. All in all, an exciting and productive year which bodes well for 2019.

Bayden sampling for sea urchins, Diadema atrementosa*, at Ko Khai, Chumphon, Thailand*

Leszek Karczmarski

Conservation ecology of coastal cetaceans in the heavily-impacted Pearl River Delta region remains the primary focus of Leszek's work, with significant novel findings on the socio-demographic structure of humpback dolphins and new estimates of the population trajectory of finless porpoises, both setting a benchmark for future studies. While the dolphin population appears to be below the threshold of long-term persistence, the porpoises show initial signs of population recovery, after many years of previous decline. By mid-2018, Leszek left SWIMS to pursue further research in the western Pacific and southeast Asia through his newly-established independent organisation, Cetacea Research Institute, but continued the supervision of his SWIMS-based PhD students.

Leszek during photo-ID field work in Hong Kong

Benoit and Stefano taking sediment cores in Deep Bay's mudflats

Benoit Thibodeau

In 2018, Benoit was named Associate Editor of *Frontiers in Marine Sciences*, for the section Marine Biogeochemistry. His lead author publication entitled "Last Century warming over the Canadian Atlantic shelves linked to weak Atlantic Meridional Overturning Circulation" had a major impact on the global change community and was widely covered by the media. This study provided what is probably the most reliable record of the Atlantic Meridional Overturning Circulation covering the last 1,500 years. These data highlighted a major weakening of the Atlantic circulation, which could cause dramatic change in regional climate affected by these currents.

Opening meeting of the project between Christelle, Plastic Free Seas and Morgan Stanley Investment Asia Limited

Christelle Not

This year, Christelle and her team have concurrently worked on paleoclimate reconstruction and plastic pollution. Her group continued its progress in the development and utilisation of a suite of geochemical tracers (trace elements, U-series isotopes) to reconstruct past environmental conditions. She also carried on her work on the distribution and abundance of microplastics in Hong Kong for which she developed a citizen science project in collaboration with Plastic Free Seas and Morgan Stanley Investment Asia Limited. Finally she took a research contract to investigate the sediment dynamics in Mai Po.

Dr JD Gaitan-Espitia

JD Gaitan-Espitia

The iBEER group started in March 2018. Since then, JD's group has grown, recruiting 2 PhD students and a RA. During 2018, JD got an ECS-UGC research grant and HKU-seed fund. Moreover, his group led a GRF proposal (Marine Holobionts), a NSFC-UGC proposal (adaptive role of sexual reproduction), and collaborated in a research CRF (Metabolic depression), and equipment CRF (PacBio) proposal. In this year, JD published seven papers and three manuscripts are under review. JD was associate editor of two special issues in *Phylosophycal Transactions B: Biological Sciences* and also in *Marine and Freshwater Research.* JD also served as an organizing committee member for the 4th International Workshop of the Global Ocean Acidification Observatory Network (GOA-ON) in China.

Celia Schunter

Celia is a new member of SWIMS as she moved to Hong Kong in October 2018. She is fascinated by how organisms and populations deal with change. Therefore, in her research, she uses genetic, molecular and computational tools to investigate species responses as well as long-term adaptations to change in the environment. One of her favourite topics is the change in behaviour that can alter populations and ecosystem dynamics in the marine environment. This year she went to the White Island in New Zealand to test behavioural changes and brain transcriptomics of fishes living in natural CO_2 seeps. She is excited to start her lab and new research at SWIMS.

Celia diving at the natural CO_2 seeps in Papua New Guinea, studying effects of ocean acidification

Post Doctoral Fellows

Briony Mamo

Briony continues her work investigating Hong Kong's benthic ecosystems using microfossils and she finds their increasing sensitivity and variability to Hong Kong's dynamic ecosystems of great interest. She was delighted to present her findings on this project to international colleagues at both the FORAMS 2018 and International Palaeontological Congress meetings in Edinburgh and Paris during the summer. Briony remains heavily involved with the Integrated Ocean Discovery Program investigating past marine settings based on recovered microfossil assemblages, their associated biotopes and how sediment transport within submarine canyons obscures biostratigraphic signatures.

Briony highlighting the intrusive dykes found at Greenpoint, Bluff Harbour, New Zealand

Juan Carlos Astudillo

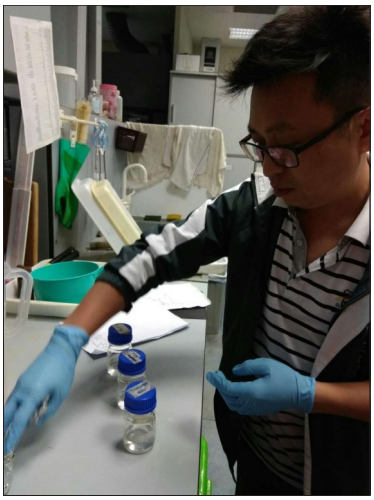
Juan Carlos's research focuses on the development of eco-shoreline features to enhance the biodiversity, ecosystem function and services of artificial shores. His work also assesses the marine biodiversity and the ecology of invasive species on natural and artificial habitats. Currently, Juan Carlos is working on eco-shoreline trials on seawalls and artificial mudflats created by land reclamation in Hong Kong and China. The trials include the ecological design, implementation and assessment of intertidal and subtidal units on seawalls and mangrove plantations. Preliminary results indicate that eco-shoreline features increase the number and abundance of intertidal species.

JC working on artificial intertidal pools on rip-rap seawalls in mainland China

Shelby interacting with school children during the MarineGEO assays

Shelby McIlroy

Shelby is continuing her work on MarineGEO-Hong Kong, a global initiative to quantify coastal marine biodiversity. This year, that work has included a lot of time in the lab working to extract and amplify DNA and working through some of the first analyses and reporting of data from Tolo Harbour. The MarineGEO team also deployed 42 more ARMS across a broader range of Hong Kong's marine habitats which will be collected and analyzed in 2019. One of the highlights of 2018 was leading a Molecular Ecology summer course for HKU Ecology & Biodiversity graduate students, including a class project which is still ongoing.



Guang-Jie conducting his experimental work

Guang-Jie Zhou

Discharge of partially treated effluent from sewage treatment plants is an important source for the continuous input of chemical contaminants into the marine environment of densely populated and urbanized coastal cities. Guang-Jie has been investigating the removal efficiency of emerging contaminants such as retinoids and endocrine disrupting chemicals in a newly developed sewage treatment process that couples chemically enhanced primary sedimentation of sewage and fermentation of sludge. This project aims to develop a better treatment process to enhance the removal of these micro-pollutants and recover valuable resources like phosphorus, nitrogen and bio-plastics.

Naomi filtering the water of incubation experiments for OCEAN-HK

Naomi Geeraert

Naomi continued to work on the OCEAN-HK project where she looks at the nitrate dynamics around Hong Kong by using stable isotopes of nitrate. During this year's cruise, the focus was on incubation experiments to gain insight into the different N pathways. With the arrival of the new mass spectrometer with a GasBench and elemental analyzer, she has been setting up the denitrifier method at HKU and further assisted with the expansion of the stable isotope laboratory. In a collaborative project with American University, Naomi looked at the stable isotope distribution along the coast of Saipan and the relationship with nitrate isotopes in groundwater.

Sam Crickenberger

Sam's research interests focus on studying the distribution and abundance of marine invertebrates at both large and small spatial scales. At large spatial scales Sam has studied local adaptation of marine invertebrate larvae, distributional limits of invasive species, and how climate change has driven shifts in the distribution of species over the past century. At SWIMS Sam is studying how sexual selection and behaviour may interact to affect the susceptibility of rocky intertidal snails to climate change over spatial scales as fine as a few meters.

Sam out in the rocky intertidal

Ashley Hemraj

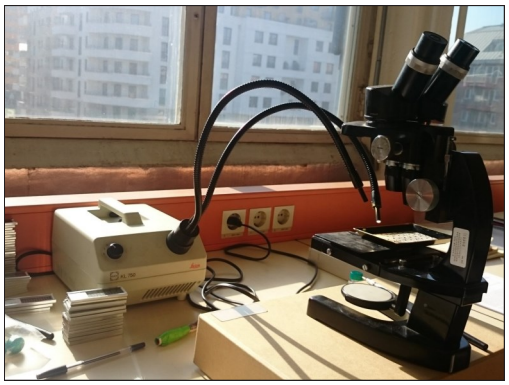
Ashley joined SWIMS in July 2018 to work in the Marine Futures Laboratory. His research investigates the multi-generational adaptation of organisms to global change. Currently, he is undertaking an experiment to identify the effects of rate of change and severity of ocean acidification on the physiology, genetic responses, and fitness of an intertidal copepod over multiple generations. Ashley is also collaborating with Dr Laura Falkenberg at the Chinese University of Hong Kong to investigate the influences of hypoxia and ocean acidification on oyster physiology and immunology.

Ashley sampling for copepods in tidepools

Tommy Hui

Tommy investigates whether fast-moving intertidal animals behaviourally select thermally-favourable microhabitats and thus rely less on physiological tolerances, whereas slow-moving animals are unable to do so and so have a wider thermal tolerance to cope with 'un-escapable' environmental variations. Tommy has shown that crabs and fast-moving snails have more narrow thermal tolerances than slow-moving/sessile species (i.e. oysters and littorinid snails), supporting his proposed model. Tommy is further investigating such patterns when food availability and habitat temperature are taken into account, and is constructing a model depicting the relative importance of physiology and behaviour in shaping species' thermal ecology.

Tommy deploying temperature loggers on the shore to quantify habitat temperatures



Anna's microscope in the micropalaeontology division of the Senckenberg Research Institute

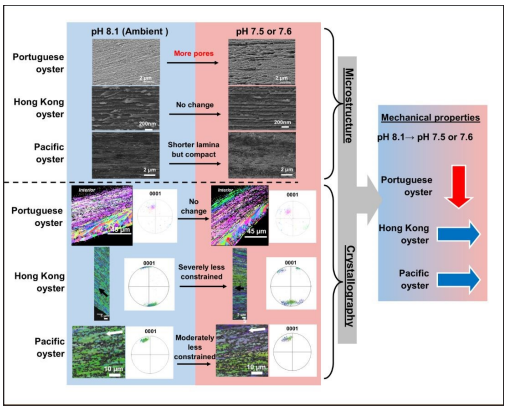
Anna Joest

Anna went to Germany as a Visiting Post-Doctoral research scientist to conduct microfossil research at the Senckenberg Research Institute in Frankfurt am Main for a couple of months. The project is a collaboration with the Geomar Helmholtz Center for Ocean Research Kiel (Germany). Her two main research questions are: how did meiobenthic abundance and diversity respond to past severe warming and cooling events? and, which taxa are suitable indicators for specific paleo-environmental and -climatic conditions in the NA? She uses Ostracoda (Crustacea) fossil assemblages (Pleistocene) from a deep-sea (2800 m) sediment core to address these questions. General diversity and abundance patterns, and temporal distribution of indicator taxa are used to evaluate environmental impacts on past deep-sea meiofauna.

Yuanyuan and Rachel collecting mollusc samples by trawling

Yuanyuan Hong

Ostracods (microcrustaceans) are an ideal model for long-term quantitative paleoecological analyses because of their small size, high abundance and excellent fossil record. Yuanyuan analysed ostracod faunal distributions and their controlling factors quantitatively using rigorous statistical modelling. Then, she investigated fossil ostracods in sediment cores to understand long -term natural and anthropogenic impacts. Also, the mismatch in composition of molluscan living and time-averaged death assemblages is being investigated to evaluate human modification on Hong Kong shallow marine ecosystems.



Summary slide of Yuan's PhD work

Yuan Meng

Over 80% of the world's edible oyster production depends on wild larval seeds collected along the coastal waters of China. After investigating the impact of a novel climate change stressor, i.e. ocean acidification (OA), on adult oyster shells during her PhD, Yuan has shifted her focus to larval oyster shells under OA during her post-doc period. Her focus is on larval shell crystallography. She is using multiple techniques borrowed from the field of material science, i.e. Focus Ion Beam facilities, Transmission Electron Microscopy and Atomic Force Microscope, for the structural characterizations of oyster larval shells to unveil the altered biomineralization process under OA.

Lily Tao

Lily successfully obtained her PhD this year, and completed a comprehensive investigation on how the trawl ban influenced local demersal crustacean resources. She discovered initial signs of recovery of benthic crustacean communities in eastern and western waters of Hong Kong, though a deteriorating situation was found in waters around Lamma Island three years after the trawl ban. Increased non-trawling fishing efforts, illegal fishing activities with trawlers and large-scale marine construction projects might have hindered any recovery. After her PhD study, Lily continued working in Kenny's lab as a post-doc, assisting in various consultancy projects related to local marine ecology and biodiversity.

Doctors and doctors-to-be from the trawling team

Postgraduate Research

Metapopulation dynamics of Indo-Pacific humpback dolphins in the Pearl River Estuary

Stephen Chan has completed his PhD with significant findings on the socio-demography of humpback dolphins across the Pearl River Estuary (PRE). He applied modelling approaches to investigate the population structure, connectivity, parameters, and viability of the PRE dolphins. His work indicates a complex metapopulation system with multiple spatially discrete and socially distinct subpopulations, where individuals exhibit moderate geographic fidelity and limited dispersal. Dolphin survival rates are below the threshold of long-term persistence, and viability analyses suggest that the metapopulation is declining more rapidly than previously thought and should be classified as Critically Endangered.

Stephen celebrating the completion of his PhD study with Leszek

Physiological responses to seasonality in five species of subtropical coral

Phil Thompson recently completed his PhD where he studied the physiology of coral-algal symbiosis such as photochemistry and host metabolism and how they respond to seasonal temperatures and light. He modeled physiological performance across seasons in five species of hard corals. Evidence suggests that certain species may be persisting at their thermal extremes and further temperature perturbations brought about by climate change will expose them to conditions outside of their fundamental niche. Phil will continue to work at SWIMS for MarineGEO to understand how marine ecosystems function by measuring biodiversity via autonomous reef monitoring structures (ARMS).

Phil at sea on the MarineGEO project

Camilla with her PhD supervisor (Rajan) and thesis evaluation committee members (Stefano and Bayden)

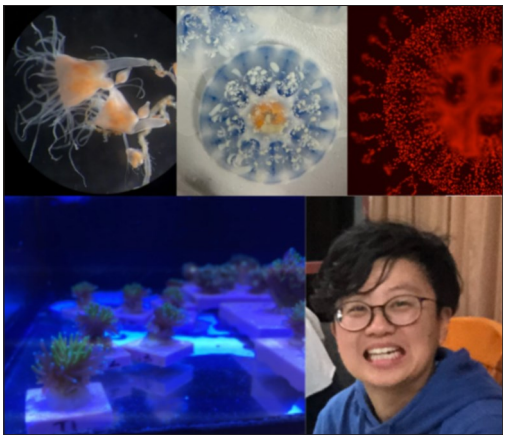
Intertidal predator-prey system under high-CO_2

Camilla Campanati successfully submitted her PhD thesis this year. Through an experimental approach, her work investigated high-CO_2 induced ocean acidification (OA) impacts on the interaction between the rock oyster, *Saccostrea cucullata*, and its predator, *Reishia clavigera*. Her study supports the broad research literature which highlights elevated sensitivity to OA in early-life stages of calcifying invertebrates. However, interspecific differences were found, with the predator being more susceptible to OA than the prey. Predation rates did not differ either when the predator was exposed to OA, nor when the prey was acidified. Camilla will soon start a post-doc at Cambridge University.

Ronia with Prof Xinhong Wang's group at Xiamen University

Contamination and distribution of triphenyltin compounds in Hong Kong

Ronia Sham evaluated the contamination status of triphenyltin compounds (TPT), a highly toxic antifouling biocide, in the marine environment of Hong Kong. In early 2018, Ronia analyzed organotin compounds in her biota samples at Xiamen University in collaboration with Prof Xinhong Wang. Her results suggest that marine organisms inhabiting the western waters of Hong Kong have been heavily contaminated with TPT, especially finless porpoises and Indo-Pacific humpback dolphins. The results also indicate that the major route of TPT uptake in organisms is through dietary intake, with a trophic magnification factor of 3.5 and 3.4 for the two marine mammal species, respectively.



Jane studies nutritional exchange between host and symbionts

New systems to study cnidarian-algal symbiosis

Jane Wong developed a photo-cartridge to mimic a coral polyp for Symbiodiniaceae research. Its flexibility to regulate nutrient supply without disturbing the cell suspension has potential benefits to study Symbiodiniaceae under conditions comparable to the physical environment within the host. She has demonstrated that the microalgae residing within the cartridge were growing in high densities and in a three-dimensional fashion. Furthermore, she has adopted *Cassiopea* and *Galaxea* as model systems to investigate nutritional exchange between Symbiodiniaceae and their host.

Functional microbial symbiosis in sea whips

This year, Inga Conti-Jerpe characterized the microbial communities associated with three species of gorgonian soft corals and one species of black coral collected in Hong Kong waters. Using 16S rRNA gene amplicon metabarcoding, Inga measured the richness and abundance of microbes associated with these corals. By combining these sequence data with stable isotope assimilation experiments, Inga was able to determine that certain microbes associated with some coral species act as symbionts by assimilating inorganic nitrogen and sharing it with their coral host. This enlarges the trophic niche of these corals and may allow them to persist in eutrophic environments.

Inga explains the ecology of coral communities found in Hoi Ha Wan to HKU students

Linking sewage impacts to coastal biodiversity and ecosystem function

Coastal marine environments face tremendous pressure from urbanization and eutrophication caused by excess nutrients. Archana Anand quantified primary productivity, grazing and predation intensity and organic matter decomposition along a pollution gradient in northeast Hong Kong to understand the link between nutrient enrichment and ecosystem function. She also conducted high-throughput sequencing on the taxonomic and functional diversity of bacterial and archaeal communities in the sediments. Strikingly, the most polluted site recorded the lowest primary productivity, lowest predation intensity, and highest rate of decomposition. This also revealed that eutrophic sediments have the highest abundance of decomposer microbes and poorest carbon storage capacity when compared to other disturbed and undisturbed terrestrial and aquatic ecosystems.

Archana at the National Geographic Science Telling Bootcamp in Hong Kong

Predicting the future aquaculture sustainability of the Pacific oyster, *Crassostrea gigas* in northern China

By integrating the physiological responses of *Crassostrea gigas* with projected environmental data, Alicia Tan has constructed a Dynamic Energy Budget (DEB) model to predict the spatial-temporal changes in the life history traits of *C. gigas* in northern China. The DEB model highlights the strong link between sea surface temperature, chlorophyll-a concentration and oyster growth. Oysters in areas which are not food limited under present -day conditions were generally predicted to benefit from increasing temperatures when the projected decrease in chlorophyll-a concentration was less than 10%. Alicia's study may, therefore, provide useful information for aquaculture management of how this species can be cultivated under future climate change conditions.

Alicia with participants at the Tsitsikamma field course in South Africa

Taihun at the Max Planck Institute for Chemistry (Mainz, Germany)

Responses of coral species-specific fatty acid profiles under eutrophication

In the third year of his PhD, Taihun Kim visited the Max Planck Institute for Chemistry in Mainz (Germany) for 3 months to analyze coral skeleton bound stable isotopes (CS-$\delta^{15}N$ and $\delta^{18}O$) in his core samples from Chuuk (Federated States of Micronesia). His coral core was estimated to date back 127 years. His data showed that alterations of N cycling associated with both human impacts and ENSO are recorded by corals in the nearshore reefs of Chuuk. These results will be used to project how coral reefs respond to human impact and climate change in the entire Western Pacific Ocean.

Derek collecting soundscape recordings in western Lantau waters

Multi-faceted study of delphinid foraging ecology

Derek Ho's project uses the teeth of Indo-Pacific humpback dolphins (*Sousa chinensis*) to study the dolphins' foraging ecology and environmental nitrogenous input in the Pearl River Estuary. Stable isotope analysis results suggest that the dietary shift that marks the dolphins' weaning age takes longer than previously thought. Apart from food, dolphins ingest a variety of non-food items, including microplastics (size <5mm) which originate from various sources, but large pieces of plastic (macroplastics) seem rare. Using acoustic techniques, Derek found that the essential soundscape features within the dolphin's habitat are site and season-specific and likely affects their foraging ecology.

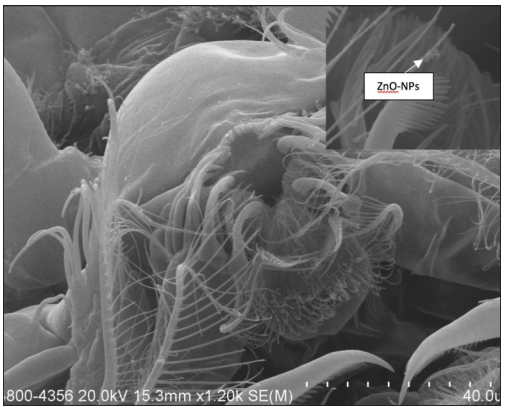
May with Jon conducting microfaunal analyses on sediment cores

Understanding the history of life from a paleontological perspective

May Huang is interested in applications of ostracods in paleoecology. Using fossil records of ostracods, she studied benthic faunal changes on geological time scales in different environmental settings to understand the mechanisms that control biodiversity. In 2018, she and co-authors published two papers on their studies in the Sea of Japan where they focused on biological impacts of Pleistocene climate events that are associated with oceanic deoxygenation and other processes. Their results showed cycles of glacial extirpation events caused by anoxia and suggested high vulnerability of the deep-sea ecosystem to oceanic deoxygenation.

Ecological risk of zinc oxide nanoparticles with different coatings

Zinc oxide nanoparticles (ZnO-NPs) are ranked as the 7th most prevalent nanomaterials in commercial products and hence can pose a substantial risk to marine organisms. In commercial products, ZnO-NPs are commonly functionalized with different coatings. However, there are only few studies that compare their toxic effects towards marine organisms. Racliffe Lai has revealed that different coatings can affect the physicochemical characteristics of ZnO-NPs (e.g. ion dissolution, particle size and surface charge) that, in turn, govern their toxicity. These ZnO-NPs can all induce oxidative stress in the marine copepod *Tigriopus japonicus* and significantly impair their population growth.



Scanning Electron Microscope of Tigriopus japonicus *showing presence of ZnO-NPs around its monthparts*

Identifying factors that shape the benthic food web in Hong Kong's coastal waters

The ecosystem-based management (EBM) approach requires a good understanding of the ecosystem and has gained popularity in environmental management. Following the EBM approach, Jason Yau's PhD study aims at elucidating the marine benthic food web in Hong Kong via stable isotope analysis. He identifies factors that shape the food web by analysing the isotope data among communities with different environmental conditions. Results indicate that both total nitrogen concentration and species richness of benthos have significant influences on the food chain length. His study provides valuable isotope data and essential information for adopting EBM in the near future.

Sea urchin blooms in the western waters of Hong Kong

Coping with extremes and variability - survival strategies of rocky shore littorinids

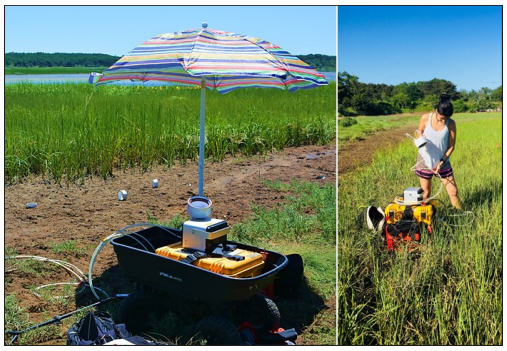
The prevalent viewpoint in thermal biology considers tropical species thermal 'specialists' as they are more adapted to endure extreme temperatures, and temperate species thermal 'generalists' as they are more adapted to tackle variability in temperatures, and suggests a tradeoff between the two. Hong Kong rocky shore species, however, experience both tropical extreme temperatures (during daytime emersion periods as the tides fall) and temperate temperatures (seasonal variability due to changing monsoons). Sarah Lau, using Hong Kong littorinids as model species, is testing how local rocky shore species' performances are shaped by these extreme and variable temperatures and manage to survive in such a dynamic and stressful environment.

Sarah making field observations in Vigo, Spain

Jay snorkeling in the mangroves at Orpheus Island, Great Barrier Reef, Australia

Resistance of subtidal reefs to change under future conditions: the role of benthic grazers

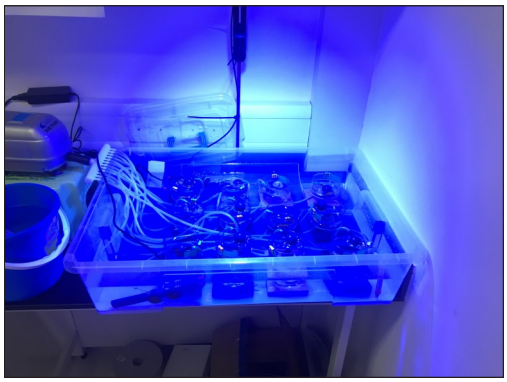
Jay Minuti is investigating the ecophysiology of key benthic grazers with current forecasts for climate change, by assessing metabolic responses of sea urchins and gastropods to ocean acidification and rising temperature. Jay has found that urchins and gastropods both respond very differently to these environmental stressors despite sharing similar roles in the ecosystem. Jay hopes to develop a clearer picture of their role from her field-based exclusion experiment which she deployed this year. Jay will also be assessing whether adaptation to stress can be inherited, in a collaboration with the University of Sydney, she will be conducting heat stress experiments with sea urchins across different life stages.



Laura performing greenhouse flux measurement within a NE-American salt marsh

Crab burrows in wetlands increase CO_2 release through bioturbation

Under the HKU-UChicago Strategic Partnership Fund, Laura Agusto went to the Marine Biological Laboratory in Woods Hole, USA. She investigated the role of crabs in mediating greenhouse gas fluxes within a salt marsh. Results indicate that burrowing crabs do play an important role in CO_2 release. Moreover, burrow abundance may influence this process further and augment CO_2 release. Laura, therefore, proposes to re-assess conventional methods of CO_2 flux measurements in salt marshes by not overlooking these important bioturbators. Laura is also analyzing the bioturbation potential of mangrove crabs within Hong Kong.



Shannon's experiment to investigate the effects of eutrophication and temperature on coral microbiomes

The effect of anthropogenic stressors on the nitrogen cycle and microbiome of corals and coralline algae

Shannon Hanson's research, so far, has focused on the effect elevated pCO_2 has on nitrogen cycling in corals. By using a natural CO_2 seep in Japan, she was able to observe after four months *in-situ* corals in the high pCO_2 site generally showed nitrogen release in incubations, whereas those from the low pCO_2 site generally showed nitrogen uptake. She has also carried out experiments investigating the effects of elevated temperature and nitrogen concentrations on the coral microbiome. In December 2019, she will travel to Glasgow where, for the following three months, she will investigate nitrogen cycling in coralline algae and how it's affected by temperature and pCO_2.

Biomineralization in acidifying oceans

Kanmani Chandra Rajan is a third year PhD student studying biomineralization mechanisms in oysters under ocean acidification (OA). This academic year, she has discovered that dissolution of the prismatic layer of the shells under OA affects their elemental composition (Mg/Ca and S/Ca ratios). Also, the elemental composition of the shell prismatic layer depends on its organic content. This suggests that using trace elements in calcareous structures as a proxy for determining environmental conditions should be attempted with caution. She is currently using Scanning Electron Microscope-based Electron Back Scatter Diffraction techniques for studying shell crystal orientation. She is also employing RNA-seq and Methyl RAD techniques for understanding the molecular mechanisms of biomineralization under OA.

Kanmani using EBSD for understanding oyster shell crystal orientation

Human impacts on Hong Kong mangroves and their fauna: heavy metal pollution

Hong Kong mangroves are exposed to multiple and intense anthropogenic stressors, such as heavy metals, due to their proximity to highly populated and industrialised areas. Rebekah Butler is interested in how anthropogenic activities influence the natural world and is examining the concentrations of metals (Al, Cu, Cd, Cr, Fe, Mg, Mn, Zn, Ni, Pb, As) in mangrove sediments, flora and fauna using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). Rebekah's other research includes investigating the potential effect of metal bioaccumulation on mangrove crabs by exploiting interdisciplinary approaches including seascape genomics, physiology and biomagnification.

Rebekah assisting with the Tsitsikama field course in South Africa

Seasonal spatio-behavioural patterns of African elephants

Scott Chui investigates spatio-behavioural patterns of African elephants in the Associated Private Nature Reserves, South Africa. He found that elephants generally prefer frequent short visits to habitat patches throughout the year. They increase the rate and duration of visits in dry seasons as a behavioural response to cope with resource scarcity. The next step in his analyses is to investigate the correlations between elephant movement and various environmental factors, e.g. surface-water availability and vegetation, to identify key determinants of elephant spatial ecology. His findings will directly benefit ecological management and conservation, especially in areas with high human-elephant land-use conflicts.

Scott in one of his study sites, Pilanesberg National Park, South Africa

Rhyn deploying an oxygen sensor to measure dissolved oxygen concentration

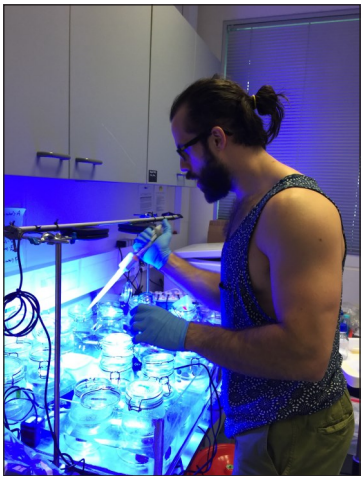
Productivity of the Hong Kong coastal alga, *Sargassum hemiphyllum*

Primary producers such as algae form the basis of most marine food webs. Marine macroalgae, serving both as a food source and habitat in coastal ecosystems, are influenced by temperature and light intensity which in turns affects their productivity. Rhyn Cheung's research has found that productivity of *S. hemiphyllum*, an important local species, is highest at temperatures equivalent to that during early spring in Hong Kong - their season of greatest growth. He is also investigating the microbial diversity and functions that accompany the algal detritus after the algae die.

Spinner shark (Carcharhinus brevipinna) *pectoral fin denticle morphology*

Developing novel methods for wildlife trade analysis

Vicki Sheng is developing a convolutional neural network for image recognition of shark fins, which now uses a DenseNet architecture and has expanded to 18 species categories (including 9 out of 12 CITES-listed species). She visited Harvard's ichthyology collections and attended a shark species identification workshop in Taiwan to build capacity for government stakeholders. To further investigate provenance of shark fins, Vicki is analyzing carbon, nitrogen, and sulfur stable isotope ratios in shark tissue across 4 CITES-listed species to compare with reference ocean isoscapes. She is also collaborating on various forensic projects, including DNA barcoding and qPCR of illegal eel species as well as environmental DNA surveys of wholesale fish markets.



Jon feeding his corals to understand what form of nitrogen they assimilate

A temporal look into Hong Kong's coral diversity and nitrogen assimilation

Jonathan Cybulski has spent the first part of his dissertation establishing a historical baseline for Hong Kong's coral assemblages, and has shown that in the past coral diversity was higher and reefs supported more branching (fast growing) coral morphologies. Jon's work this year has shifted from historical ecology to biogeochemistry, where he has begun to research what type of nitrogen corals assimilate into their organic matrix during calcification. In this way, he hopes to obtain historical nitrogen signatures from his collected coral fossils, which he can then use to interpret past anthropogenic influences on the marine ecosystem and better understand coral biology and coral calcification.

Effects of temperature on the physiology and behaviour of bioturbating crabs and the possible implications of global warming

Crabs are essential for mangrove ecosystem functioning. Mangroves are thermally stressful environments, and their associated organisms are vulnerable to global warming. Pedro Jimenez studies the effects of temperature on the physiology and behaviour of mangrove crabs to understand how this group will respond to ongoing global warming. Pedro's work includes investigating the thermal performance of mangrove crabs, their thermal limits, and the relationship between temperature and evaporative water loss. His data suggests that mangrove crabs experience a high thermal stress and that some species may be at risk of changing their life traits as a consequence of global warming.

Pedro after a fun day catching crabs

Pearl cultivation in Hong Kong: past, present and future

Wa-Tat Yan had a rough year in 2018 as Typhoon Mangkhut completely destroyed his land-based research facilities at Tung Tze in Tai Po and damaged the fish rafts at Lo Fu Wat in Tolo Harbour. More than 1500 pearl oysters were lost in these two sites. Inevitably, some experiments were postponed. Fortunately, four more fish farms have recently joined his pearl cultivation project, enabling him to collect more data on growth rate of the pearl oysters, and allowing him to better assess the feasibility of revitalizing the pearl cultivation industry on a large scale.

Fish rafts at Lo Fu Wat after Typhoon Mangkhut

Variation in thermal performance across a biogeographic range: can tropical populations survive?

Ocean warming is increasingly causing thermal stress to marine ectotherms, but responses are variable. Theory suggests that temperate organisms should be better adapted than tropical species. Most studies, however, have only compared different species. Jake Dytnerski wants to know if this theory holds for a single species across temperate and tropical environments. After measuring metabolic performance of the sea urchin, *Diadema setosum*, Jake found that populations from Thailand, Hong Kong and Japan have high physiological plasticity to warming. The tropical population, when given time to acclimate, had the same aerobic performance as temperate populations, suggesting that tropical populations may still acclimate to a warming ocean.

Jake getting ready for a dive survey

Target species, the rocky shore crab Eriphia ferox

Predator and prey in a warming and acidifying ocean: their interactions, physiology and microbiome

Ocean acidification (OA) and warming are two major threats to marine species and healthy ecosystem function; however, the effects of these stressors on many species is still unclear. Kevin Geoghegan is using a multi-stressor approach to identify the effects of OA and warming on the predatory rocky shore crab *Eriphia ferox* and the mussel *Septifer virgatus* as a model system. So far, he has investigated the acclimation potential of *E. ferox* to high temperatures and found evidence of thermal plasticity. He is now using a long-term mesocosm experiment to test the effects of future conditions on physiology, predator-prey interaction and the microbiome of predator and prey.

Ying with some large marine debris at To Kwa Peng mangroves

Quantification of anthropogenic marine debris in Hong Kong mangroves

Anthropogenic marine debris (AMD) is an issue that affects all marine habitats, and Hong Kong's mangroves are no exception. In the summer of 2018, Ying Luo (with help) surveyed 19 mangrove sites across Hong Kong. It was found that debris at the landward and seaward zone of the mangrove differed in type and origin, suggesting either a filtering effect of the mangrove trees and/or that sources of AMD in the mangrove are more varied than once thought. Additionally, 71% of debris found was plastic, highlighting the persistent nature of plastic pollution.

John exploring Hong Kong's nature trails

Biogeochemical archives of polar-Atlantic ocean circulation

The high northern latitudes play a critical role in driving global ocean circulation via the densification and outflow of subpolar Atlantic water masses. To understand this process on geological timescales, John Doherty's research uses a variety of stable isotope systems to investigate upper-ocean structural dynamics in the polar North Atlantic throughout previous warm periods in Earth's climate history. This year, he has obtained intriguing results from stable nitrogen experiments, which demonstrate that the Nordic Seas became the major source region for deep-water formation during a particularly warm interglacial cycle, providing the first field data supporting recently-published numerical simulations.

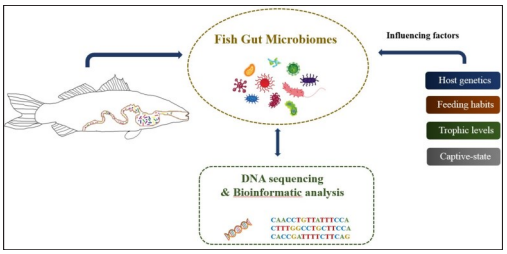
Ecological risks of retinoic acids in urbanized coastal marine ecosystems

Katie Yeung investigated the environmental fate of retinoic acids (RAs), the main metabolites of retinoids and well-known teratogens, in Hong Kong by measuring their concentrations in sewage influent and effluent, sludge samples as well as coastal seawater samples. She found that Deep Bay exhibited higher concentrations of RAs than other areas, probably due to the influence of contaminated freshwater discharges from the Pearl River. She also discovered that sewage treatments can effectively remove RAs from wastewater. In the future she will examine the toxic effects of RAs on larvae of marine species before assessing their ecological risks to the marine ecosystem.

Katie collecting seawater in Lung Ha Wan

Gut microbiomes in marine fishes

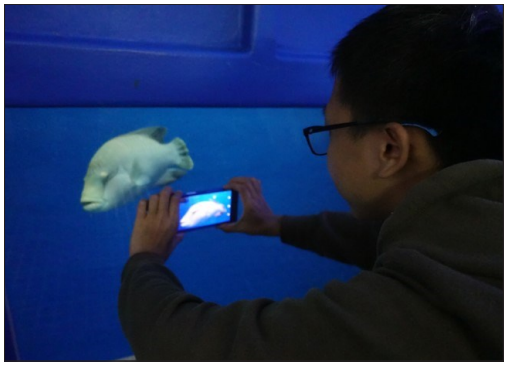
Gut microbial communities can influence the host's metabolic homeostasis, including food digestion and assimilation, and immune defence against pathogens and diseases. Qi Huang investigated gut microbiomes of 20 wild-caught marine fish species via analysis of their 16S rRNA profiles. Although fish gut microbiomes had relatively low diversity when compared with those in activated sludge, she uncovered a large proportion of unknown gut microorganisms in these fishes. Herbivorous and omnivorous fishes, which require microbes to digest cellulose, tend to harbour more diverse gut microorganisms than carnivorous fishes. Results of her research have implications on feeding ecology and evolution in marine fishes.



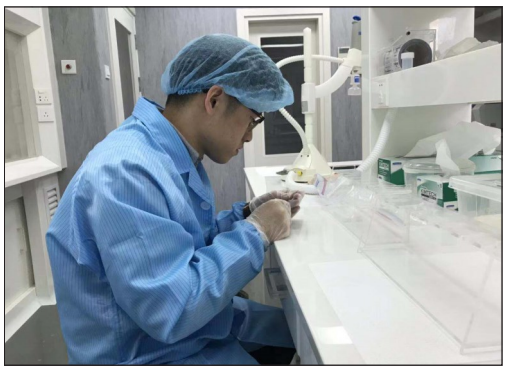
Conceptual overview of the fish gut microbiome study

Photo-identification techniques of humphead wrasse, *Cheilinus undulatus*, to combat illegal trade

The humphead wrasse, *Cheilinus undulatus*, is threatened and traded, sometimes illegally, in luxury seafood markets to feed the appetites of Hong Kong and Chinese consumers. Loby Hau has been testing a photo-identification technique, based on complex facial markings of the fish, to aid enforcement and reduce illegal trade. By long-term tracking of fish individuals, he found that the facial markings remained consistent for at least 6 months which allows them to be used to track individual fish in retail stores. A collaboration with a local mobile application developer company, Corvidae, is in progress to provide a tool to assist enforcement by local government officials.



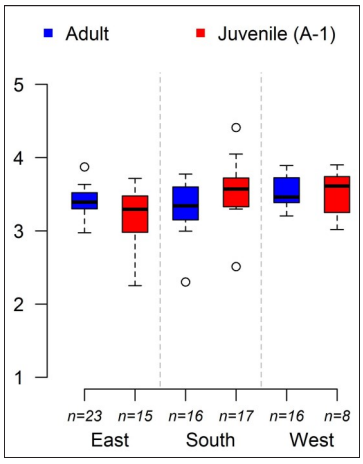
Loby taking a photo of humphead wrasse facial markings using a phone app



Oliver preparing chromatography columns to separate U and Th isotopes

^{230}Thxs and ^{231}Paxs in Arctic Ocean sediments

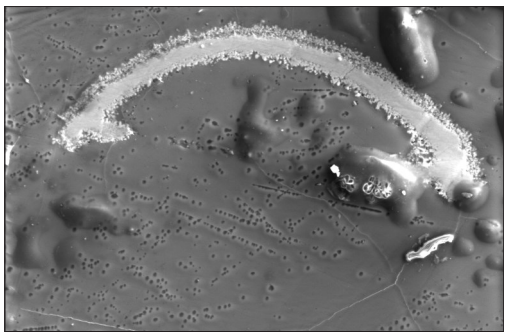
Excess ^{230}Th and ^{231}Pa (^{230}Thxs and ^{231}Paxs, scavenged from seawater into sediments) are emerging as important proxies for paleoenvironmental reconstruction in Arctic sediments. By measuring ^{230}Thxs and ^{231}Paxs in a sediment core recovered from the central Arctic Ocean, Oliver Xu has been able to estimate an average sedimentation rate of ~3.5 mm/ka which is similar to previous studies. Sedimentation rates of the order of a few mm/ka suggest that a 'sediment-starved' environment exists in the Arctic Ocean. Combining the ^{230}Thxs and ^{231}Paxs records available in the Arctic Ocean allow us to highlight the similarity of ^{230}Thxs profiles from the western Arctic Ocean and more complex sedimentary environment in the Eastern Arctic Ocean.



Strontium/Calcium (Sr/Ca) ratios of ostracods retrieved from Hong Kong

Trace element distribution in marine ostracods

Temperature and salinity instrumental data have allowed us to understand ocean variability over the last century. However, this period represents only a small portion of the Earth's history. Marine adult shells retrieved from sediment layers have been used to fill this gap through the relationship between shell trace elements and physicochemical water properties. Nevertheless, environmental reconstructions face complications, such as a scarce availability of samples. The addition of juvenile shells into paleoenvironmental analyses would help to lessen this limitation. Max Rodriguez has been studying this, showing that the oldest juveniles and adult ostracods are similar in terms of their chemical composition, which should allow us to perform more robust paleoenvironmental studies.



High resolution photos of ostracod shells

Reconstruction of the Western Arctic Ocean water mass stratification during the last climatic cycle

In recent decades, the decline of Arctic sea ice has become more vigorous, however, its underlying reasons are not fully understood. The halocline hinders the heat transfer from warm Atlantic water to the surface sea ice. The halocline thickness variation, therefore, might be a possible controlling factor in sea ice development. Hilary Man's research aims at evaluating the halocline thickness and its effect on sea ice extent in the last climatic cycles. She discovered bottom water temperature has been fluctuating between 0°C and 1.5°C, suggesting the presence of a warm Atlantic Layer up to 434m in the Western part of the Arctic Ocean.

Forming a scientific foundation for reef management and restoration action plans in the South China Sea

Genetic conservation is lacking in most coral restoration efforts and has not been well supported with scientific evidence, particularly in subtropical marginal reefs. Vriko Yu is a reef conservationist aiming to optimize restoration techniques and inform coral conservation strategies in South China. Her research focuses on seascape genetics, which reveals the genetic diversity, connectivity and resilience of coral communities in the region. With the population genetics data generated using restriction site-associated DNA (RAD) genotyping method, coral population structures will be revealed to inform conservation actions and strengthen conservation outcomes in the region.

Vriko assessing a bioeroded Platygyra *colony*

Nitrogen isotope fingerprint from atmospheric deposition

The main sources of nitrogen pollution in Hong Kong coastal waters are sewage runoff, discharge from the Pearl River delta and groundwater. However, atmospheric deposition is often neglected as a source. Yet, this deposition is of increasing importance to the receiving waters because of the increase in anthropogenic air pollutants from the land due to industrial activities and transportation. Yvonne Yau will analyze the wet and dry atmospheric deposition using stable nitrogen isotopes which can track the sources of pollutants. She has sampled rain and air particulates and analysed the samples using Stable Isotope Ratio Mass Spectrometry. Her project will determine the isotopic signature and the contribution of atmospheric deposition to the marine ecosystem.

Yvonne collecting samples in Hong Kong

The ecological importance of sea cucumbers in Hong Kong and their potential as an aquaculture species

Sea cucumbers are a highly valued delicacy with an ever-increasing demand in South-East Asian markets. Many economically valued species are overexploited in the wild, with the lack of proper rearing techniques for aquaculture providing few viable alternatives for the growing demand. Conversely, sea cucumbers are an essential component of the cycling of nutrients in marine ecosystems. Cheryl Chu's research aims to investigate the effects of sea cucumbers (*Holothuria scabra* and *Holothuria leucospilota*) on detrital pathways which will provide insights on the potential of them as aquaculture species under integrated aquaculture systems, as well as in the wild.

The black sea cucumber (Holothuria leucospilota) *at Little Palm Beach*

Adrian measuring characteristics of the habitat that is not occupied by Lottia

High shore survivor: how can this limpet persist under extreme heat stress?

Hong Kong rocky shores are one of the most stressful habitats in the summer, being insolated by strong sunlight and experiencing long air exposure time at mid and high shores. Surprisingly, the limpet, *Lottia dorsuosa*, inhabits the mid-low shore in the winter but lives well above the high water mark during summer where the rock surface temperature can often exceed 55°C. To investigate how *Lottia* survives at such a thermally challenging tidal height in the summer, Adrian Wong will compare the habitat characteristics of where *Lottia* is present and absent and assess its physiological performance and possible metabolic depression at different temperatures.

Christine in the mangroves during fieldwork

The sky's the limit: the irresistible ascent to land and trees by crabs

We are currently witnessing an evolution from an aquatic lifestyle to a terrestrial lifestyle in marine crabs. Many of these species exhibit terrestriality to different extents. Some live in coastal mangroves while others inhabit terrestrial forests. Christine Cheng conducted extensive surveys mangroves and recorded over 50 species of crabs in Hong Kong. Yet, little is known about the terrestrial crabs. Christine's current project aims to evaluate the distribution and population dynamics of two native forest dwelling crabs, namely the Red-clawed Crab (*Chiromantes haematocheir*) and the endemic *Pseudosesarma patshuni*. Christine will also investigate their adaptations to the terrestrial lifestyle, with a focus on their microbiome.

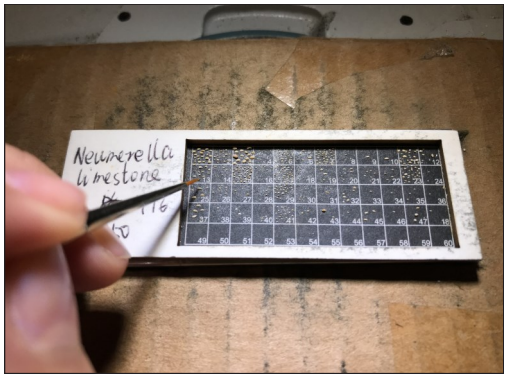
Ka Hei spotting something surprising on shore

Evolutionary biology on terrestrial crabs and osmoregulation strategies

Ka Hei Ng is interested in the evolutionary biology of Brachyurans, especially terrestrial crabs. Supported by the TUYF Charitable Trust, Ka Hei is studying the relationship of microbiomes in terrestrial crabs and their hosts, and how their physiological traits allow them to adapt to the terrestrial environment. Apart from microbiomes, osmoregulation strategies demonstrated by these crabs caught her attention. Various forms of adaptations regarding osmoregulation of freshwater and land crabs are described but linkage to their ancestors yet to be discovered. Her studies will focus on the evolutionary trend of terrestrial crabs, hoping to provide more information on phylo-physiology of Brachyurans.

Hopping or Whack-A-Mole? Cenozoic dynamics of marine biodiversity hotspots

The temporal and spatial shift of marine biodiversity hotspots is one of the most important topics in marine biology. But the emergence and collapse of major hotspots (e.g. Eocene Tethyan, Eocene-Miocene Arabian and Miocene Indo-Pacific hotspots) is not well understood. Fossil records indicate consistent patterns of the migration of higher taxa from the Tethyan to Indo-Pacific through the Arabian pathway and it is hypothesized the dispersal events are causally linked to successive development of historical biodiversity hotspots. Skye Tian's research will focus on the comparison of faunal diversity and composition among these biodiversity hotspots using ostracods as model organisms and eventually show the relative importance of biotic and abiotic factors in biodiversification.



Skye studying Miocene ostracods under the microscope

Historic ecology of a coral reef in the thermal plume of a nuclear plant

As global ocean warming progresses into the coming century, coral reef ecosystems are expected to transition into previously unseen community configurations. A reef in a semi-enclosed bay exposed to over forty years of a consistent 2-3°C elevation in temperature at the outlet of thermal effluent from a nuclear power plant in Kenting, Taiwan provides the opportunity to study responses to persistent thermal stress on a multi-decadal scale. Alison Corley will be using sediment matrix push cores from the site to construct a chronology of ecological succession using coral subfossils, and to develop ancient environmental DNA extraction methods.

Alison with a sediment core collected from the Hoi Ha Wan marine park

Oyster adaptation to ocean acidification through epigenetic modifications

Unprecedented changing global climates are exposing marine organisms to aquatic environments not previously experienced in recent years. The ability to adapt and alter a phenotype in response to rapid environmental changes, known as adaptive plasticity, may help to buffer against reductions in fitness. James Lim is looking into the regulation of epigenetic mechanisms on the adaptive plasticity of edible oysters. With the data and knowledge gained, his research characterizes and deciphers the vital role of epigenetic plasticity in oysters under ocean acidification. More importantly, this research can help to better improve current oyster production efficiency as well as to sustain further hatchery management.

James sorting out different species and sizes of oysters in Lau Fau Shan

Bovern presenting his research in Morrison Hall Academic Symposium

Understanding ecological dynamics of host-associated microbiomes in changing environments

Microbial assemblies are shaped mainly by stochastic and deterministic processes acting in different ecological systems. However, little is known about how the microbial community changes after environmental perturbations, especially within a host environment. Bovern Arromrak's research lies in exploring the stability and dynamic changes of microbiomes following one-off or constant disturbances and determining the underlying processes within and between species. The outcome from this study will improve our understanding of the ecological dynamics during the establishment of microbiomes in natural populations.

Chiu collecting water samples for his baseline survey

Ecological engineering for improving marine diversity on seawalls

Shoreline hardening is almost inevitable in every urbanised coastal city and Hong Kong is no exception. More than 15% of shorelines in Hong Kong have been reclaimed and constructed with artificial seawalls that do not provide suitable habitats for marine organisms. The PhD research of Lo Chi-Chiu will apply ecological engineering to retrofit existing seawalls with ecologically friendly structures which will provide water retention, shading, holes and crevices for organisms to live and forage. He will test the hypothesis that these eco-engineered seawalls will increase biodiversity and ecological functions (e.g. biofiltration and carbon fixation).

Alessia visiting the shellfish farms off Sam Mun Tsai

The bivalve larval shell proteome: plasticity of biomineralization under ocean acidification

Shell matrix proteins (SMPs) are occluded within molluscan shells and play key roles in biologically-controlled mineralization. Larval shell formation is a main bottleneck in the bivalve life cycle, and it has been observed to occur under unfavourable conditions of ocean acidification (OA). This raises questions on the role of SMPs in guiding larval biomineralization under stressors. However, no studies have been carried out on the effect of OA on bivalve larval SMPs using a proteomic approach. Therefore, Alessia Carini plans to couple shell proteomics with shell crystallography in an oyster multispecies project where larvae are exposed to decreasing pH to investigate the plasticity of larval biomineralization under OA.

Community Outreach

The ongoing major expansion work has effectively prevented us from engaging in our normal outreach activities this year. Nevertheless, we have used our temporary SWIMS at campus for hosting school groups, NGOs and professional groups as well as joining beach clean ups. As always, SWIMS graduate students and staff visited several schools to give talks and seminars.

Our annual exchange of SWIMS students and staff with Tokyo University of Marine Science and Technology (Japan) and The University of Johannesburg (South Africa) have continued. Now, the field course in South Africa involves students and teachers not only from SWIMS and South Africa but also from the USA. Four Tokyo University students visited and closely interacted with SWIMS students and staff during March 2018. We were also able to accommodate several students, student helpers from various local and overseas universities, to conduct their internship work at SWIMS for several months. This strong student and staff exchange, engagement and outreach activities will help us to develop further in the newly expanded SWIMS.

Beach cleaning led by Christelle at Sam Pak Wan

Conservation

SWIMS and IUCN

The Napoleon fish, *Cheilinus undulatus*, is threatened and listed on CITES App II. Yvonne was involved in a decade of underwater surveys at 6 locations in Indonesia, the major global exporter of the species, which revealed indications of recovery through distinct recruitment pulses in areas of low and medium fishing intensity, but none where fishing pressure remains high. In one location which was no longer fished, significant increases in fish numbers occurred along with increases in fish sizes. These indications of improvement in low and medium exploitation areas are a sign that fishing pressure should be reduced where exploitation for the species remains high and that some protection of the species and moderate fishing levels can reduce threats, allow for recovery and maintain fisheries.

Surveying Humphead wrasse in the field

SWIMS and Reef Check

Continuing with SWIMS' effort to promote marine conservation and outreach, we gathered 26 volunteers at our 18th participation of the Reef Check program run by AFCD. With the financial support from SWIMS and passion from our students, we conducted surveys for reef fishes, benthic composition and invertebrates. Reef Check provides not only a chance for us to contribute to coral conservation in Hong Kong, but is also a platform for SWIMer's reunion. We are looking forward to see you all and more newcomers in 2019.

SWIMS Reef Check team 2018

The pre-expansion SWIMS in the summer season

Research Opportunities

Research Visitors

The Swire Institute of Marine Science offers three major sources of funding to support researchers wanting to visit SWIMS to undertake research. For enquiries, please contact the Director, Gray A Williams.

The Laurence Caplin Scholarship in Marine Biology

Established in memory of Laurence Caplin by his widow, Mrs E Caplin and daughter, Mrs J Woodford, to bring young people to SWIMS to undertake research in marine biology with a resident staff member.

The Intertidal Trust Fund

Established in 1982 with profits from the book 'The Seashore Ecology of Hong Kong', grants from the Intertidal Trust Fund can be made to overseas students and scientists who wish to undertake research on intertidal ecology at SWIMS.

Cape d 'Aguilar Trust Fund

Established in 1995 with profits from the book 'An Introduction to the Cape d'Aguilar Marine Reserve, Hong Kong', grants from the Cape d'Aguilar Trust Fund can be made to local or overseas students and scientists who wish to undertake marine biological research on the Cape d'Aguilar Marine Reserve at SWIMS.

Higher Degrees (M.Phil / Ph.D)

Students who are interested in undertaking a research postgraduate degree (M.Phil or Ph.D) in marine biology and ecology should directly contact SWIMS academic staff for more information regarding individual projects.

SWIMS was hit by Super Typhoon Mangkhut in September 2018

Student Research Assistantships/Internships

Undergraduate students holding a permanent Hong Kong identity card are encouraged to apply to work as volunteer student research assistants during the semester breaks/summer holidays. Undergraduate students from both local and overseas institutions who are enrolled in a degree programme, which requires the completion of an internship, may also contact us to discuss how we can facilitate that requirement. Interested students should contact SWIMS Secretary, Ms Sylvia Yiu.

Accommodation

SWIMS residential blocks are situated on top of the Cape d'Aguilar cliffs. Accommodation at the Residence is available for students, researchers and visitors working at SWIMS. Those interested in booking the accommodation should contact SWIMS Secretary, Ms Sylvia Yiu.

SWIMS Publications (Jan - Dec 2018)

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Other Contributions from SWIMS

David Baker

Councillor, The International Society for Reef Studies
Associate Editor, *Frontiers in Ecology & Evolution*
Associate Editor, *Coevolution*

Stefano Cannicci

Member, IUCN SSC Mangrove Specialist Group
Fellow, Royal Institute of Navigation
Member, Biodiversity Strategy and Action Plan (BSAP) Marine Biodiversity Working Group, HKSAR
Member, Mai Po Management Committee, HKSAR
Member, Italian Union of Zoologists
Member, Italian Society of Ethology

Leszek Karczmarski

Associate Editor, *Journal of Experimental Marine Biology and Ecology*
Associate Editor, *Journal of Zoology*
Associate Editor, *Estuarine, Coastal and Shelf Science*
Subject Editor, *Mammalian Biology*
Academic Editor, *PLoS ONE*, *Scientific Reports*, *Sustainability*
Editorial Board, *Integrative Zoology*
Member, IUCN Species Specialist Group: Small Cetaceans
Member, IUCN Species Survival Commission
Member, Society for Marine Mammalogy
Member, Society for Conservation Biology
Member, Scientific Advisory Committee - Ocean Park Conservation Foundation Hong Kong (OPCFHK)
Postgraduate Advisor, National Taiwan University, Taiwan
Postgraduate Advisor, Sun Yat-sen University, China
Associate Research Fellow, Mammal Research Institute, University of Pretoria, South Africa

Kenny Leung

Member, International Scientific Advisory Committee of the Chinese Research Academy of Environmental Sciences, China
Co-Editor-in-Chief, *Regional Studies in Marine Science*
Subject Editor and Founding Editorial Board Member, *Integrated Environmental Assessment and Management*
Subject Editor, *Environmental Science and Pollution Research*
Member of Editorial Board, *Marine Pollution Bulletin*, *Canadian Journal of Zoology*, *Toxicology and Environmental Health Sciences*, *Ocean Science Journal* and *PeerJ*
Member, Advisory Council on the Environment, HKSAR Government
Member, Advisory Council on Food and Environmental Hygiene, HKSAR Government
Chairman, Marine Mammal Conservation Working Group, HKSAR Government
Chairman, Marine Parks Committee, HKSAR Government
Members, Country and Marine Parks Board, HKSAR Government
Member, Board of Directors of the Ocean Park Corporation
Trustee, Ocean Park Conservation Foundation Hong Kong
Chairman, Fisheries Enhancement Fund Management Committee
Member, Steering Committee for the Marine Ecology and Fisheries Enhancement Funds
Member, Town Planning Appeal Board Panel
Member, Red Tide/Harmful Algal Bloom Expert Advisory Group, HKSAR Government
Member, The Outstanding Young Persons' Association, Hong Kong
Examiner and Founding Fellow, Hong Kong Institute of Qualified Environmental Professionals
Founder and Adviser, Environmental Management Association of Hong Kong
Coordinator, Joint University Consortium on Biodiversity, Ecology and Conservation of Marine Ecosystems (BECoME), Hong Kong
Member, Management Committee of State Key Laboratory of Marine Pollution (City University of Hong Kong)
Honorary Adviser, the Hong Kong Union of Youth Leaders

Bayden Russell
Academic Editor, *PLoS ONE*

Yvonne Sadovy
Board Member, World Wide Fund for Nature Hong Kong
Chair, Conservation Advisory Committee, World Wide Fund for Nature Hong Kong

Benoit Thibodeau
Editorial Board Member, *Frontiers in Marine Science: Biogeochemistry*

V ThiyagaRajan
Council Member, Hong Kong Proteomics Society
Academic Editor, *PLoS ONE*
Editor (Review), *Aquatic Biology*
Contributing Editor, *Aquaculture Environment Interactions*
Academic Member, State Key Laboratory for Marine Pollution
Founder and Chairman, Interdisciplinary Symposium on Ocean Acidification and Climate Change (ISOACC)

Gray A Williams
Guest Professor, The University of Xiamen
Chairman, International Advisory Committee of the Dongshan Swire Marine Station (D-SMART)
Guest Lecturer, Tropimundo
Special Visiting Research Fellow, National Council for Scientific and Technological Development, Brazil
Visiting Lecturer, Zoology Fieldcourse to Tsitsikamma Marine Reserve, 4-10 Mar 2018, University of Johannesburg, South Africa
Editorial Board Member, *Journal of Thermal Biology*
Subject Editor, *Zoological Studies*
Education Committee, Hong Kong Maritime Museum

Moriaki Yasuhara
Chair, International Research Group on Ostracoda (IRGO)
Scientific Committee Member, bioDISCOVERY, Future Earth
Member, Global Ocean Oxygen Network (GO2NE), IOC-UNESCO
Trustee, the Deep-Sea Biology Society
Vice Chair, Society of Friends of IRGO (SF*IRGO)
Editorial Board Member, *Global and Planetary Change*
Editorial Board Member, *Marine Micropaleontology*
Editorial Board Member, *Open Quaternary*
Associate Editor, *Marine Biodiversity*
Associate Editor, *Paleontological Research*
Editor, *Plankton and Benthos Research*

Conferences and Workshops

David Baker
Oral Presentation; Workshop of Intelligent Technology and Big Data in Nature Conservation, 8-10 Apr 2018, Kunshan, China.
Oral Presentation; 2nd International Workshop on Ecoshoreline Design, 28-31 May 2018, HKU, Hong Kong.
Oral Presentation; 4th Asia-Pacific Coral Reef Symposium, 4-8 Jun 2018, Cebu, Philippines.
Organizer; Workshop on PAM Fluorometry, 8-11 Jul 2018, Mangilao, Guam.
Invited Talk; UP Diliman, 16 Oct 2018, Manila, Philippines.
Invited Talk; International Symposium on the Response of Coral Symbionts to Global Climate Change and Human Activities, 6-11 Dec 2018, Haikou, China.

Stefano Cannicci
Poster Presentation; Biogeochemistry of Marine Interfaces conference, 8-13 Jul 2018, HKUST, Hong Kong.
Invited Oral Presentation; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment., 27-29 Sep 2018, Xiamen, China.
Invited Lecture; The 10th Brazilian Crustacean Congress (CBCX), 11-14 Nov 2018, Mar Convention Center, Recife, Pernambuco, Brazil.
Vice-Chairperson; Global Challenges in Food, Nutrition & Environment Symposium, 6-9 Dec 2018, HKU, Hong Kong.
Poster Presentation; British Ecological Society Annual Meeting; 16-19 Dec 2018, Birmingham, UK.

Sam Crickenberger
Invited Oral Presentation; Xiamen University Lingfeng Forum #67: Marine Organisms and Ecological Processes Under Influences of Ocean Global Changes, 20 Apr 2018, Xiamen, China.
Invited Oral Presentation; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Naomi Geeraert
Oral Presentation; Advances in Stable Isotope Techniques and Applications, 4-6 Jun 2018, Washington DC, USA.
Oral Presentation; Association for the Sciences of Limnology and Oceanography Summer Meeting, 10-15 Jun 2018, Victoria BC, Canada.
Oral Presentation; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Ashley Hemraj
Participant; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Tommy Hui
Oral Presentation; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Leszek Karczmarski
Organizer and Chair; 2nd Regional Training Workshop in Computational Behavioural Ecology: Spatial Ecology and Quantitative Analyses of Animal Movement, 3-12 Jan 2018, Hong Kong.
Oral Presentation; 2nd Ocean-Noise Asia Conference, 5-7 Jun 2018, Hokkaido, Japan.
Poster Presentation; Workshop on Big Data Challenges for Predictive Modelling of Complex Systems, 26-30 Nov 2018, Hong Kong.

Kenny Leung
Invited Keynote Speaker; 4th Conference on Environmental Pollution and Health (Session: Omics Advances in Ecotoxicology), 18-20 May 2018, Tianjin, China.
Chairman of the Organizing Committee; 2nd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development, 28 -31 May 2018, HKU, Hong Kong.
Invited Keynote Speaker; 4th Korea-China Symposium on Environmental Health and Ecological Safety cum Yellow Sea Ecosystem (YES) Symposium 2018, 18-21 Jul 2018, Seoul, Korea.
Invited Speaker; The BK21 Environmental Health Workshop: Advancing Toxicology and Omics for Environmental Health Management, 14 Sep 2018, Seoul, Korea.
Invited Speaker; Global Challenges in Food, Nutrition & Environment Symposium, 6-8 Dec 2018, HKU, Hong Kong.

Briony Mamo

Poster Presentation; European Geophysical Union General Assembly, 8-13 Apr 2018, Vienna, Austria.

Oral Presentation; FORAMS 2018 Symposium, 17-22 Jun 2018, Edinburgh, Scotland.

Oral Presentation; 5th International Palaeontological Congress, 9-13 Jul 2018, Paris, France.

Participant; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Shelby Mcilroy

Oral Presentation; 4th Asia-Pacific Coral Reef Symposium, 4-8 Jun 2018, Cebu, Philippines.

Oral Presentation; 9th International Symbiosis Society Congress, 15-20 Jul 2018, Corvallis, U.S.A.

Oral Presentation; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Yuan Meng

Participant; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Christelle Not

Co-organizer; Tara Ocean Talk, 13 Mar 2018, Hong Kong.

Panel Speaker; Plastic Pollution, 14 Mar 2018, French International School, Hong Kong.

Co-organizer and Invited Presentation; China and the Sea: Maritime Economy and the Challenge of Sea & Ocean Sustainability Symposium, 7-8 Jun 2018, Hong Kong.

Leader; Power Hour, Gordon Research Conference on Ocean Biogeochemistry, 9 Jul 2018, HKUST, Hong Kong.

Bayden Russell

Oral Presentation; The 19th International Conference on Shellfish Restoration, 19-21 Feb 2018, Adelaide, Australia.

Oral Presentation; Lessons from Two High-CO_2 Worlds: Future Oceans and Intensive Aquaculture, 10-12 Apr 2018, Sao Miguel, Azores.

Oral Presentation; 4th International Symposium on the Effects of Climate Change in the World's Oceans, 4-8 Jun 2018, Washington DC, USA.

Invited Talk; The Integrated Marine Biosphere Research Project, Coastal Margins Working Group (IMBeR CMWG) Meeting, 20-21 Sep 2018, Shanghai, China.

Scientific Organising Committee; Global Challenges in Food, Nutrition & Environment Symposium, 6-9 Dec 2018, HKU, Hong Kong.

Lily Tao

Poster Presentation; 2018 Summer School on Marine Environment and Fishery Resources under Global Change, 5-14 Jul 2018, Keelung, Taiwan.

Oral Presentation; 2018 年两岸四地环境科技创新与合作青年学者论坛, 3 Aug 2018, Hefei, China.

Workshop on Marine Fisheries Resources and Management in Hong Kong, 1 Nov 2018, HKU, Hong Kong.

Award: Professor Brian Morton Postgraduate Prize in Marine Biology; Outstanding Poster Presentation and Outstanding Group Oral Presentation, Summer School on Marine Environment and Fishery Resources under Global Change.

Benoit Thibodeau

Oral Presentation, AGU Ocean Sciences Meeting, 11-16 Feb 2018, Portland, Oregon, USA.

Oral Presentation; Advances in Stable Isotope Techniques and Applications, 4-6 Jun 2018, Washington DC, USA.

Oral Presentation; Association for the Sciences of Limnology and Oceanography Summer Meeting, 10-15 Jun 2018, Victoria BC, Canada.

Oral Presentation; 9th International Conference on Asian Marine Geology, 10-12 Oct 2018, Shanghai, China.

V ThiyagaRajan

Invited Keynote Talk; International Oyster Forum: Farming Sustainability and Food Safety, 21-23 Apr 2018, Shandong, China.

Invited Keynote Talk; International Congress on Marine Corrosion and Fouling (ICMCF), 24-29 Jun 2018, Melbourne, Florida.

Invited Keynote Talk; Marine Science and Technology Symposium Environmental Adaptation of Aquatic Animals, 24 Nov 2018, Nagasaki, Japan.

Gray A Williams

Invited Talk: Putting the Ocean in the History of Modern East Asia, 13 -14 Jan 2018, HKU.

Invited Presentation; Xiamen University Lingfeng Forum #67: Marine Organisms and Ecological Processes Under Influences of Ocean Global Changes, 20 Apr 2018, Xiamen, China.

Co-organizer; China and the Sea: Maritime Economy and the Challenge of Sea & Ocean Sustainability Symposium, 7-8 Jun 2018, Hong Kong.

Invited Seminar; Estación Costera de Investigaciones Marinas, Las Cruces Pontificia Univesidad Católica de Chile, 15 Aug 2018, Chile.

Co-organizer, Invited Speaker and Theme Leader; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Moriaki Yasuhara

Invited Lecture; Japan Geoscience Union Meeting, 20-24 May 2018, Chiba, Japan.

Session Organizer and Oral Presentation; Asia Oceanic Geosciences Society (AOGS) 15th Annual Meeting 3-8 Jun 2018, Hawaii, USA.

Academic Award and Oral Presentation; The 2018 Annual Meeting, The Palaeontological Society of Japan, 22-24 Jun 2018, Sendai, Japan.

Oral Presentation; 5th International Palaeontological Congress, 9-13 Jul 2018, Paris, France.

Oral Presentation; 3rd Asian Ostracod Meeting, 6-10 Aug 2018, Kanazawa, Japan.

Workshop and Lecture; GO2NE (Global Ocean Oxygen Network) 1-2 Sep 2018, Kiel, Germany.

Session Chair, Oral and Poster Presentations; 15th Deep-Sea Biology Symposium, 9-14 Sep 2018, Monterey, USA.

Invited Lecture; Mainland-Hong Kong Joint Workshop on Challenges in Sustainable Coastal Observation and Experiments in a Rapidly Changing Environment, 27-29 Sep 2018, Xiamen, China.

Invited Lecture; International Symposium: Biodiversity Estimation in Space and Time, 24 Oct 2018, Okinawa, Japan.

Participant; Workshop under the Auspices of the United Nations, in Support of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, 28-29 Nov 2018, Doha, Qatar.

Invited Lecture and Workshop; IODP Expedition 346: Mini-Workshop, 17 Dec 2018, Woods Hole, USA.

Guang-Jie Zhou

Oral Presentation; Society of Environmental Toxicology and Chemistry (SETAC) Asia-Pacific 2018 Conference, 16-19 Sep 2018, Daegu, Korea.

Postgraduates

Archana Anand
Participant; Molecular Ecology and Data Analysis Workshop, 20-24 Aug 2018, HKU, Hong Kong.
Oral Presentation; National Geographic ScienceTelling Bootcamp, 9-13 Nov 2018, Fox Office, Hong Kong.
Award: National Geographic Society Explorer and National Geographic Society Explorer Dependent and Childcare.

Laura Agusto
Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Poster Presentation; Biogeochemistry of Marine Interfaces conference, 8-13 Jul 2018, HKUST, Hong Kong.

Rebekah Butler
Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Poster Presentation; British Ecological Society Annual Meeting; 16-19 Dec 2018, Birmingham, UK.

Camilla Campanati
Organizing Committee; International Workshop on Transgenerational Inheritance of Gene-climate Interplay in Oysters, 5-7 Feb 2018, HKU, Hong Kong.
Oral Presentation; The 19th International Conference on Shellfish Restoration & Shellfish Reef Restoration Network Meeting, 19-21 Feb 2018, Adelaide, Australia.

Alessia Carini
Participant; Protein Bioinformatics: Sequence-Structure-Function, 14-16 Nov 2018, Swiss Institute of Bioinformatics (SIB), Switzerland.

Stephen Chan
Organizing Committee Member and Participant; 2nd Regional Training Workshop in Computational Behavioural Ecology: Spatial Ecology and Quantitative Analyses of Animal Movement, 3-12 Jan 2018, Hong Kong.

Rhyn Cheung
Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.

Scott Chui
Participant; Workshop on Spatial Ecology and Quantitative Analyses of Animal Movement, 3-12 Jan 2018, Hong Kong.
Visiting Researcher: Department Environmental Science Policy and Management, University of California at Berkeley, 7 Nov-13 Dec 2018, California, USA.

Inga Conti-Jerpe
Oral Presentation; 11th International Conference on the Applications of Stable Isotope Techniques to Ecological Studies 2018, 30 Jul-3 Aug 2018, Viña del Mar, Chile.
Participant; Molecular Ecology Workshop 2018, 20-31 Aug 2018, HKU, Hong Kong.

Jon Cybulski
Poster Presentation; 11th International Conference on Stable isotope Ecology, IsoEcol, 31 Jul 2018, Chile.
Oral Presentation; Asia-Pacific Coral Reef Symposium, 5 Jun 2018, Philippines.
Award: Isotope Ecology 2018 and Smithsonian Fellowship.

John Doherty
Oral Presentation; American Geophysical Union Fall Meeting, 10-14 Dec 2018, Washington DC, USA.
Poster Presentation; Gordon Research Conference on Ocean Biogeochemistry, 8-13 Jul 2018, HKUST, Hong Kong.
Best Oral Presentation; The 10th UCAS Postgraduate Symposium, 18 -23 Mar 2018, Xiamen, China.

Kevin Geoghegan
Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.

Shannon Hanson
Oral Presentation, AGU Ocean Sciences Meeting, 11-16 Feb 2018, Portland, Oregon, USA.
Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.

Loby Hau
Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.

Derek Ho
Participant; Workshop on Spatial Ecology and Quantitative Analyses of Animal Movement, 3-12 Jan 2018, Hong Kong.
Workshop Instructor; Aquatic Soundscape Workshop, 14-16 May 2018, Cebu, Philippines.
Best Student Oral Presentation; 2nd Oceanoise Asia Conference, 5-7 Jun 2018, Hakodate, Japan.
Poster Presentation; Big Data Challenges for Predictive Modeling of Complex Systems, 26-30 Nov 2018, Hong Kong.

May Huang
Oral Presentation; The 5th International Palaeontological Congress, 9-13 Jul 2018, Paris, France.
Participant; 2018 Analytical Paleobiology Workshop, 18 Jul-15 Aug 2018, Florida, USA.

Pedro Jimenez
Oral Presentation; The 10th Brazilian Crustacean Congress (CBCX), 11 -14 Nov 2018, Recife, Pernambuco, Brazil.

Taihun Kim
Oral and Poster Presentation; 4th Asia-Pacific Coral Reef Symposium, 4-8 Jun 2018, Cebu, Philippines.

Racliffe Lai
Poster Presentation; Society of Environmental Toxicity and Chemistry Europe 2018 Conference, 13-17 May 2018, Italy.
Oral Presentation; Society of Environmental Toxicity and Chemistry Asia-Pacific 2018 Conference, 16-19 Sep 2018, Korea.

Sarah Lau
Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.

James Lim
Oral Presentation; State Key Laboratory in Marine Pollution - Annual and Academic Committee Meeting, 1-2 Mar 2018, City University of Hong Kong, Hong Kong.

Ying Luo

Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Poster Presentation; International Conference on Plastics in the Marine Environment (ICPME) 2018, 5-7 Dec 2018, National University of Singapore, Singapore.

Hilary Man

Poster Presentation; The 5th Conference on Earth System Science, 2-5 Jul 2018, Shanghai, China.
Poster Presentation; Gordon Research Conference on Ocean Biogeochemistry, 8-13 Jul 2018, HKUST, Hong Kong.
Oral Presentation; ICAMG-9, 10-12 Oct 2018, Shanghai, China.
Award: 2018 Ministry of Education of China 1000 Exchange Program.

Jay Minuti

Oral Presentation; 4th International Symposium on the Effects of Climate Change in the World's Oceans, 4-8 Jun 2018, Washington DC, USA.
Invited Seminar; 6 Aug 2018, University of New South Wales, Australia.

Kanmani Rajan

Participants; Bioinformatics Training Workshop for Transcriptome Data Analysis at Tjärnö Marine Laboratory, 5-9 Nov 2018, Strömstad, Sweden.
Award: Universitas 21 – Graduate Collaborative Research Awards (U21-GCRA).

Max Rodriguez

Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Poster Presentation; Gordon Research Conference on Ocean Biogeochemistry, 8-13 Jul 2018, HKUST, Hong Kong.
Poster Presentation; The 9th International Conference on Asian Marine Geology, 10-12 Oct 2018, Shanghai, China.

Ronia Sham

Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China
Oral and Poster Presentation; 5th National Symposium on Ecotoxicology in China, 25-28 Apr 2018, Dalian, China.
Poster Presentation; Society of Environmental Toxicity and Chemistry Europe 2018 Conference, 13-17 May 2018, Italy.
Oral Presentation; Society of Environmental Toxicity and Chemistry Asia-Pacific 2018 Conference, 16-19 Sep 2018, Korea.

Vicki Sheng

Oral Presentation; Nanyang Technological University Winter School, 22-28 Mar 2018, Singapore.
Participant; 2018 CITES Shark Species Identification Capacity Building Workshop, 31 Oct-1 Nov 2018, Taipei, Taiwan.

Jane Wong

Oral Presentation; 4th Asia-Pacific Coral Reef Symposium, 4-8 Jun 2018, Cebu, Philippines.
Organizer; PAM Workshop (NSF funded), 8-11 Jul 2018, Mangilao, Guam.
Oral Presentation; 9th International Symbiosis Society Congress, 15-20 Jul 2018, Corvallis, U.S.A.

Oliver Xu

Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Poster Presentation; Gordon Research Conference on Ocean Biogeochemistry, 8-13 Jul 2018, HKUST, Hong Kong.
Oral Presentation; The 9th International Conference on Asian Marine Geology, 10-12 Oct 2018, Shanghai, China.
Oral Presentation; 5th Young Scientist Forum of Earth Science, 26-29 Oct 2018, Nanjing, China.

Jason Yau

Oral Presentation; The World Conference on Marine Biodiversity (WCMB), 13-16 May 2018, Montreal, Canada.
Participant; Workshop on Marine Fisheries Resources and Management in Hong Kong, 1 Nov 2018, HKU, Hong Kong.

Katie Yeung

Oral Presentation, The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China
Participant; The 2nd International Workshop on Eco-shoreline Designs for Sustainable Coastal Development, 28-31 May 2018, HKU, Hong Kong.
Poster Presentation; Society of Environmental Toxicity and Chemistry Europe 2018 Conference, 13-17 May 2018, Italy.
Oral and Poster Presentation; Society of Environmental Toxicity and Chemistry Asia-Pacific 2018 Conference, 16-19 Sep 2018, Korea.

Vriko Yu

Oral Presentation; The 10th UCAS Postgraduate Symposium, 18-23 Mar 2018, Xiamen, China.
Participant; Methods in Ecological Genomic Analysis 2018, 3-16 Jun 2018, Florida, USA.
Oral Presentation; Great Barrier Reef Restoration Symposium, 16-19 Jul 2018, Cairns, Australia.
Oral Presentation; Marine Conservation Forum 2018: Challenges and the Way Forward, 15 Sep 2018, Hong Kong.
Participant; Population Genomics Workshop (Physalia), 12-16 Nov 2018, Quebec City, Canada.

Visitors to SWIMS

As we have moved out of SWIMS, due to the expansion, no formal visitors were recorded for 2018.

Many thanks to all the following for their cheerful and excellent help: Ms. Aika Kubo, Mr. Kenya Minami, Ms. Ms. Natsumi Handa, Mr. Tomohiro Ozeki, Ms. Giulia Puntin, Mr. Jackson Lau, Mr. Alex Chan, Mr. Heysen Ho, Mr. Lai Kwun-Yin, Ms. Hung Ka-Ching, Ms. Hui Ming-Wai, Ms. Choi Ho-Hei & Ms. Charlotte Crane

Student Graduations

Ph.D

Cheung, Ching Wa (2018) - Environment-marine ecosystem association in East Asia: biogeographical and paleoecological approach using microfossils ostracodes and foraminifera.

Hui, Tin Yan (2018) - Behavioural ecology of the sand-bubbler crab *Scopimeera intermedia* Balss, 1934 in Hong Kong.

Joest, Anna Beate (2018) - Recent and quaternary deep-sea ostracoda from the Sub-polar North Atlantic: paleoecological and paleoceanographical applications.

Meng, Yuan (2018) - The integrated system of the microstructure, crystallography and mechanical performances of biomineralized oyster shell materials: ocean acidification perspectives.

Tao, Shiru (2018) - Effects of the trawling ban on demersal crustacean resources (orders: Decapoda and Stomatopoda) in the marine environment of Hong Kong.

Wong, Wai Ho (2018) - Macro- and micro- scale anthropogenic impacts on Chinese white dolphins in Hong Kong: quantifying impacts of habitat loss and coastal tourism.

M.Phil

See, Chun Lung (2018) - Clark's anemonefish, *amphiprion clarkii*, local distribution, group composition, sex change, agonistic behaviour and growth. A study of anemonefish under natural and captive environments.

Staff Training

Ms. Sylvia Yiu has attended the Oracle Financials (OF) Upgrade Project – Purchasing Module on 10 January 2018 (9:30-11:30am).

Ms. Sylvia Yiu has attended the Oracle Financials (OF) Upgrade Project – Interdeparmental Charges on 10 January 2018 (2:00-3:30pm).

Ms. Chan Kit Ping has attended the General Safety Training for Cleaners on 6 March 2018 (9:00am-12:30pm).

Mr. Cheung Ming has attended the First Aid Course and Examination 7 May 2018 & 21 May 2018.

Mr. Cheung Ming Hong has attended the First Aid Course and Examination 9 May 2018 & 23 May 2018.

Acknowledgements

The late Sir Adrian Swire, John Swire and Sons Ltd

Mr. Martin Cubbin, Mr. Pat Healy, Ms. Laura Lau and Ms. Tina Chan, The Swire Group of Companies

Mr. Davy Ho, Swire Properties

Prof. Peter Mathieson, President and Vice-Chancellor, HKU

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Mr. Donald Tong, Director, EPD

Mr. Lui and staff, PCCW Cape d'Aguilar Station

Mr. Shun Chi-Ming and staff, the Hong Kong Observatory

Ms. Suzanne Gendron and staff, Ocean Park Conservation Foundation Hong Kong

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